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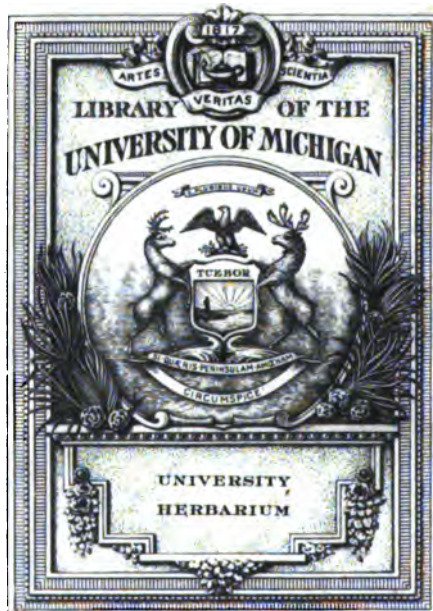
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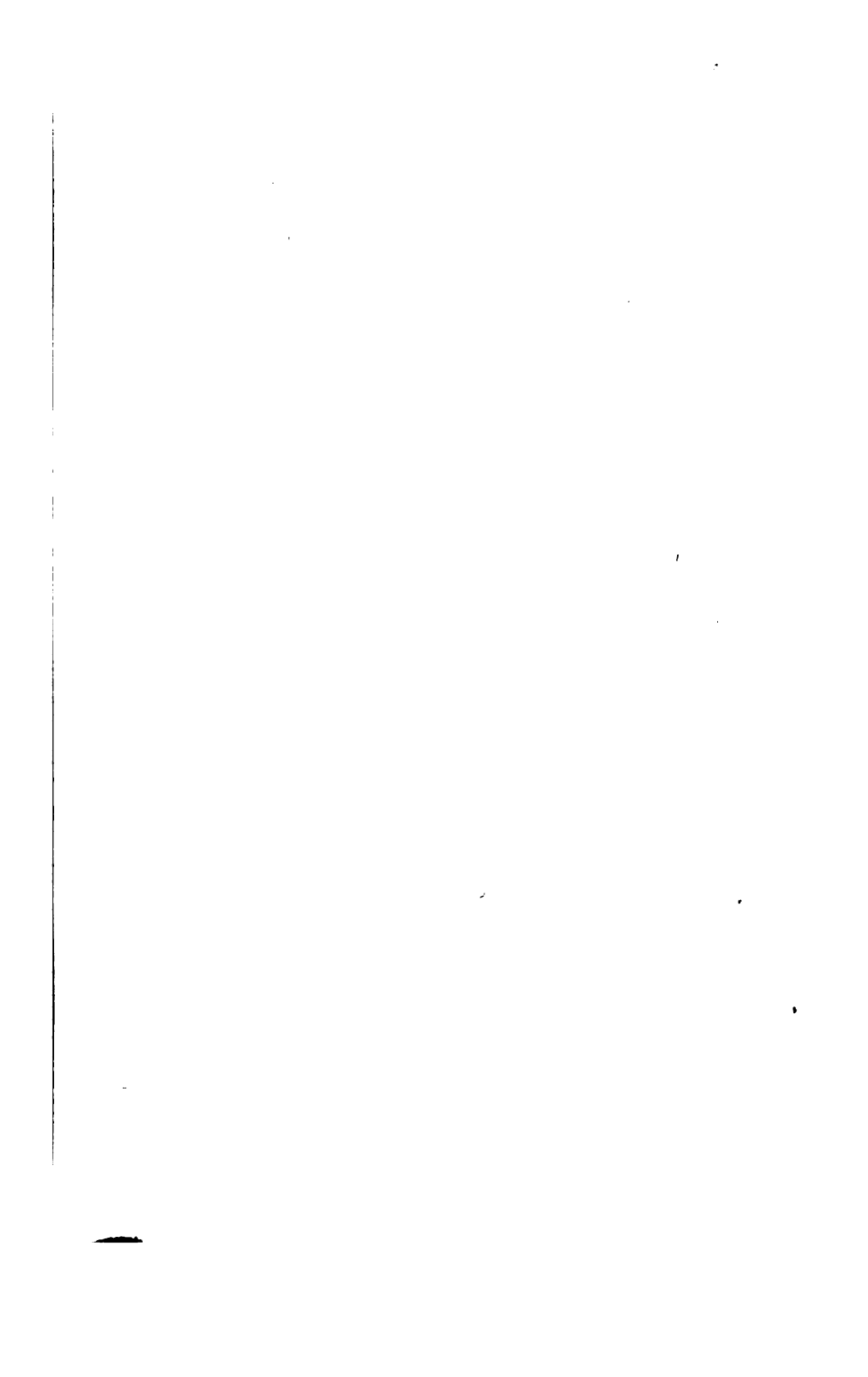
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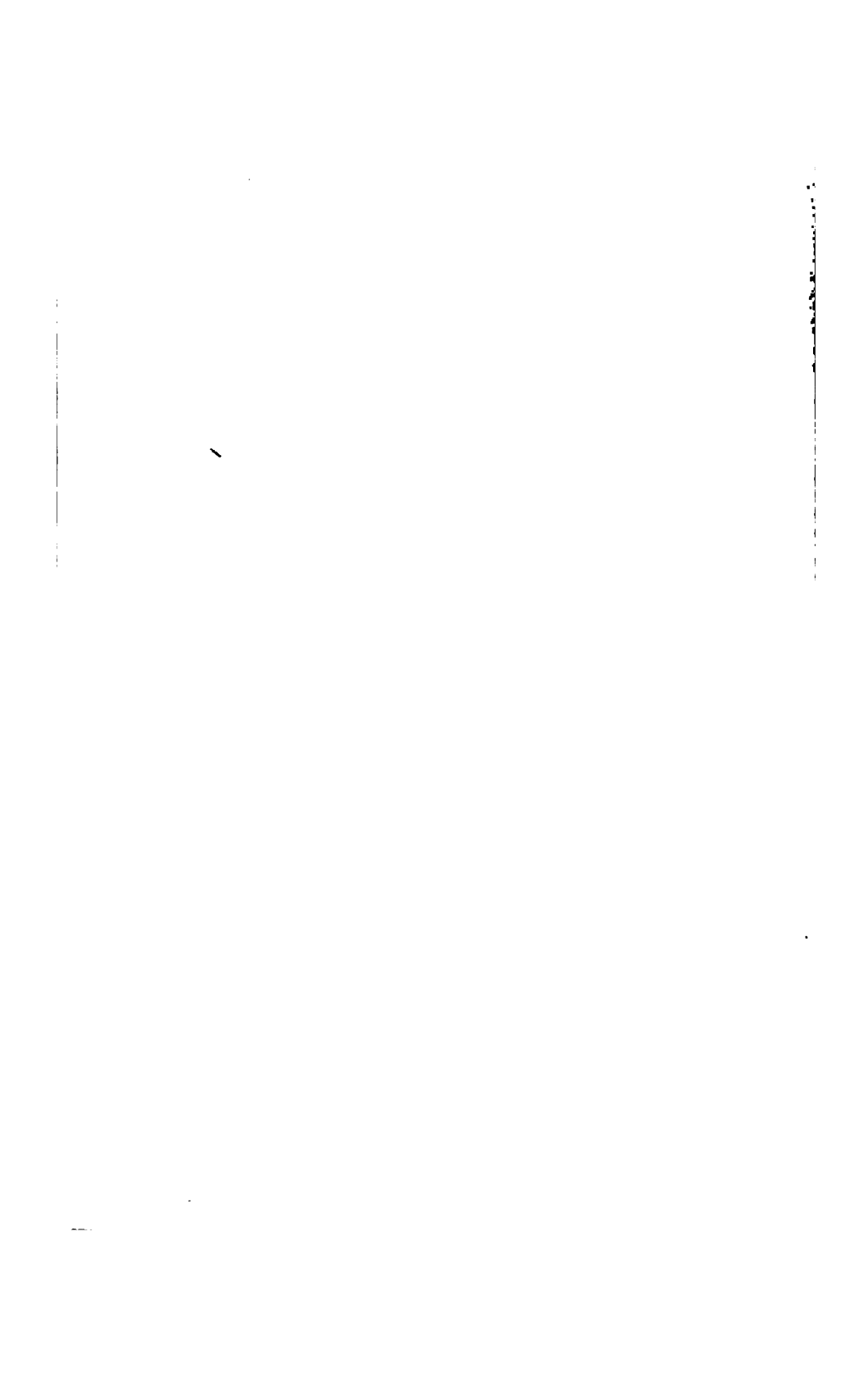
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THE GIFT OF
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AN
ENCYCLOPÆDIA
OF
GARDENING;

COMPRISING THE
THEORY AND PRACTICE
OF
HORTICULTURE, FLORICULTURE,
ARBORICULTURE,
AND
LANDSCAPE-GARDENING,
INCLUDING
All the latest Improvements ;
A GENERAL HISTORY OF GARDENING IN ALL COUNTRIES ;
AND A STATISTICAL VIEW OF ITS PRESENT STATE ;
WITH SUGGESTIONS FOR ITS FUTURE PROGRESS, IN THE
BRITISH ISLES.

By *J. C. Loudon*
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HON. MEM. OF THE HORT. SOC. OF LISLE, NEW YORK, MASSACHUSETTS, BALTIMORE,
PHILADELPHIA, PENNSYLVANIA, AND TORONTO.

ILLUSTRATED WITH
MANY HUNDRED ENGRAVINGS ON WOOD, BY BRANSTON.

A NEW EDITION,
CONSIDERABLY IMPROVED AND ENLARGED.

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P R E F A C E.

THE object of this *ENCYCLOPEDIA* is to present, in one systematic view, the History and present State of Gardening in all Countries, and its Theory and Practice in Great Britain. Under the term Gardening, we include Horticulture, or all that relates to the kitchen-garden and the orchard; Floriculture, or all that relates to the flower-garden, the botanic garden, the shrubbery, and the culture of flowers and ornamental shrubs and trees; Arboriculture, or the formation of useful and ornamental plantations, and the culture of the most valuable timber trees; and Landscape-Gardening, or the art of laying out grounds.

Encyclopædias, hitherto, have been generally arranged as Dictionaries; but we have rejected this form of arrangement, because it presents no other principle of order than that of the initial letters of the subjects; and because (as the learned author of the prospectus of the *Encyclopædia Metropolitana* has observed) it is altogether unsuitable to the present advanced state of science. Instead, therefore, of breaking up the whole accumulated mass of garden knowledge into fragments, and scattering these over a thousand pages, with no other connection than that afforded by the letters of the alphabet, we have presented it in such a manner, that every part stands in immediate connection with that which precedes and that which follows it; and, consequently, all those subjects which are most clearly allied in their natures are placed together, for connected perusal, and for illustrating each other.

A Dictionary, or alphabetical arrangement of knowledge, is generally considered the most convenient for reference; but we take it upon us utterly to deny that this is the case, in any work except a mere Lexicon. We assert, with perfect confidence, that a complete alphabetical index to a Dictionary will always afford more ready access to the subjects on which it treats, than turning over the leaves of the work. To be convinced of this, let the reader turn to any word which has one or more synonymes, in any Dictionary of Art, and afterwards, if the Dictionary has an index, let him try that. In the Dictionary when he is referred from one synonyme to another, he has probably to open several volumes, and, at all events, to turn over a great number of pages; whereas, in the index, he is either directed at once, from whatever synonyme he may look for, to the particular page where he will find the explanation; or, he has at most to turn over the few pages which the index occupies. In short, the question between finding out a subject by the alphabetical arrangement of a Dictionary, and finding it by an alphabetical index, is reduced to one between looking through a volume, or perhaps two or more volumes, and looking over a few pages. But this is the least defect of the Dictionary mode of arranging knowledge; the grand evils of Dictionaries are, the frittering down of treatises into fragments, and the placing subjects close together which are totally unconnected, while those are widely apart which ought to be together. By thus never looking at any subject but in separate parts, the mind of the reader can never fully comprehend any subject as a whole.

Having thus given our reasons for the arrangement adopted in this work, we shall next state the principles by which we have been guided in carrying that arrangement into execution. Passing over the Historical and Statistical Parts of the work, in the former of which we have chiefly related facts in Chronological Order, and in the latter in the order of affinity, we shall confine our statement to the Science and Art of Gardening and to the Practice of Gardening in Britain, as treated of in Parts II. and III. Now, in the composition of every treatise embracing a great variety of opinions and practices, there are two modes of proceeding: viz., that of generalising the opinions and practices of others, and giving the result as those of the author; and that of laying before the reader the opinions and practices of others, and leaving him either to generalise on them for himself, or to particularise them, and to adopt such of them as may

appear to him most suitable to his individual case. The latter method we have adopted, as being, in our opinion, decidedly the best. If we had preferred the former mode, our work must necessarily have exhibited only our own opinions; whereas, by adopting the latter mode, our work exhibits all the most valuable opinions and practices on every subject which it treats of, which have hitherto been published, more particularly in Britain. The young reader is thus induced to think for himself, and to refer his opinions and practices to fundamental principles; while the experienced practitioner may adopt the opinions and practices of those authors in whom he has most faith.

A little reflection will, we think, convince every unprejudiced mind, that this method of compilation is calculated to be the most useful in all general works on the practical arts; and that it is more especially so in the arts of gardening and agriculture will be at once allowed, when it is considered how much the practice of these arts must vary with variations of climate, soil, and other geographical circumstances. How, for example, on any other plan than that which we have adopted, could we have treated of the culture of every plant, so as to have rendered our Treatise alike suitable for England and Scotland: or how could we so easily have enabled the reader, who inhabits neither England nor Scotland, to deduce from the practices of those two countries a practice suitable to his own country; say, for example, North America?

Unless the distinctions between a systematic Encyclopædia and a Dictionary, and between the two modes of executing the former just described, be clearly understood, the great advantages which our Encyclopædia of Gardening possesses over all other general works on the same subject, which have preceded it, cannot be duly appreciated.

IN submitting an entirely revised edition of the *Encyclopædia of Gardening* to the public, we consider it advisable to give a short outline of the numerous important improvements which it contains.

The general arrangement remains the same; experience having confirmed the author in his opinion of the justness of the sentiments on this subject, which he prefixed to the first edition of the work. Not only is there a saving of time by referring to a general index, instead of to the body of a Dictionary of any art or science; but, in a systematic work like the present, every subject being found in its proper place and connection, one subject throws light upon another, and the work becomes a whole, which is rendered readable from beginning to end. This, to the young gardener, and to the amateur student, is an incalculable advantage.

The execution of the work has been conducted on the same principles; viz., those of inducing the young gardener to think for himself, and giving the man of experience a choice of practices. All knowledge, to be truly useful, must be gained by experience, and the next best thing to gaining this experience from personal practice, is to observe and reflect on the practices of others. Our great object, throughout the work, has been to instruct — not to lead.

PART I., containing *The History of Gardening*, is nearly all rewritten; it has been enriched with a great number of new facts, and descriptions of gardens; and with numerous engravings of ground plans, and views of garden and park scenery. In order to give a complete view of the present state of gardening throughout the world, nearly every book of travels, published since 1810, has been consulted, and the author made a tour (in 1829) for the purpose of personally examining the finest gardens in France and Germany. An universal History of Gardening throughout the world was never attempted till this Encyclopædia appeared; and the author flatters himself that, with the assistance of Mr. Forsyth, he has, in this edition, rendered it, not only a very complete, but a very entertaining and instructive, portion of the work.

IN PART II., containing *The Science of Gardening*, the first book, which treats on Botany, has been entirely recomposed, so as to embrace the most approved modern opinions on Vegetable Physiology, and in other respects to harmonise with the present

state of botanical science. All the other books have been brought into similar harmony with the present state of knowledge and practice, and more particularly Book III., on the *Mechanical Agents* employed in Gardening. In this book are described and figured all the new implements, instruments, and machines, considered valuable, and all the improvements in the construction of Hot-houses, and more especially the different modes of heating them by steam and by hot water; the latter, the greatest improvement which has been made in Gardening since this Encyclopædia originally appeared in 1822.

In Book IV., which treats of the operations of Gardening, the chapter on insects, vermin, and the enemies of gardens, has been entirely rewritten, and greatly enlarged, by that eminent naturalist, Mr. Swainson. It is illustrated by numerous new engravings, and will be found a most important addition to this department of the work.

PART III., on *Gardening as practised in Britain*, has received most invaluable additions, more particularly in the descriptive catalogues of fruits and culinary vegetables, with their synonymes. For these we are indebted to the Committee of the Horticultural Society, who kindly permitted us to consult on these subjects with their head gardener, Mr. Munro, and with the gardener of their fruit department, Mr. Thompson; and the result is, that we are enabled to present such descriptive catalogues, and such selected lists for particular situations and particular purposes, as could at no former period, and even at this time from no other source, be produced.

Under Floriculture, in most of the preceding editions, the tables of ornamental plants were comparatively meagre and imperfect; and in the first and second editions full of orthographical errors. These tables were entirely recomposed by Mr. George Don, for the edition of 1831, and then received copious additions: they have now been brought down to the present time, by Mr. Denson, and, for accuracy, we will venture to state, that, if they are equalled, they are not surpassed, in any work whatever.

Arbiculture has received those improvements in the details of transplanting, pruning, &c. which the advanced state of physiological knowledge required. Landscape-Gardening has also undergone revision.

Throughout the work, wherever the subject of insects and vermin has occurred, it has been corrected, or rewritten, by the eminent naturalist above referred to; and advantage has been taken, as far as garden insects are concerned, of the more recent discoveries communicated to our *Magazine of Natural History*, now published in monthly Numbers, price 2s. each. The botanic names have been put in harmony with the nomenclature of our *Hortus Britannicus*; preserving, however, the Linnæan or popular synonyme, where it has been considered advisable.

The present Edition has received upwards of 500 new engravings, many of which are of the full size of the page. The language throughout the work has been improved; and it is confidently hoped that no gardening book, so comprehensive, and containing such an immense mass of matter, has ever been submitted to the public more free from errors, either of the pen or of the press.

The most material additions to the present edition have been taken from the *Gardener's Magazine*, and that work (now published monthly at 1s. 6d. per No.) will continue to be, as it has hitherto been, a perpetual Supplement to this Encyclopædia, to the *Encyclopædia of Plants*, and to the *Hortus Britannicus*. The most important gardening acquisitions which we anticipate, are additions to our hardy fruits and culinary vegetables, chiefly through the exertions of the Horticultural Society of London and the Provincial Horticultural Societies; and new hardy plants, trees, and shrubs, in consequence of the general intercourse which, in this time of universal peace, exists among botanists throughout the world, and of the numerous botanical collectors who are now employed by British cultivators or amateurs, in different countries. The additions so received will henceforth be found included under four standing articles in the *Gardener's Magazine*; headed, respectively, *Floricultural and Botanical Notices*; or, notices of newly introduced flowers, shrubs, and trees; *Pomological Notices*, or notices of new fruits; *Olitorial Notices*, or notices of new culinary vegetables; and *Arbicultural Notices*, or notices of new hardy trees and shrubs.

The article entitled *Floricultural and Botanical Notices* has appeared in every No. of the *Gardener's Magazine*, since the publication of the first edition of our *Hortus Britannicus*, in May, 1830.

The article to be headed *Pomological Notices*, or notices of new fruits, will commence with the year 1835, and will appear occasionally, as may be required.

The article to be entitled *Oliviorial Notices*, or notices of new culinary vegetables, will also commence with the year 1835, and be continued occasionally, as new articles in this department are originated or introduced.

The article to be entitled *Arboricultural Notices*, or notices of new species or varieties of hardy trees and shrubs, useful or ornamental, will also commence with the year 1835, and be continued as occasion may require.

The object of having the information to be contained in these articles under distinct heads, is to enable the possessors of the *Encyclopedia of Gardening*, of the *Hortus Britannicus*, and of our *Arboretum Britannicum* (which will appear in 1835), to ascertain, through the medium of the *Gardener's Magazine*, with the least possible loss of time, and with the least trouble to themselves, all the important additions which may be made in each year to the plants already in cultivation in Britain, whether in private gardens and country seats, or in commercial nurseries.

To aid us in perfecting these Notices, the Council of the Horticultural Society of London have kindly granted us permission to apply, from time to time, for information to their head gardener, Mr. Munro, and to their fruit gardener, Mr. Thompson; and we have received the same indulgence from the Council of the Caledonian Horticultural Society, with reference to their head gardener, Mr. Barnet. We have directed the attention of all our foreign correspondents to these standing articles; and we earnestly request the assistance of the secretaries of all horticultural societies, of the curators of all botanic gardens, of all nurserymen, domestic and foreign, and, in short, of every gardener and amateur of gardening, in order that we may render them as complete as possible.

Baywater, Oct. 28. 1834.

J. C. L.

NOTICE RESPECTING CONTRIBUTORS.

IN consequence of the notices which we have given from time to time for the last five or six years in the *Gardener's Magazine*, we have received corrections, additions, and suggestions for this new edition of the *Encyclopedia of Gardening* from upwards of fifty persons. Nine tenths of these corrections and additions were for that part of the statistical division of the work, which enumerated and slightly described the principal country-seats of Great Britain and Ireland, under the heads of the respective countries in which they were situated. Descriptions of many new places have been sent to us; with corrections of the names of the owners of places formerly described, and of the rank of the residence; that is, stating whether it belonged to the class of first-rate residences, or those of mansions, or villas. From these descriptions and corrections we found, first, that, if we introduced the whole or the greater part of them, the bulk of that part of our work would be disproportionately increased; secondly, that it would be extremely difficult to give satisfaction in the classification of residences; and, thirdly, that it would be next to impossible to attain correctness as to the names of the proprietors. Under these circumstances, we resolved to omit this part of the work altogether in the present edition; and we can only, therefore, return our most sincere thanks to those individuals who took so much trouble on our behalf. These contributions will not be lost; for, as far as they are of general interest, they have been, or will be, given in the *Gardener's Magazine*.

The few suggestions which we received were chiefly recommending coloured plates of plants, folding plates of plans for laying out grounds, &c.; and, though we entirely disapprove of both in such a work as this *Encyclopedia*, we are not the less obliged to those who gave us the best advice in their power.

The principal aid which we have made use of in this edition has been received from Mr. Munro, Mr. Thompson, and Mr. Gordon, of the Horticultural Society's Garden, by permission of the Council of the Horticultural Society, from Mr. Forsyth, and from Mr. Swainson, as acknowledged in the Preface. From Mr. Fradgley, resident architect to the Earl of Shrewsbury, at Alton Towers, we received, by permission of the earl, a plan and several views of that magnificent place, and its different ornamental buildings; from Mr. Abraham, the loan of the drawing from which the view of the enchanted valley, p. 329, was engraved; from Sir G. T. Staunton, the drawing from which the view of Conesbury's house and garden, p. 1201, was taken; from Mr. Smith of Hopetoun House, the map, view, and description of that residence; and from Mr. McNab, the plan and description of the New Edinburgh Botanic Garden.

An eminent chemist and mineralogist looked over that part of the work which treats of soils and manures; Mr. Denon revised the whole of the names of plants; Mr. Scott supplied us with a list of stove Orchideæ, with a copious account of their culture; Mr. Dennis, with a select list of pelargoniums, and remarks; Mr. Malcolm, Mr. Ronalds, and Mr. Charlwood, with lists of culinary vegetables and seeds; Mr. Gorrie supplied some facts and some derivations of names; Mr. Main and M. Vilmorin supplied some arboricultural notices; and M. Rauch of Vienna, M. Otto of Berlin, M. Bosch, M. Hertz, and M. Salucci, of Stuttgart, M. Hartweg of Carlsruhe, M. Petersen of Copenhagen, and Professor Agardh of Lund, some plans, views, and historical facts or corrections. The most valuable additions to the work are, the lists of fruit received from Mr. Thompson, and of culinary vegetables from Mr. Munro; and the next valuable, the article on insects, by Mr. Swainson, from p. 684 to p. 700.

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PART I.

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INDICATION OF SYSTEMATIC NAMES.

With a view to assist in impressing the names of plants on the memory, we have adopted a plan which we think calculated to excite attention to each name as it passes before the reader. This plan is as follows:—The systematic names of animals, plants, and minerals which are commemorative, as Cuvier in *Insectarium Cuvieri*, are distinguished by having the subjoined letters in Italic where the rest of the word is in Roman, and in Roman where the rest of the word is in Italic, as Cuvieri, Cuvieri; those which have been applied by the classic writers of antiquity to animals, plants, or minerals, have, in like manner, the initial letter in Italic or Roman, as *Ætina* and *Sémia*; and those which are of unknown derivation are wholly in Italic or wholly in Roman, according to the type in which the words preceding and following are printed, as the *Bontiga* major of Norway, and the *Bontiga* major of Norway. All the other names are formed, in almost every case, from the Greek, but sometimes from the Greek and Latin.

ACCENTUATION OF SYSTEMATIC NAMES.

All the systematic names which occur in this work are accentuated on the simple principle explained in the following

RULES FOR PRONOUNCING SYSTEMATIC NAMES.

SYLLABLES.

In classical words there are as many syllables as there are vowels; except when *a* with any other vowel follows *g*, *q*, or *s*, and when two vowels unite to form a diphthong. The diphthongs are *æ*, *ai*, *ei*, *oi*, *au*, *eu*, and *ou*. These seldom coalesce in final syllables. *oo*, *ee*, *ea*, and other combinations which never occur as diphthongs, in classical words, follow, in commemorative names, the pronunciation of their primitives, as *Tædici*, *Wæddia*.

VOWELS.

In this work, the sounds of the accented vowels are indicated by the mark placed over each, the long sound by a grave accent (˘), the short by an acute (˙); but the following observations will be found useful in showing when the vowel is to be sounded long, and when short:—

Every accented penultimate vowel is pronounced long, when followed by a vowel or a single consonant, as *Achilles totentibus*; but it is shortened when followed by two consonants or a double one, as *Sórtus*, *Téxus*, except when the first consonant is a mute and the second a liquid, as *A'trus*.

Every accented antepenultimate vowel, except *a*, is pronounced short, as *Hélléborus*, *Fámulus*; but when succeeded by a single consonant, followed by *e* or *i* and another vowel, it is lengthened, as *Stellária*; except *i*, which is short, as *Tília*.

A unaccented, ending *a*, as *Tília*, is pronounced like the interjection *ah*, as *Sticta (ah)*.

E final, with or without a consonant preceding, always forms a distinct syllable, as *Silénē*, *A'lot*; also when the vowel is followed by a final consonant, as *Trichéma-nē*, not *Trichéma-nēs*.

I unaccented, if final, sounds as if written *eye*, as *Spica vinti (eye)*; but, when it ends a syllable not final, it has the sound of *e*, as *Métopus (Mecpētus)*, *Santhii (Smith's-eye)*.

Y is subject to the same rules as *i*.

The diphthongs *æ* and *œ* conform to the rules for *e*; *ei* is generally pronounced like *eye*; the other diphthongs have the common English sounds.

In addition to the primary accent, every word of more than three syllables contains a secondary accent, which is regulated by the same rules. The secondary accent must always be at least two syllables before the primary accent, as in *Chéllidonium*; for its place the ear is a sufficient guide, and even were it entirely omitted, still, however inharmonious, the pronunciation would not be incorrect.

CONSONANTS.

C and *g* are hard before *a*, *o*, and *u*, as *Córnus*, *Gálinus*; soft before *e*, *i*, and *y*, as *Cetrària*, *Citrus*.

T, *s*, and *c*, before *æ*, *ie*, *il*, *io*, *ia*, and *œ*, when preceded by the accent, change their sounds, *t* and *c* into *th*, as *Blietia*, *Ficia*; and *s* into *z*, as *Blietia*; but, when the accent is on the first diphthongal vowel, the preceding consonant preserves its sound, as *asarachæum* (*asf*), *Cólichicum* (*colichicum*); but in commoner names it follows their primitives, as *Richardsonia*, in which the *ch* is soft.

Cm, *cn*, *ct*, *gm*, *gn*, *ma*, *mn*, *pt*, and other uncombinable consonants, when they begin a word, are pronounced with the first letter mute, as *Pteris* (*teris*), *Culex* (*ulix*), *Gmelina* (*metina*), *Gnidia* (*midia*); in the middle of a word they separate as in English, as *Lap-æna*, *Lém-na*.

Ph, followed by a mute, is not sounded; but, followed by a vowel or a liquid, sounds like *f*, as *Phileum* (*feum*).

Sch sounds like *sk*, as *Schénus* (*skenus*); in *tl* and *zm* both letters are heard.

S, at the end of a word, has its pure hissing sound, as *Dactylis*; except when preceded by *e*, *r*, or *n*, when it sounds like *s*, as *Ribes* (*cs*).

X, at the beginning of a word, sounds like *z*, as *Xánthium*; in any other situation it retains its own sound, as *Thxus*, *Tamarix*. (*Gardener's Magazine*, vol. v. p. 232.)

ABBREVIATIONS.

sh. me.	above medium.	stly ov.	Flatly ovate.	Pearm. sh.	Pearmain-shaped.
be. me.	} below medium.	med.	Medium.	Rh. ov.	Roundish ovate.
bel. me.		ov. ob.	ovate oblong.		

AUTHORITIES.

<i>Ag.</i>	<i>Agardh</i> . Professor of botany in the university of Lund.	<i>Knor. Thes.</i>	<i>Knorr's Thesaurus, &c.</i>
<i>B. P.</i>	<i>Brown's Prodromus</i> .	<i>L. & Sm.</i>	<i>Linnaeus and Smith.</i>
<i>Black.</i>	<i>Mrs. Elizabeth Blackwall</i> , widow of Dr. Blackwall. Author of a herbal.	<i>L. & Sow.</i>	<i>Linnaeus and Sowerby.</i>
<i>Bot. Mag.</i>	<i>Botanical Magazine</i> .	<i>Lamarck.</i>	A French naturalist.
<i>Bot. Reg.</i>	<i>Botanical Register</i> .	<i>Lam. Ill.</i>	<i>Lamarck's Illustrations.</i>
<i>Brook. Pom.</i>	<i>Brookshaw's Pomona</i> .	<i>Lang. Pom.</i>	<i>Langley's Pomona.</i>
<i>Brown's Jasn.</i>	Dr. P. Brown's History of Jamaica.	<i>Lat.</i>	<i>Latreille</i> . A French naturalist.
<i>Cav. Ic.</i>	<i>Cavanilles's Icones</i> .	<i>Lea.</i>	Dr. Leach. Editor of the Zoological Miscellany.
<i>D. C.</i>	} <i>Decandolle</i> . Professor of botany at Geneva, and author of numerous botanical works.	<i>L.</i>	} <i>Linnaeus</i> . The celebrated Swedish reformer of natural history.
<i>Dec.</i>		<i>Lia.</i>	
<i>Desf.</i>	<i>Desfontaines</i> . A French botanist, and traveller in Barbary.	<i>Lindl.</i>	Dr. John Lindley. Professor of botany in the London University.
<i>Dub.</i>	<i>Dubamel</i> . A French physiological botanist.	<i>L. S.</i>	<i>Lodiger's Supplement.</i>
<i>Dub. ed. nov.</i>	New edition of Dubamel's works.	<i>M.</i>	} <i>Marsham</i> . An English entomologist.
<i>Dum.</i>	<i>Dunal</i> . A French botanist.	<i>Marsh.</i>	
<i>Eng. Bot.</i>	<i>English Botany</i> .	<i>Mill. Ic.</i>	<i>Miller's Figures of Plants.</i>
<i>F.</i>	} <i>Fabricius</i> . A German entomologist.	<i>Moriz.</i>	<i>Morison</i> . An old writer on plants.
<i>Fab.</i>		<i>Perk. Parad.</i>	<i>Parkinson's Paradisus.</i>
<i>Fér.</i>	<i>Férussac</i> . A French naturalist, the proprietor and director of the Bulletin des Sciences Universelles.	<i>P.</i>	} <i>Persoon</i> . A Prussian botanist, now residing in France.
<i>Ger. Fru.</i>	<i>Gertner's De Fructibus, &c.</i>	<i>P. S.</i>	
<i>G.</i>	} <i>Gmelin</i> . The editor of an enlarged edition of Linnaeus's <i>Systema Naturæ</i> .	<i>Pom. Franc.</i>	<i>Pomona Franconia.</i>
<i>Gm.</i>		<i>Pom. Mag.</i>	<i>Pomological Magazine.</i>
<i>Hav.</i>	<i>Hasortii</i> . An English naturalist.	<i>R.</i>	} <i>De Reaumur</i> . A French entomologist.
<i>H. K.</i>	<i>Hortus Kewensis</i> . A catalogue of the plants cultivated in the botanic garden at Kew.	<i>Reich.</i>	
<i>Hook.</i>	Dr. W. J. Hooker. Professor of botany at Glasgow.	<i>Riv.</i>	<i>Rivinus</i> . A German botanist.
<i>Humb.</i>	<i>Baron Humboldt</i> . A celebrated Prussian botanist and traveller.	<i>Ronalds</i>	<i>Pyrus Malus Brynfordicus, &c.</i>
<i>I.</i>	} <i>Illiger</i> . A German naturalist.	<i>Roz.</i>	<i>Rozburgh</i> . An Indian botanist.
<i>Ill.</i>		<i>Sab.</i>	<i>Sabine</i> . An English amateur of botany.
<i>Jac. Aus.</i>	<i>Jacquin's Flores Austriacæ Icones.</i>	<i>Sm.</i>	<i>Sir James Edward Smith</i> . An English botanist, and purchaser of the Linnaean collection.
<i>J.</i>	} <i>Jussieu</i> . The celebrated French botanist, who introduced the Natural System.	<i>Su.</i>	<i>Suëret</i> . An English botanical author.
<i>Juss.</i>		<i>T.</i>	<i>Tramwink</i> . A French naturalist.
		<i>Trev. chert.</i>	<i>Trevin's Plante Selectæ, &c.</i>
		<i>Wds.</i>	<i>Woods</i> . An English writer on Roses.
		<i>W.</i>	} <i>Willdenow</i> . A German botanist.
		<i>Willde</i>	

ENCYCLOPÆDIA

OF

GARDENING.

THE chief business of private life in the country, consists in the occupations of housewifery or domestic economy, agriculture, and gardening.

Gardening, the branch to which we here confine ourselves, as compared with agriculture, is the cultivation of a limited spot, by manual labour, for culinary and ornamental products; but, relative to the present improved state of the art, it may be defined the formation and culture, by manual labour, of a scene more or less extended, for various purposes of utility, ornament, and recreation.

Thus gardening, like most other arts, had its origin in the supply of a primitive want; and, as wants grew into desires, and desires increased, and became more luxurious and refined, its objects and its province extended; till from an enclosure of a few square yards, containing, as Lord Walpole has said, "a gooseberry-bush and a cabbage," such as may be seen before the door of a hut on the borders of a common, it has expanded to a park of several miles in circuit, its boundaries lost in forest scenery, — a palace bosomed in wood near its centre; — the intermediate space varied by artificial lakes or rivers, plantations, pleasure-grounds, lawns, flower-gardens, hot-houses, orchards, and kitchen-gardens: — producing for the table of the owner and his guests, the fruits, flowers, and culinary vegetables of every climate of the world! — displaying the finest verdant landscapes to invite him to exercise and recreation, by walking over velvet turf, or along smooth and firm gravel walks, sheltered, shady, or open, in near scenes; or gliding with horses and chariots through "rides" and "drives" "of various view" in distant ones.

From such a variety of products and objects, and so extended a scene of operations, have arisen the different branches of gardening as an art; and from the general use of gardens, and of their products by all ranks, have originated their various kinds, and the different forms which this art has assumed as a trade or business of life. Gardening is practised for private use and enjoyment, in town, suburban, cottage, villa, and mansion gardens; — for public recreation, in umbrageous and verdant promenades, parks, and other places, in and near to large towns; — for public instruction, in botanic and experimental gardens; — for public example, in national or royal gardens; — for the purpose of commerce, in market, orchard, seed, physic, florists', and nursery gardens; — and for the purpose of ornamenting places of burial, in planted cemeteries.

To aid in what relates to designing and laying out gardens, artists or professors have arisen; and the performance of the operative part is the only source of living of a numerous class of serving gardeners, who acquire their art by the regular routine of apprenticeship; by the study of botany; by the perusal of various works connected with the science of gardening, as well as works on the practice of the art; and by labouring in gardens for some years as journeymen.

The products of the kitchen-garden form important articles of human food for all ranks of society; and furnish the chief luxuries of the table for the rich, and a main support for the families of the poor. A garden, to a workman residing in the country, forms a deposit for his spare labour and that of his family, and is therefore a certain source of profit, as well as of pleasurable recreation. One of the first objects of a colonist, on arriving at a new settlement, is to plant a garden, as at once a proof of possession and a pledge of immediate enjoyment; and, indeed, the history of the civilisation of mankind bears evidence that there are few benefits which a cultivated people can bestow on savage

tribes, greater than that of distributing among them the seeds of good fruits and culinary vegetables, and teaching them their culture.

The pleasure attending the pursuit of gardening is conducive to the health both of the body and of the mind ; and a taste for the enjoyment of gardens is so natural to man, as to be almost universal. Our first most endearing and most sacred associations, Mrs. Hofland observes, are connected with gardens ; our most simple and most refined perceptions of beauty are combined with them ; and the very condition of our being compels us to the cares, and rewards us with the pleasures attached to them. Gardening has been the inclination of kings, and the choice of philosophers, Sir William Temple has observed ; and the Prince de Ligne, after sixty years' experience, affirms, that the love of gardens is the only passion which augments with age : — " Je voudrois," he says, échauffer tout l'univers de mon goût pour les jardins. Il me semble qu'il est impossible qu'un méchant puisse l'avoir. Il n'est point de vertu que je ne suppose à celui qui aime à parler et à faire des jardins. Pères de famille, inspirez la jardinomanie à vos enfans." (*Mémoires et Lettres*, tom. i.)

That which makes the cares of gardening more necessary, or at least more excusable, Sir William Temple adds, is, that all men eat fruit that can get it : so that the choice is only, whether one will eat good or bad ; and all things produced in a garden, whether of salads or fruits, a poor man will eat better who has one of his own, than a rich man who has none.

To add to the value and extend the variety of garden productions, new plants have been introduced from every quarter of the globe ; and the indigenous fruits and culinary vegetables have been improved by selection, and by various processes of culture. To diffuse instruction on the subjects of botany and gardening, numerous books have been written, societies have been established, and premiums held out for rewarding individual merit ; and, where professorships of rural economy exist, gardening may be said to form a part of public instruction.

A varied and voluminous mass of knowledge has thus accumulated on the subject of gardening, which must be more or less necessary for every one to be acquainted with who would practise the art with success, or understand when it is well practised for him by others. To combine as far as practicable the whole of this knowledge, and to arrange it in a systematic form, adapted both for study and reference, is the object of the present work. The sources from which we have selected it, are the modern British authors of decided reputation and merit ; sometimes recurring to ancient or continental authors, and occasionally, though rarely, to our own observation and experience ; — observation in all the departments of gardening, chiefly in Britain, but partly also on the Continent ; and experience during nearly thirty years' practice as a landscape gardener and garden architect.

With this purpose in view, Gardening is here considered, in

PART	BOOK
I. As to its origin, progress, and present state,	{ 1. Among the different nations of the world. 2. Under different political and geographical circumstances.
II. As a science and an art founded on	{ 1. The study of the vegetable kingdom. 2. The study of the natural agents of vegetable growth and culture. 3. The study of the mechanical agents employed in gardening. 4. The study of the operations of gardening.
III. As an art adapted to the climate of Britain, comprehending	{ 1. The practice of horticulture. 2. The practice of floriculture. 3. The practice of arboriculture. 4. The practice of landscape-gardening.
IV. Statistically in Britain	{ 1. As to its present state. 2. As to its future progress.

A Kalendarial Index to those parts of the work which treat of culture and management, points out the operations as they are to be performed in the order of time and of the seasons ; and a General Index affords references to every part of the work in alphabetical order, and is, in short, a comprehensive Dictionary of Gardening. As the gardening and the agriculture of every country depend essentially on the climate and the natural history of that country, we have inserted frequent references to those paragraphs, in the *Encyclopædia of Geography*, which give descriptions of the physical geography and of the natural productions of different countries to which it would be useful for the readers of the *Encyclopædia of Gardening* to refer : and as gardening and agriculture are intimately connected ; and plants, which in some countries are cultivated in gardens, are, in others, grown in the fields ; we have, when treating of countries or plants where this is the case, referred to those paragraphs in the *Encyclopædia of Agriculture* which supply what is wanting in the *Encyclopædia of Gardening*.

PART I.

GARDENING CONSIDERED IN RESPECT TO ITS ORIGIN, PROGRESS, AND PRESENT STATE AMONG DIFFERENT NATIONS, GOVERNMENTS, AND CLIMATES.

1. *The history of gardening may be considered chronologically, or in connection with that of the different nations who have successively flourished in different parts of the world; politically, as influenced by the different forms of government which have prevailed; and geographically, as affected by the different climates and natural situations of the globe. The chronological history is useful as showing what has been done, and what is the relative situation of different countries as to gardens and gardening; and the political and geographical history affords interesting matter of instruction as to the past and future progress of the art.*

BOOK I.

HISTORY OF GARDENING AMONG ANCIENT AND MODERN NATIONS.

2. *The chronological history of gardening may be divided into three periods: the ages of antiquity, commencing with the earliest accounts, and terminating with the foundation of the Roman empire; the middle ages, including the rise and fall of the Roman empire; and the modern times, continued from that epoch to the present day.*

CHAP. I.

Of the Origin and Progress of Gardening in the earliest Ages of Antiquity, or from the remotest Traditions, to the Foundation of the Roman Empire.

3. *All ancient history begins with fable and tradition; no authentic relation can reach farther back than the organisation of the people who followed the last grand revolution sustained by our globe. Every thing which pretends to go farther must be fabulous, and it is only the primeval arts of war and husbandry which can by any means go so far. The traditions collected by Herodotus, Diodorus, Hesiod, and some other authors, when freed from the mythological and mysterious terms in which they are enveloped, seem to carry us back to that general deluge, or derangement of the surface strata of our globe, of which all countries, as well as most traditions, bear evidence. As to gardening, these traditions, like all rude histories, touch chiefly on particulars calculated to excite wonder or surprise in ignorant or rude minds; and accordingly the earliest notices of gardens are confined to fabulous creations of fancy, or the alleged productions of princes and warriors. To the first may be referred the gardens of Paradise, of the Hesperides, and of Phœacia; and to the others the gardens of the Egyptians, Babylonians, Jews, Persians, and Greeks.*

SECT. I. *Of the fabulous Gardens of Antiquity.*

4. *The fabulous gardens of antiquity are connected with the religions of those times. These religions have been arranged by philosophers (De Pown's Dissert.) in three divisions; Barbarism, Scythism, and Hellenism. To the latter belong the Hebrew, Greek, and Mohammedan species. Each of these has its system of creation, its heaven and its hell, and, what chiefly concerns us, each system has its garden. The garden of the Jewish mythology is for the use of man; that of the Grecian polytheism is appropriated to the gods; and the Mohammedan paradise is the reward held out to the good in a future state.*

5. *Gan-eden, an enclosed garden, (from גן gan, to protect or defend, and עֵדֶן eden or eden, pleasure or delight,) or the Jewish paradise, is supposed by some to have been situated in Persia, by others in Armenia; and by others in Chaldea, on the north of the Persian Gulf, near the present Bassora, the river Euphrates dividing there into four streams, in the manner mentioned in holy writ. (Conver. on Chron. and Gen. Hist., p. 13.) Buckingham tells us that the people of Damascus believe implicitly that the site of Paradise was at El Mezey, near that city; now a favourite place of recreation for the Turks. The waters of the Tege and Barrady, which supply the numerous fountains of Damascus, divide there into four streams, and these they suppose to be the four rivers of Moses. (Buck., Trav. Arab Tribes.) The inhabitants of Ceylon say that Paradise was*

placed in their country, and, according to the Rev. Dr. Buchanan (*Researches in India*), they still point out Adam's bridge and Abel's tomb. Sir Alexander Johnston informs us (*Trans. of Royal Asiatic Soc.*) that they also point out as the tree which bore the forbidden fruit, the *Divi Ladner*, or *Tabernæmontana alternifolia* of botanists (*fig. 1.*). In con-



firmation of this tradition, they refer to the beauty of the fruit, and the fine scent of the flowers, both of which are most tempting. The shape of the fruit gives the idea of a piece having been bitten off; and the inhabitants say that it was excellent before Eve ate of it. Its effects are, however, poisonous at present; and shortly after the taking of Columbo, in 1795, two English soldiers, who were tempted by its appearance to taste it, soon after sickened and died. (*Mag. Nat. Hist.*, vol. v.) Sweden was among the numerous sites given to Paradise; and Olaus Rudbeck, professor of anatomy and botany at Upsal, wrote a book on the subject, entitled *Atlantica, sive Manheim vera Japheti posteram Sedes ac Patria*, &c., 4th ed. fol. 1698—1702. The description of Eden given by Moses may be considered as exhibiting the ideas of a poet, whose object was to bring together every sort of excellence of which he deemed a garden susceptible; and it is remarkable that, in so remote an age as that in which he lived, his picture should display so much of general nature. Of great extent, watered by a river, and abounding in timber and woodiness, paradise seems to have borne some resemblance to a park and pleasure-grounds in the modern taste; to which, indeed, its amplified picture by Milton has been thought by Walpole and others to have given rise. Milton's idea has been beautifully embodied by that sublime artist, Martin, in his justly celebrated *Illustrations of the Bible* (*fig. 2.*). It is curious to contrast with Martin's picture, the ideas entertained of Paradise by the Italian artist who illustrated *Andreini's* poem *L'Adamo*, in the 17th century (*fig. 3.*). When Adam began to transgress in the garden, he was

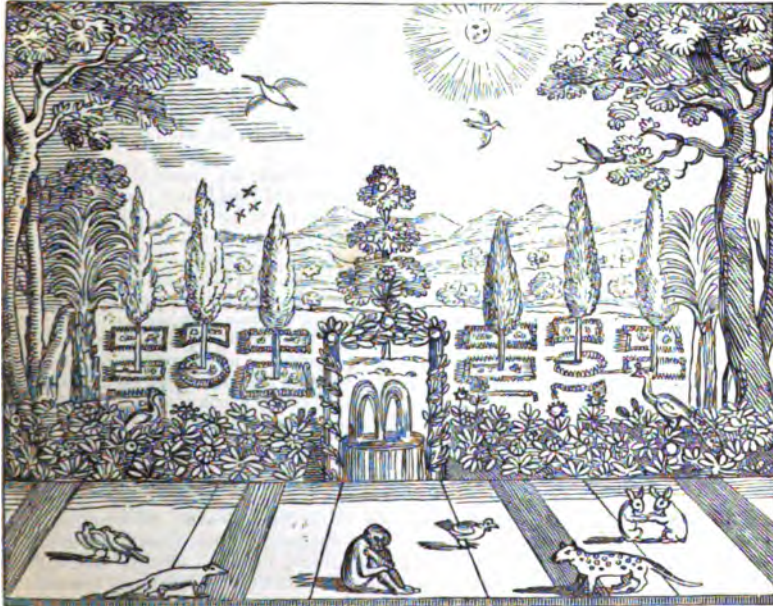
turned out to till the ground; and paradise was afterwards guarded by a mira-

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culous sword, which turned every way to meet trespassers. (See *Genesis*, ii. 3.; *Bishop Huet on the Situation of Paradise*, 1691, 12mo; *Burnet's Theory of the Earth*, book ii. chap. 2.; *Sickler's Geschichte der Obst Cultur*, 1801, 1ster band.)

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6. The gardens of *Hesperides* (ἡδὺ γῆ, or *peru*, a tree of fruit, fruit gardens) were situated in Africa, near Mount Atlas; or, according to some, near Cyrenaica. They are described by Scylax, a geographer of the sixth century B. C., as lying in a place eighteen fathoms deep, steep on all sides, and two stadia in diameter, covered with trees of various kinds, planted very close together, and interwoven with one another. Among the fruit trees were golden apples (supposed to be oranges), pomegranates, mulberries, vines, olives, almonds, and walnuts; and the ornamental trees included the *Arbutus*, myrtle, bay, ivy, and wild olive. This garden contained the golden apples

which Juno gave to Jupiter on the day of their nuptials. They were inhabited by three celebrated nymphs, daughters of Hesperus, and guarded by a dreadful dragon which never slept. Hercules carried off the apples by stratagem, but they were afterwards returned by Minerva. (See *Lucretius*, lib. v. c. 93., and *Parkhurst's Heb. Lex. in loco.*) Many writers have imagined these gardens to have been the oases of the desert, and various other hypotheses have been offered respecting them; but Lieutenant Beechey (*Travels in Cyrene*, 8vo, 1828) has shown that, like many other wonders ancient and modern, when reduced to simple truth, they afford very little that is uncommon. They are, in short, nothing more than old stone quarries, which had been excavated to build the town of Berenice, now Bengazi, and which still remain, their bottoms covered with excellent soil, in which is planted various shrubs and luxuriant fruit trees. (*Gard. Mag.*, vol. iv. p. 398.)

7. *The promised garden of Mahomet*, or the heaven of his religion, is said to abound in umbrageous groves, fountains, and Houris, or black-eyed girls: and the enjoyments, which in such scenes on earth last but for a moment, are to be there prolonged for a thousand years. "Whosoever doeth good works," it is said in the Koran, "either man or woman, and believeth, shall enter into Paradise. They shall enter gardens of pleasure, together with those of their fathers or wives that have done good." (See *Surat*, xl. 43.; xvi. 95, &c.)

8. *Dr. Sickler's opinion of these gardens* is, that Eden and Hesperides allude to, or are derived from, one original tradition. Paradise he considers as a sort of figurative description of the finest district of Persia; and he traces various resemblances between the apples of Eve and of Juno; the dragon which never slept, and the flaming sword which turned every way. Some very learned and curious speculations on this subject are to be found in the introduction to his *Geschichte der Obst Cultur*. With respect to the paradise of Mahomet, it is but of modern date, and may probably have been suggested by the gardens described in "Solomon's Song," and other poems; though some allege that the rural coffee-houses which abound in the suburbs of Constantinople gave the first idea to the prophet.

9. *The garden of Alcinoüs*, the Phæacian king, was said to be situated in an island of that name, by some considered Corfu, in the Ionian sea, and by others an Asiatic island. It is minutely described by Homer in the *Odyssey*, and may be compared to the garden of an ordinary farm-house in point of extent and form; though in respect to the variety of fruits, vegetables, and flowers cultivated, it was far inferior. It is said to have embraced the front of the palace; to have contained something less than four acres, surrounded by a hedge, (the first, as Harte remarks, which we read of in history,) and to have been interspersed with three or four sorts of fruit trees, some beds of culinary vegetables, and some borders of flowers; it contained two fountains or wells, the one for the use of the garden, and the other for the palace.

10. *The gardens of Laërtes*, mentioned in the same work, are described as similar to the above in character and extent, use being more studied than beauty; and vicinity to the house or palace, for the immediate access of the queen or housewife, being a greater desideratum than extent, variety of products, or prolonged recreation.

11. *The reality of the last two gardens* is very doubtful. They are by many ranked with those of Adonis (*Virg. Georg.*, ii. 87.), Paradise, Hesperides (*Virg. Æn.*, iv. 484.), and Venus (*Ali Bey's Travels*, vol. i.); and considered with them as mere creations of the fancy. Sir W. Temple is of opinion that the principal gardens of Ionia may have had some resemblance to those described by Homer, as lying in the barren island of Phæacia; but that the particular garden stated as belonging to Alcinoüs is wholly poetical. (*Temple's Works: Essay on Gardens.*) Goguet rejects altogether the idea of Phæacia being an European isle, and considers the Phæacians as a Greek colony in one of the islands of Asia. (*Origine de Loix*, tom. iii. p. 174.) The ancients associated many other fables with rural objects; such as the fountain and grove of Egeria, &c.

SECT. II. Gardening among the Egyptians. B. C. 2000.

12. *The art of cultivating the soil*, according to Sir Isaac Newton, Stillingfleet, and others, was invented in Egypt; but though some fragments remain, from which may be derived some slight knowledge of Egyptian agriculture, there are very few data extant to enable us to form any idea of their gardening. According to Herodotus, the sacred groves or gardens were often of extraordinary beauty, thus designedly corresponding with that primeval garden which they all equally represented. Such was the grove of Ammon, or Osiris, in one of the oases of Africa (*El Kargeh*). These groves were watered by meandering streams, which flowed from numerous fountains, and produced a wonderful temperature of climate, resembling most of all the delightful season of spring, which prevailed through the whole year with an equal degree of salubrity. Every sacred grove was a copy of Elysium, and the prototype of Elysium itself was the paradise

of Mount Ararat. The sycamore was planted in avenues, and the date palm was indigenous every where.

13. *The accounts handed down to us of the splendour of Memphis in the time of the Pharaohs, of its magnificent temples, its colossal statues, and its extensive palaces, say nothing of its gardens.* It is probable, however, that, as the palm was, and still is, the prevailing tree in Egypt, the general appearance of the vegetation around this city would not be materially different from what it is at the present day. Palms and pyramids must have been the most prominent features of the scenery round the ancient city of Memphis, as they are now of that surrounding the village of Mit-Rahyneh (fig. 4.), built upon its site.



14. *Egypt seems to have abounded in fruits.* Strabo represents the country, in his time, as a delicious garden, through which a traveller might proceed from one end to the other, under the shade of all kinds of fruit trees. The peach tree was sacred to Harpocrates, the god of silence; and the reason given is, the resemblance between its fruit and the heart, and its leaves and the human tongue. Egypt possessed vines: in speaking of the festival at Bubastis, Herodotus remarks, that more wine was consumed at it than in the whole year besides. The word used expresses "of the vine," as if decisively to mark its not being the sea, or extract from grain. In the book of Numbers, the Israelites murmur that the place they are brought to has not the advantages of nature they left behind them in Egypt; among which figs, vines, and pomegranates are expressly enumerated. In the Psalms, we read, that God "destroyed their vines with hailstones;" and another incontrovertible testimony of the culture of the vine in Egypt, exists in the sculpture of the grottoes of Silsilis. (*Notes to Rameses*, vol. iii. p. 309.)

15. *Of culinary vegetables,* it is probable the Egyptians had the greater part of those used by the Jews and Greeks. Upon the outside of the pyramid of Cheops was found an inscription, in Egyptian characters, recording the various sums of money expended, in the progress of the work, for the radishes, onions, and garlic consumed by the workmen. That the art of cultivating vegetables, both in gardens and fields, must have been in an advanced state, is evident from the pains taken to provide the means of irrigation. Herodotus says that the Bucolic marshes and fens abounded with the lotus plant, which the natives ate as bread. (*Notes to Rameses*, vol. i. p. 340.) Champollion's drawings, copied from the Egyptian tombs, and sent home in 1830, throw some light on the operations of agriculture; such as the gathering of the corn, the flax, and the papyrus, the vintage and the sowing, but none on those of horticulture. In some of the drawings, however, are vases filled with flowers. (*Lit. Gaz.*, May 15. 1830.)

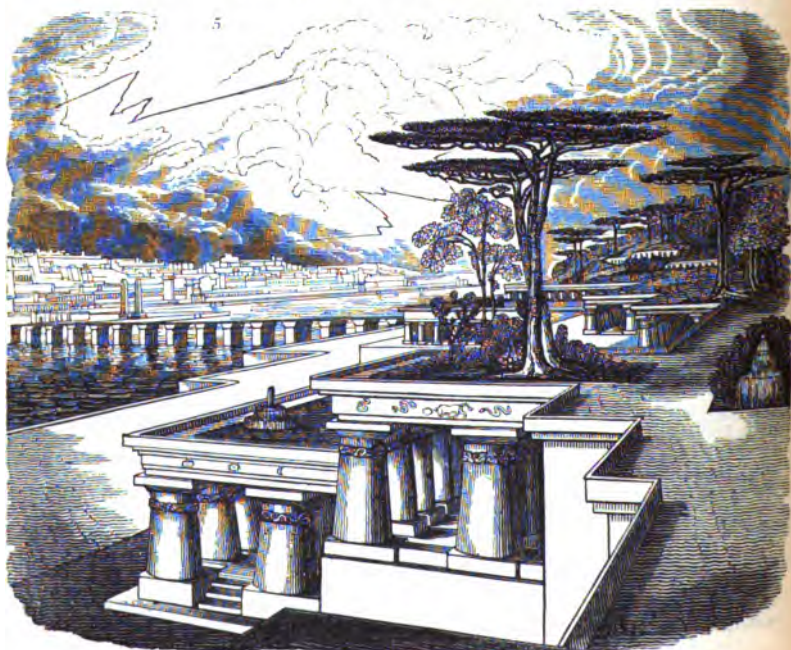
16. *The cemeteries of the Egyptians* appear to have been ornamented, but probably more by architecture than vegetation. The great Egyptian cemetery on the farther shore of the lake Acherusia, near Memphis, was ornamented with trees and water-courses, and answered to the Elysian fields of latter times. The more wealthy Egyptians sacrificed this natural taste for the ambition of architectural splendour, and their mummies were gathered into catacombs, as the coffins of modern rich men are preserved from returning to nature by being piled up in vaults under churches. (*North Amer. Rev.*, Oct. 1831, p. 401.) — See the *Ency. of Agr.* § 8.

SECT. III. *Babylonian or Assyrian Gardens.* B. C. 2000.

17. *The gardens of Cyrus at Babylon* (*Plin.*, xix. 4.), or of the kings of Assyria, or, according to Bryant (*Anal. of Ancient Mythology*, vol. iii. p. 100.), of the chiefs of the ancient people called Semarim, were distinguished by their romantic situations, great extent, and diversity of uses and products, and were reckoned in their day among the wonders of the world.

18. *The form of these gardens was square; and, according to Diodorus and Strabo, each side was four hundred feet in length, so that the area of the base was nearly four acres. They were made to rise with terraces constructed in a curious manner above one another, in the form of steps, and were supported by stone pillars to the height of more than three hundred feet, gradually diminishing upwards till the area of the superior surface, which was flat, was reduced considerably below that of the base. This building was constructed by vast stone beams placed on pillars of stone (arches not being then invented), which were again covered with reeds, cemented with bitumen, over which was placed a double row of bricks united by cement. These bricks were covered with plates of lead, which effectually prevented the moisture from penetrating downwards. Above all was laid a coat of earth, of depth sufficient for plants to grow in it; and the trees planted there were of various kinds, and were ranged in rows on the side of the ascent, as well as on the top, so that at a distance it appeared as an immense pyramid covered with wood. The situation of this extraordinary effort of human skill, aided by wealth, was situated adjoining to, or upon, the river Euphrates, from which water was supplied by machinery for the fountains and reservoirs employed for cooling the air and watering the garden.* (*Dr. Falconer's Historical View of the Gardens of Antiquity, p. 17.*)

19. *The prospect from these elevated gardens was grand and delightful. From the upper area was obtained a view not only of the whole city, and the windings of the Euphrates, which washed the base of the superstructure three hundred feet below, but of the cultivated environs of the city, and of the surrounding desert, extending as far as the eye could reach. The different terraces and groves contained fountains, parterres, seats and banqueting-rooms, and combined the minute beauties of flowers and foliage, with masses of shade and extensive prospects; the retirement of the grove with the vicinity of civic mirth and din; and all the splendour and luxury of eastern magnificence in art, with the simple pleasures of verdant and beautiful nature. "This surprising and laborious experiment," Geo. Mason considers "as a strain of complaisance in king Nebuchadnezzar to his Median queen, who could never be reconciled to the flat and naked appearance of the province of Babylon, but frequently regretted each rising hill and scattered forest she had formerly delighted in, with all the charms they had presented to her youthful imagination. The king, who thought nothing impossible for his power to execute, nothing to be unattempted for the gratification of his beloved consort, determined to raise woods and terraces even within the precincts of the city, equal to those by which her native country was diversified." (*Essay on Design, p. 9.*) These gardens have not been forgotten in the inspired pictures of Martin, who has realised, in his painting of the "Destruction of Babylon" (*fig. 5.*), all that the most vivid and fertile imagination*



could conceive of Eastern splendour. The fine effect of the cedar and the cypress in these gardens has been ably illustrated by a writer in the *Gard. Mag.*, vol. i. p. 119. It is observed by Major Rennell, that there are now very few trees, or even bushes, and both of very diminutive stature, to be found on the supposed site of this monument of royal extravagance and folly.

20. *An elevated situation* seems in these countries to have been an essential requisite to a royal garden; probably because the air in such regions is more cool and salubrious,—the security from hostile attack of any sort more certain,—and the prospect always sublime. “When Semiramis came to Chanon, a city of Media,” observes Diodorus Siculus (lib. ii. cap. 13.), “she discovered, on an elevated plain, a rock of stupendous height, and of considerable extent. Here she formed another paradise, exceeding large, enclosing a rock in the midst of it, on which she erected sumptuous buildings for pleasure, commanding a view both of the plantations and the encampment.”

21. *The existence of these gardens* is, however, very problematical. Bryant (*Ancient Mythology*) gives his reasons for disbelieving the very existence of Queen Semiramis, who, Dr. Sickler says, was not a queen, but a (*heuschläferien*) concubine. Bryant acknowledges, however, that paradises of great extent, and placed in elevated situations, were with great probability ascribed to the ancient people called Semarim. Granville Penn says that the name of Semiramis is no other than the appellative of her country, Semarin; and that she was nothing more than a captive Hebrew, like Esther, of fascinating beauty and accomplishments, who was carried off from her native country Samaria, when the greater part of its population was transferred to Assyria. (*Lit. Gaz.* 1830.) Quintus Curtius (lib. xv. cap. 5.) calls these gardens “fabulous wonders of the Greeks;” and Herodotus, who describes Babylon, is silent as to their existence. Many consider their description as representing a hill cut into terraces, and planted; and some modern travellers have fancied that they could discover traces of such a work. The value of such conjectures is left to be estimated by the antiquarian; we consider the description of this Babylonian garden as worth preserving for its grandeur and suitability to the country and climate, and as furnishing valuable ideas for the architectural decoration of landscape. For the same reason, we have, with the permission of our much esteemed friend Mr. Martin, given a specimen of his beau idéal of the gardens of Nineveh, taken from his celebrated picture of the fall of that city (fig. 6.).



SECT. IV. Jewish Gardens. B. C. 1500.

22. *King Solomon's garden* is the principal one on record; though many others belonging both to Jewish princes and subjects are mentioned in the Bible. Solomon was at once a botanist, a mason, a man of learning, a man of pleasure, and a king. The area of his garden was quadrangular, and surrounded by a high wall; it contained a variety of plants, curious as objects of natural history, as the hyssop (a moss, as Hasselquist thinks,) “which springeth out of the wall;” odoriferous and showy flowers, as the rose, and the lily of the valley, the calamus, camphire, spikenard, saffron, and cinnamon; timber trees, as the cedar, the pine, and the fir; and the richest fruits, as the fig, grape, apple, date, and pomegranate. (*Curtii Sprengel Historia Rei Herbariae*, lib. i. c. 1.) It contained water in wells and in living streams, and, agreeably to eastern practices, aviaries, and a seraglio. The seraglio, Parkhurst supposes, was at once a temple of worship and of pleasure; and he quotes the words of Ezekiel (xiii. 90.) in their literal translation:—“I am against, saith the Lord, your luxurious cushions, wherewith ye ensnare souls in the flower-gardens.” Ashuë or Venus was the deity who was worshipped by a company of naked females. Dr. Brown (*Antiq. of the Jews*) describes this mode of worship; and concludes by lamenting that depravity in man, which converts the beauties of nature into instruments of sin. The situation of Solomon's garden

was in all probability near the palace, as were those of Ahasuerus and Ahab. (*Esther*, vii. 8.) Solomon says, "I made me gardens and paradises, and I planted in them all kinds of fruit trees. I made me pools of water, to water with them the groves flourishing with trees." (*Eccles.*, ii. 5. 9.) According to Maundrell (*Travels*, p. 88.), the remains of the pools made by Solomon for the reception and preservation of the waters of a spring still exist. "As for Solomon's pools," he says, "they are three in number, lying in a row above one another; being so disposed as that the waters of the uppermost may descend into the second, and those of the second into the third. Their figure is quadrangular; in their length there is some difference; the first being 126 paces, the second 200, and the third 220. The breadth of all of them is 90 paces. They are all lined with walling plastered, and they contain a great depth of water." (*A. G., Gard. Mag.*, vol. viii.)

23. *Of the horticulture of the Jews* we know little; but, like that of the eastern nations in general, it was probably then, as it still is in Canaan, directed to the growing of cooling fruits, to allay thirst, and to moderate heat; aromatic herbs, to give a tone to the stomach; and wine, to refresh and invigorate the spirits. Hence, while their agricultural produce was wheat, barley, rye, millet, vetches, lentils, and beans; their gardens produced cucumbers, melons, gourds, onions, garlic, anise, cumin, coriander, mustard, and various spices. Their vineyards were sometimes extensive; Solomon had one at Bealhamon which he let out at 1000 pieces of silver per annum. (*Cant.*, viii. 11, 12.) Vines were raised from seed (*Jeremiah*, ii. 21.); and it appears probable that the Jews were aware of the effects of one flower being impregnated by the pollen of another; for Moses says (*Deut.*, xxii. 9.), "Thou shalt not sow thy vineyard with divers seeds: lest the fruit of thy seed which thou hast sown, and the fruit of thy vineyard, be defiled."

24. *The cemeteries of the Jews* may be considered as a species of garden. We find that Abraham, when Sarah died, purchased from the children of Heth a "field, and all the trees which were within its limits, or on its borders," as a place of burial. It appears, from Abraham having declined the choice of any of the sepulchres of Heth, and fixed on a spot ornamented with trees, that burial-places in those days were considered scenes of beauty, as well as of mournful associations. This idea is confirmed by the circumstance of the sepulchre in which Jesus Christ was laid, being placed in a garden. We read of others formed under a tree, and sometimes hewn from the sides of a rock; so that, on the whole, it is clear, that, with all who could afford it, among the Jews, the place of burial was not only sacred, from its use; but interesting, or beautiful, from being accompanied by some striking or agreeable natural features. (*N. Amer. Rev.*)—See *Ency. of Agr.* § 17.

SACR. V. Persian Gardens. B. C. 500.

25. *The Persian kings were very fond of gardens*, and Sir John Malcolm tells us that their first king, Mahabab, planted gardens. Xenophon says that the Persian gardens were cultivated for the sake of beauty as well as fruit. "Wherever the Persian king Cyrus resides, or whatever place he visits in his dominions, he takes care that the paradises shall be filled with every thing, both beautiful and useful, the soil can produce." (*Sir J. Mal., Persia*; and *Xen., Memorab.*, lib. v. p. 829.) The younger Cyrus was found by Lysander, as Plutarch informs us, in his garden or paradise at Sardis; and on its being praised by the Spartan general, he avowed that he had conceived, disposed, and adjusted the whole himself, and planted a considerable number of the trees with his own hands. Cyrus had another paradise at Celene, which was very extensive, and abounded in wild beasts; and we are informed that the same prince "there mustered the Grecian forces to the number of thirteen thousand." (*De Cyri Exped.*, lib. i.; *Brisson, De Regio Persarum Principatu*, p. 52., 8vo, 1595; *Xenophon's Economics*; *Diodorus Siculus*, lib. xvi.; *Plutarch in vita Artaserxis*, &c.) "We are informed by Xenophon, in his Expedition of the Ten Thousand, that the king of Persia had a large hunting-park in Phrygia stocked with wild beasts, and near it a fortified palace, supposed to have been built by Xerxes. Another such palace was passed, on the river Daraclax, in the Syria of Mesopotamia, having a large and beautiful park, 'producing every thing proper to the season.' The royal country palaces of Persia are at this day castellated, and many villages have towers of defence. During the retreat of the Grecian army, on the borders of Armenia, Xenophon notices a large village with a palace in it belonging to the satrap. Near to Pergamus, Xenophon made a plundering expedition against the castle of Asidates, a Persian noble. The building was large, high, and well fortified with battlements. The Greeks made a breach in the wall, which was eight bricks thick, but were not able to seize the expected treasure. This was a summer residence; for in the winter the Persian retired to the mountain district, with his family, his cattle, stores, and household furniture." (*Gilbert Laing Meason's Landscape Architecture*, 1828.)

26. *A paradise in the island of Panchaea*, near the coast of Arabia, is described by Diodorus Siculus as having been in a flourishing state in the time of Alexander's im-

mediate successors, or about a. c. 300. It belonged to a temple of Jupiter Tryphilius, and had a copious fountain, which burst at once into a river, was ceased with stone for near half a mile, and was afterwards used for irrigation. It had the usual accompaniments of groves, fruit trees, thickets, and flowers.

27. *The grove of Orontes* in Syria is mentioned by Strabo (lib. xvi.) as being in his time nine miles in circumference. It is described by Gibbon as "composed of laurels and cypress, which formed in the most sultry summers a cool and impenetrable shade. A thousand streams of the purest water issuing from every hill preserved the verdure of the earth, and the temperature of the air; the senses were gratified with harmonious sounds, and aromatic odours; and the peaceful grove was consecrated to health and joy, to luxury and love." (*Decline and Fall of the Roman Empire*, chap. xiii.)

28. *In Persian gardens of a more limited description*, according to Pliny and other Roman authors, the trees were arranged in straight lines and regular figures; and the margins of the walks covered with tufts of roses, violets and other odoriferous flowering plants. Among the trees, the terebinthinate sorts, the oriental plane, and, what may appear to us remarkable, the narrow-leaved elm, (now called English, but originally, as Dr. Walker and others consider, from the Holy Land,) held conspicuous places. Buildings for repose, banqueting, and voluptuous love; fountains for cooling the air, aviaries for choice birds, and towers for the sake of distant prospect, were introduced in the best examples. (*G. L. Meason*.)

29. *A tower was a necessary appendage to an eastern garden*, from the most remote era. Speaking of a vineyard, Isaiah says, "He fenced it, and gathered out the stones thereof, and planted it with the choicest vines, and built a tower in the midst of it." (*Isaiah*, v. 2.) Seven hundred years afterwards, the custom was preserved in the Holy Land; as in the parable of our Lord, in *Matt.*, xxi. 33.; and again in *Luke*, xiv. 28. Marcus Lanatus tells us that the inhabitants of Ptolemais beat down the towers of their gardens to the ground, and removed the stones, upon the approach of the Tartars, A. D. 1260. Sandys saw many towers between Jerusalem and Bethlehem; and Maundrell mentions the same kind of edifices in his account of the gardens of Damascus; which confirms the description given by William of Tyre, of the gardens of the Levant in the twelfth century. Among the paintings found at Pompeii are some supposed to be of villas, each of which has its tower of safety hard by. Some of these towers are square, and one has a shed or awning over the top, very similar to some of the towers in the buildings of the great painters. One marine villa has near it a round embattled tower which is surrounded by water. (*Ibid.*)

30. *Persian cemeteries*. The tomb of Cyrus is described by Strabo as in a tower; and Arrian says it was situated in the royal gardens, amidst trees and running streams. (*Ibid.*)

SECT. VI. Grecian Gardens. B. C. 300.

31. *The Greeks copied the gardening of the Persians*, as they did their manners and architecture, as far as the difference of climate and state of society would admit. Xenophon, a Greek philosopher of the fourth century before Christ, admired the gardens of the Persian prince Cyrus, at Sardis; and Diogenes Laertius informs us that Epicurus delighted in the pleasures of the garden, and made choice of one as the spot where he taught his philosophy. This garden, Chandler informs us, was in the city of Athens, on the side towards Dipylon, on the road to the Academy. The teacher of ease, it is recorded, was the first who introduced that refined species of gratification, the enjoyment of the country in town. The garden of the philosopher Melanthius was opposite to the statue of Minerva Paonia, which is mentioned as the first in the Memmis. It was on the way to the Academy; for Lycurgus, son of Lycophron, with some of his descendants, were buried in it at the public expense. On the graves were placed flat slabs with inscriptions. The Lacydum, or garden of Lacydes, was in the Academy. (*Hob., Trav. in Asia Min.*, vol. ii. p. 138.) Plato lays the scene of his dialogue on beauty on the umbrageous banks of the river Ilissus. In the first eclogue of Theocritus, the scene is laid under the shade of a pine tree, and the beauty of Helen is compared to that of a cypress in a garden. It would appear from this, and other circumstances, that the love of terebinthinate trees, so general in Persia and the other eastern countries, was also prevalent in Greece; and the same flowers (made choice of for their brilliant colours and odoriferous perfumes) appear to have been common to both countries. Among these may be enumerated the narcissus, violet, ivy, and rose. (*Historical View*, p. 30. et seq.) "The rich and polished Athenians," observes Gilbert Laing Meason, "preferred a residence in the country, that they might withdraw themselves from the jealousy of envious citizens. In villa gardening they borrowed from Asia Minor; myrtles and roses, the box and the lime tree, were planted for topiary works; and Theophrastus tells us that flowers and fruits were cultivated in the winter, and that the violet was in profusion in the market of Athens while snow was on the ground." There are many

curious observations on this subject in Stackhouse's edition of Theophrastus. Lord Bacon, in his *Essay on Gardens*, and George Mason, concur in considering gardening as rather a neglected art in Greece, notwithstanding the progress of the sister art of architecture; which gave rise to the remark of the former, "that when ages grow to civility and elegance, men come to build stately sooner than to garden finely, as if gardening were the greater perfection."

32. *The vale of Tempe*, however, as described in the third book of *Ælian's Various History*, and the public gardens of Athens, according to Plutarch, prove that the philosophers and great men of Greece were alive to the beauties of verdant scenery. The *academus* or public garden of Athens, Plutarch informs us, was originally a rough uncultivated spot, till planted by the general Cimon, who conveyed streams of water to it, and laid it out in shady groves, with gymnasia or places of exercise, and philosophic walks. Among the trees were the olive, the plane, and the elm; and the two last sorts had attained to such extraordinary size, that at the siege of Athens by Sylla, in the war with Mithridates, they were selected to be cut down, to supply warlike engines. In the account of these gardens by Pausanias we learn that they were highly elegant, and decorated with temples, altars, tombs, statues, monuments, and towers; that among the tombs were those of Pirithois, Theseus, *Edipus*, and *Adrastes*; and at the entrance was the first altar dedicated to love.

33. *The cemeteries of the Greeks* may be reckoned among their public gardens. The Athenian *Ceramicus*, the burial-place which received those who had lived and died in the service of their country, was ornamented with trees and sculptures, in such a manner as to make it a pleasant resort for all who wished to borrow inspiration to noble deeds. Groves, gardens, and the sides of public roads, were also chosen as the places of sepulture for eminent men.

34. *The passages of the Greek writers which relate to gardens of taste* have been amply illustrated by the learned German antiquarian Bættinger (*Racemasionen zur Gartenkunst der Alten*); of which it may be remarked, that the qualities chiefly enlarged on are, shade, coolness, freshness, breezes, fragrance, and repose, — effects of gardening which are felt and relished at an earlier period of human civilisation than picturesque beauty, or other poetical and comparatively artificial associations with external scenery; for though gardening as a merely useful art may claim priority to every other, yet as an art of imagination, it is one of the last which has been brought to perfection. In fact, its existence as such an art depends on the previous existence of pastoral poetry and mental cultivation; for what are the beauties of nature to an uncultivated mind?

35. *That fruits and culinary vegetables* were in general cultivation among the Greeks there can be no doubt. *Aristius* of Athens was the first who cultivated the olive; the fig was introduced to Athens from Crete, and the chestnut from Sardinia. The olive, the fig, and the vine are enumerated in Solon's laws. Cabbage is frequently mentioned, as well as pulse of several kinds, and onions. Indeed, there is no reason to suppose that the Greeks had not the greater part, if not the whole, of those garden articles which were cultivated by the Romans in the time of Cato. — See *Ency. of Agr.* § 24.

SECT. VII. Gardening in the Ages of Antiquity, as to Fruits, Culinary Productions, and Flowers.

36. *The first vegetable production which attracted man's attention as an article of food*, is supposed to have been the fruit of some tree; and the idea of removing such a tree to a spot, and enclosing and cultivating it near his habitation, is thought to be abundantly natural to man, and to have given rise to gardens. All the writers of antiquity agree in putting the fig at the head of the fruit trees that were first cultivated. The vine is the next in order, the fruit of which serves not only for food like that of the fig, but also for drink. Noah the Jewish Bacchus, and Osiris the Bacchus of the Egyptians and Greeks, are alike placed in the very first age of the postdiluvian world. The almond and pomegranate were early cultivated in Canaan (*Gen.* xliii. 5. 11.; and *Numb.* xx. 5.); and it appears by the complaints of the Israelites in the wilderness, that the fig, grape, pomegranate, and melon were known in Egypt from time immemorial.

37. *The first herbage made use of by man* would be the most succulent leaves or stalks which the surface around him afforded; of these every country has some plants which are succulent even in a wild state, as the *Chenopodææ*. Cabbage and asparagus were known to the Greeks from the earliest ages, and still abound in Greece; the latter on the sandy plains, and the former on the sea shores. One of the laws of Solon prohibits women from eating *Crámbe* in childbed; probably on account of its violent diuretic and deobstruent properties, especially in a comparatively uncultivated state. Of the green seeds of herbage plants, the bean and other *Leguminosæ* were evidently the first in use, and it is singular that Pythagoras should have forbidden the use of beans to his pupils, because they were so much of the nature of flesh; or, in the language of modern chemistry, because they contained so much vegeto-animal matter.

38. *The first roots, or root-like parts, of plants made use of, must have been some of the surface bulbs, as the onion. (Numb., xi. 5.)* Under-ground bulbs and tubers, as the edible crocus (*C. aureus Fl. Græc.*) of Syria, the orchis, the *Ornithogalum*, eaten in Persia, and the earth nut, would be next discovered; and fusiform roots, as those of the lucern in Persia, and arracacha (*Arracacia esculenta*) in Mexico, would be eagerly gnawed wherever they could be got at. Bulbs of culture, as the turnip, would be of much later discovery, and must at first have been found only in temperate climates.

39. *The use of plants for preternatural, religious, funeral, medical, and scientific purposes, like every other use, is of the remotest antiquity.* Rachel demanded from her sister the mandrakes (*Mandragora officinalis W.*), whose roots are thought to resemble the human form, which Reuben had brought from the fields; impressed, as she no doubt was, with the idea of the efficacy of that plant against sterility. Bundles of flowers covered the tables of the Greeks, and were worn during repasts; because the plants of which they consisted were supposed to possess the virtue of preserving the wearer from the fumes of wine, of refreshing the thinking faculty, preserving the purity of ideas and the gaiety of the spirits. Altars were strewed with flowers both by Jews and Greeks; they were placed on high places, and under trees, as old clothes are still sacrificed on the trunks of the *Pistanus* in Georgia and Persia. In the Greek mythology, most of the gods and goddesses had plants dedicated to them. The oak was devoted to Jupiter; the olive to Minerva; the holly to Saturn; the cypress to Pluto; the lily to Juno; and the myrtle and the rose to Venus. The favourites of the gods were sometimes changed into flowers after their death, as Hyacinthus the favourite of Apollo, &c. (*Ovid. Met., ix. 219.*) Other mortals were also sometimes changed into plants, trees, and flowers; as Myrrha into the myrrh, Daphne into the laurel, Narcissus into the narcissus, &c. (*Ovid. Met., x. 298; i. 452; iii. 346, &c.*) God appeared to Moses in a bush. Jacob was embalmed, in all probability, with aromatic herbs. Aristotle's *materia medica* consisted chiefly of plants. Solomon wrote on botany as a philosopher, and appears to have cultivated a general collection, independently of his plants of ornament.

40. *Flowers, as decorations, must have been very soon used, on account of their brilliant colours and smell.* The Greeks, Theophrastus informs us (*Hist. Plant., lib. vi. c. 5.*) cultivated roses, gillyflowers, violets, narcissi, and the iris; and we read in Aristophanes (*Acharn., v. 212.*) that a market for flowers was held at Athens, where the baskets were very quickly disposed of. From the writings of other authors, we learn that a continual use was made of flowers throughout all Greece. Not only were they then, as now, the ornament of beauty and of the altars of the gods, but the youths crowned themselves with them in the fêtes, the priests in religious ceremonies, and the guests in convivial meetings. Garlands of flowers were suspended from the gates of the cities in times of rejoicing; and, what is still more remarkable, and more remote from our manners, the philosophers themselves wore crowns of flowers, and the warriors ornamented their foreheads with them in days of triumph. These customs existed in every part of the East. There were at Athens, as afterwards at Rome, florists, whose business it was to weave crowns (*coronariæ*) and wreaths of flowers. Some of these crowns and garlands were of one species of flower; others of different species; and others of branches of peculiar plants, relating to some symbolical or mythological idea. Hence the term *coronariæ* was applied to such plants as were consecrated to these uses. Of these some were cultivated, and others gathered in the fields; but the name was applied to all such as were distinguished by the beauty or fragrance of their flowers. (*Curt. Spreng., Hist. R. Herb., lib. i. ii.; Paschalis de Coronis, lib. x.; Sabina by Böttinger, in N. Mon. Mag., Jan. and Feb. 1819; Theophrastus by Stackhouse.*)

41. *The first implement used in cultivating the soil, all antiquarians agree, must have been of the pick kind. A medal of the greatest antiquity, dug up near Syracuse, contained the impression of such an implement (fig. 7. a). Some of the oldest*



lated best together. Open groves in hot countries are particularly desirable for their shade, and they seem to have been the only sort of plantation of forest trees then in use. From Cicero, and the elder Pliny, we learn that the quincunx manner of planting them was very generally adopted; and from Martial, that the manner of clipping trees was first introduced by Cneus Matius, a friend of Augustus, about the commencement of the Christian era. Statues and fountains, according to Propertius, came into vogue about the same time, some of them casting out water in the way of *jets d'eau*, to occasion surprise, as was afterwards much practised in Italy in the dawn of gardening in the sixteenth century. Horace and Juvenal appear to have had a good taste in gardening and laying out grounds; the latter more especially, for he censures the attempt to ornament water by substituting marble for the natural herbage —

— "quanto præstantius esset
Numen aque, viridi si margine clauderet undas
Herbe, nec ingenuum violarent marmora tophum." — *Sat.* lii. 18.

"How much more beauteous had the fountain been
Embellish'd with her first created green,
Where crystal streams, through living turf had run
Contented with an urn of native stone!" — *Dryden*.

Augustus died A. D. 14.

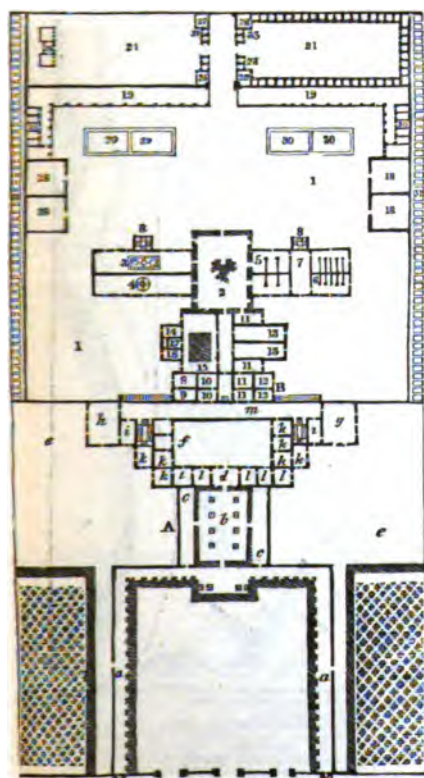
52. *The gardens of the emperor Nero*, according to Tacitus (*Annals*, lib. 15.), bore a remarkable resemblance to the English park and pleasure grounds. Tacitus says, "Ceterum Nero usus est patrie ruinis, extruxitque domum, in qua haud perinde gemmæ et aurum miraculo essent, solita pridem et luxu vulgata, quam arva et stagna et in modum solitudinum hunc sylvæ, inde aperta spatia et prospectus; magistris et machinatoribus Severo et Celere, quibus ingenium et audacia erat, etiam quæ natura denegavisset, per artem tentare, et viribus principis illudere." Thus translated: — "Moreover Nero turned the ruins of his country to his private advantage, and built a house, the ornaments of which were, not miracles of gems and gold, now usual in vulgar luxuries, but lawns and lakes, and after the manner of a desert; here groves, and there open spaces and prospects; the masters and centurions being Severus and Celer, whose genius and boldness could attempt by art what nature had denied, and deceive with princely force." The striking similarity of this description to that of a modern park is too obvious to escape notice. Nero, probably, recalled to mind the pomp of the Persian kings; and, as he affected Eastern manners, might also desire Persian paradises. These circumstances have occasioned W. Forsyth, and Pinkerton, the editor of *Walpoliana*, to conclude, and with seeming reason, that the Persian paradise was the prototype of the English garden, and that the latter, of course, was far from being unknown to the Romans: in short, that a taste for the natural or irregular style, commonly thought to be of modern origin, is of as great antiquity as the taste for the regular or geometric manner. The author of the description of the gardens of Wörlitz seems to be of the same opinion; observing in a note, that the *Villa Tiburtina* of Adrian and the *Domus Aurea* of Nero, according to the description of the latter by Suetonius, and of the former by Ælius Spartianus, must be regarded as the first, and perhaps still unrivalled, prototypes of the art of laying out pleasure grounds, which we now call English gardening. Nero died A. D. 68.

53. *Some idea of the town-gardens of the Romans*, about the beginning of the Christian era, may be obtained from the paintings rescued from the ruins of Herculaneum and Pompeii; the former buried beneath a stream of lava, and the latter overwhelmed by a shower of volcanic ashes from Mount Vesuvius, A. D. 79. The gardens in the paintings alluded to are represented as small square plots in front of the houses, enclosed with trellis work, planted with espaliers, and ornamented with fountains, urns, and other sculptured ornaments. Plants in pots and boxes appear sometimes on the walks, and set in the windows; and over the doors may sometimes be observed climbers resembling honeysuckles. The walls which surrounded these courts may still be seen at Pompeii; but the largest which we saw in 1819, could not enclose more than a quarter of an acre.

54. *The Roman villa*. The most complete example we have of an ordinary sized Roman villa is to be found in the ruins of one disinterred at Pompeii. It is situated on a sloping bank, and the front entrance opens, as it were, into the first floor; below which, on the garden side, into which the house looks (for the door is the only aperture on the side next the road), is a ground floor, with extensive arcades and open rooms, all facing the garden; and above are the principal rooms. It is spacious, and near the entrance was a bath with all the necessary appendages; in the rear the best rooms opened upon a terrace, running the whole width of the house, and overlooking a garden, or *syrtus*, about thirty yards square: this was surrounded by a covered walk or portico continued under the terrace. The lower apartments, under the arcade, were paved with mosaic work, with coved ceilings, and beautifully painted. One of the rooms had a large glazed bow window; the glass was very thick, of a green colour, and set in lead like a modern casement. The walls and ceilings of the villa are ornamented with paintings of elegant design, all of which have a relation to the uses of the apartments in

which they are. In the middle of the garden is a reservoir of water surrounded by columns. The cellars extended under the whole of the house and the arcades. A French author describes a Roman villa as a dwelling house and gardens, arranged on two or three parallel esplanades in form of steps, sustained by strong substructions. On the highest terrace the *prætorium* was erected, which was the principal pavilion or body of the house, divided into summer and winter apartments, containing bed-rooms, eating-hall, baths, and covered walks. The rustic buildings of the farm were distributed upon the sides of the lower terraces, or at the end of the gardens. When such a villa was placed upon the slope of a hill, it had only one front, and one exposure; but such as were elevated on the top of rising ground possessed varied views. The esplanades or terraces were, on such sites, carried round, forming parallelograms one above another. The main body of the building was flanked by two towers, or often overlooked by a square one, in which was an apartment for the guests to sup in, and to enjoy the prospect. In the villa of Ventidius Bassus, the tower was sixty paces square; that of the palace of Mæcenas was still larger. The representation of a marine villa on the wall of a room at Pompeii, given in Sir William Gell's *Pompeiana*, pl. lx., may be likened to the splendid Tusculan Villa of Pliny. Pliny's "spacious portico" consisted of several members, particularly "a porch built after the manner of the *sciæntis*;" he had "a second portico," and "an enclosed portico." In the Pompeian painting, the number of porticoes is perhaps exaggerated; but in Pliny's day they were erected to an extravagant extent; and "Regulus retired to his villa across the Tiber, where he covered a vast extent of ground with porticoes." (G. L. Meason.)

55. The term "*villa*," it ought to be observed, was applied to a cluster of buildings in the country for the accommodation of the family of a wealthy Roman citizen. Very extensive villas were divided into three parts; the *urbana*, the *rustica*, and the *fructuaria*. The first contained the eating-room, bed chambers, baths, covered portico, walks and terraces. The *villa rustica* was the division for the slaves, stables, &c.; and the *fructuaria* for wine, oil, and the produce of the farm. (*Ibid.*) The following arrangement of a Roman villa (*fig. 8.*) has been imagined by Castelli:—



B

A, Prætorium, or villa urbana.

- a, The peristyle.
- b, Atrium, or hall.
- c, Portico towards the palaestra.
- d, Room called *Tæbularum*.
- e, Palaestra, walks, and orchard.
- f, Inner court of the prætorium.
- g, Summer dining-room.
- h, Winter dining-room.
- i, Withdrawing-rooms.
- k, The winter apartments.
- l, The summer apartments.
- m, Portico.

n, Villa rustica and fructuaria.

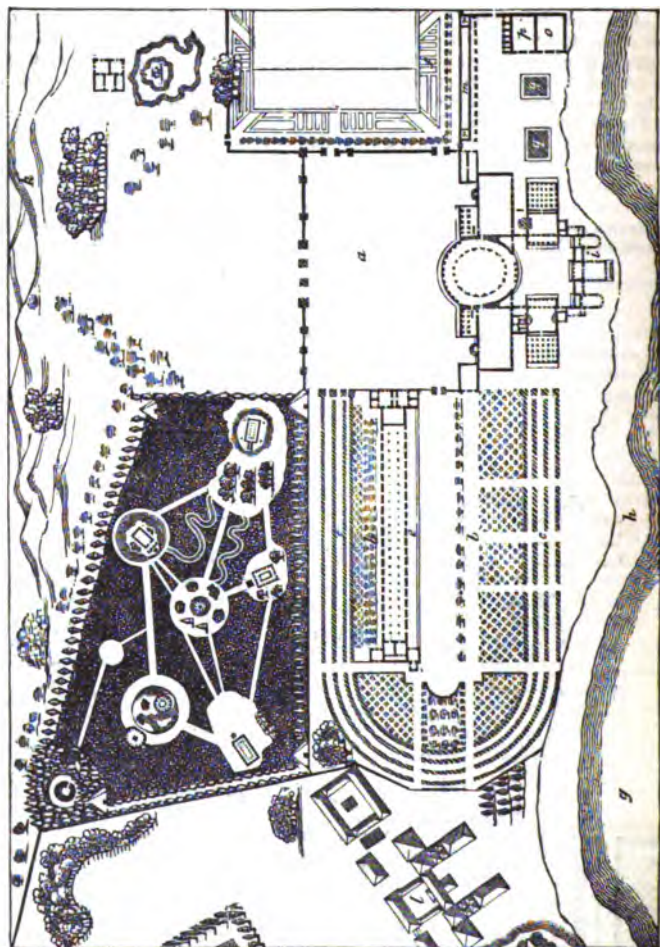
- 1, The farm yard.
- 2, The kitchen.
- 3, Wine-press and cellar.
- 4, Oil-press and cellar.
- 5, Ox-stalls.
- 6, Stable.
- 7, Hardumen and groom.
- 8, Stairs to the granaries.
- 9, Procurator or bailiff's lodge.
- 10, Husbandman's lodge and tenements.
- 11, Housekeeper's lodge and tenements.
- 12, Master of the cattle.
- 13, Lodging-rooms for servants.
- 14, Bathing-room.
- 15, Warm room.
- 16, Sweating-room.
- 17, Millarium to heat the water.
- 18, Storehouses for wood, hay, seed, &c.
- 19, Portico, or open sheds.
- 20, Hog-sties.
- 21, Sheep-fold.
- 22, Shepherd's lodge.
- 23, Shepherd's dog-kennel.
- 24, Aviary, or hen-yard.
- 25, Poultry's lodge.
- 26, Gallinarium or hen-house.
- 27, Porter's lodge.
- 28, Dog-kennel.
- 29, Dung-hill.
- 30, Pond in the farm yard.
- 31, Beds of culinary vegetables.
- 32, Porter's lodge.
- 33, Dog-kennel.

C

56. *The villas, gardens, and pleasure-grounds of Pliny the consul*, are described at length in his *Letters*, and delineations of their ichnography have been published by Félibien in 1699, and by Castell in 1798. Some things, which could only be supplied by the imagination, are to be found in both these authors; but on the whole their plans, especially those of Castell, may be considered as conveying a tolerably correct idea of a first-rate Roman villa, as in the Laurentinum, and of an extensive country residence, as in the Tuscum. Pliny died A. D. 113.

57. *The Villa Laurentina* (fig. 9.) was a winter residence on the Tiber, between Rome and the sea: the situation is near Paterno, seventeen miles from Rome, and is now called San Lorenzo. The garden was small, and is but slightly described. It was surrounded by hedges of box, and, where that had failed, by rosemary. There were platforms and terraces; and figs, vines, and mulberries were the fruit trees. Pliny seems to have valued this retreat chiefly from its situation relatively to Rome and the surrounding country, which no walls, fortresses, or belt of wood, hid from his view. On this region he expatiates with delight, pointing out all "the beauty of his woods, his rich meadows

9



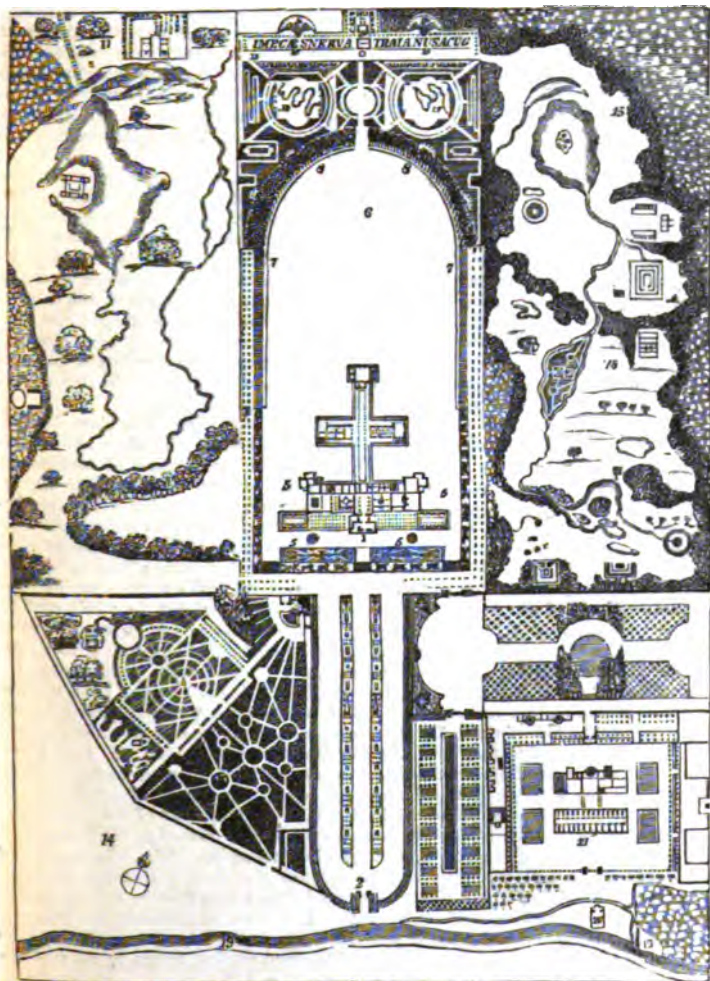
- a, Atrium, or court of honour.
 b, Hortus, or pleasure-garden.
 c, Gestatio, or place of equestrian exercise.
 d, Vineas, or vine-garden.
 e, Xystus, or terrace.
 f, Hortus pinguis rusticus, or kitchen-garden and orchard.
 g, Mare, the sea.
 h, Littus, the shore.
 i, Gynnasium, or place of exercise.

- k, Sylva et montes, woods and hills in the distance.
 l, Villa vicina, adjoining villa.
 m, Equilla, stables.
 n, Tecta vehiculis, carriage-house.
 o, Lignarium, place for wood.
 p, Foenile, place for hay.
 q, Piscine duae, two fish-ponds.
 r, Cella cervorum, place for deer.

covered with cattle, the bay of Ostia, the scattered villas upon its shore, and the blue distance of the mountains; his porticoes and seats for different views, and his favourite little cabinet, in which they were all united. So great was Pliny's attention in this particular, that he not only contrived to see some part of this luxurious landscape from every room in his house, but even while he was bathing, and when he reposed himself; and he tells us of a couch which had one view at the head, another at the feet, and another at the back!" (*Preface to the Introduction to Girardin's Essay, &c.*, p. 30.) We may add, with Eustace and other modern travellers, that the same general appearance of woods and meadows exists there to this day.

3. *Pliny's Tuscanum, or Tusculan Villa* (fig. 10.), now *Frascati*, and in 1826 the pro-

10



1. Villa, or house.
2. Grotto, or place of exercise for chariots.
3. Ambulation, or walk surrounding the terraces.
4. The slope, with the forms of boats cut in box.
5. The terrace, or terrace, before the portico, and on the sides of the house.
6. The hippodrome, on the north side of the house.
7. Fane, or temple, on the straight bounds of the hippodrome.
8. Cypress on the semicircular bounds of hippodrome.
9. The stadium and other buildings in the garden.
10. Box cut into names and other forms.
11. The peninsula, or little cross-plot in the garden.
12. Imitation of natural face of some country in the garden.

13. The walk, covered with acanthus or moss.
14. The meadows before the grotto.
15. The tops of the hills, covered with aged trees.
16. The underwood on the declivities of the hills.
17. Vineyards below the underwood.
18. Cornfields.
19. The river Tiber.
20. The temple of Ceres, built by Mustius.
21. The farmers.
22. Vivarium or park.
23. Kitchen-garden.
24. Orchard.
25. Apis.
26. Cochlearium, or snailery.
27. Glirarium, or place for dormice.
28. Oster-ground.
29. Aqueduct.

(Villas of the Ancients, p. 34, and plate Tuscanum.)

perty of Lucien Bonaparte, was situated in a natural amphitheatre of the Apennines, whose lofty summits were then, as now, crowned with forests of oak, and their fertile sides richly covered with rich cornfields, vineyards, copses, and villas. Pliny's description of this retreat, though well known, is of importance, as showing what was esteemed good taste in the gardens and grounds of a highly accomplished Roman nobleman and philosopher, towards the end of the first century, under the reign of Trajan, when Rome was still in all her glory, and the mistress of the world in arts and in arms.

59. *A general Tour of the Tusculan Gardens* is given by the translator of *Girardin's Essay* and by Dr. Falconer. Their extent, the former thinks, may have been from three to four acres, and their situation round the house.

60. *Beginning* there, the xystus, or terrace (5), says the author of the *Historical Essay*, is described as in the front of the portico, and near to the house; from this descended a lawn covered with acanthus, supposed by some to be a species of moss (13), and adorned with figures of animals cut out in box trees, answering alternately to one another. This lawn was again surrounded by a walk enclosed with tonsile evergreens sheared into a variety of forms. Beyond this was a place of exercise (2), of a circular form, ornamented in the middle with box trees, sheared as before into numerous different figures, together with a plantation of shrubs kept low by clipping. The whole was fenced in by a wall covered by box rising in different ranges to the top.

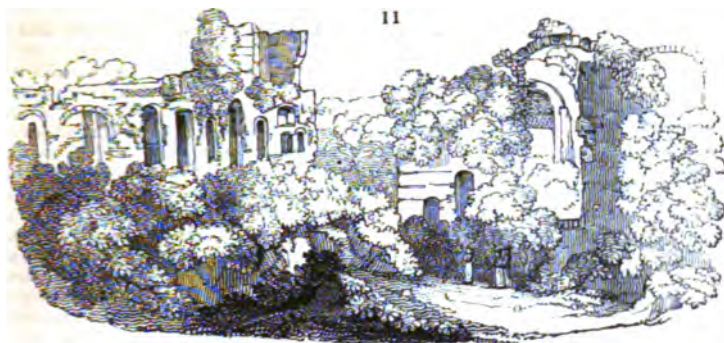
61. *Proceeding* from another quarter of the house, there was a small space of ground, shaded by four plane trees (7), with a fountain in the centre, which, overflowing a marble basin, watered the trees and the verdure beneath them. Opposite to another part of the building was a plantation of trees, in form of a hippodrome (horse-course) (6), formed of box and plane trees alternately planted, and connected together by ivy. Behind these were placed bay trees, and the ends of the hippodrome, which were semi-circular, were formed of cypress (8). The internal walks were bordered with rose trees, and were in a winding direction, which, however, terminated in a straight path, which again branched into a variety of others, separated from one another by box hedges; and these, to the great satisfaction of the owner, were sheared into a variety of shapes and letters (10), some expressing the name of the master, others that of the artificer, while small obelisks were placed here and there, intermixed with fruit trees.

62. *Farther on* was another walk, ornamented with trees sheared as above described; at the upper end of which was an alcove of white marble shaded by vines, and supported by marble pillars. From the seat of this recess issued several streams of water, intended to appear as if pressed out by the weight of those who reposed upon it, which water was again received in a basin, that was so contrived as to seem always full without overflowing. Corresponding to this was a fountain, or *jet d'eau*, that threw out water to a considerable height, and which ran off as fast as it was thrown out. An elegant marble summer-house opening into a green enclosure, and furnished with a fountain similar to that last described, fronted the above. Throughout the walks were scattered marble seats, near to each of which was a little fountain; and throughout the whole, small rills of water were artificially conducted among the walks, that served to entertain the ear with their murmurs, as well as to water the garden. (*Historical View*, &c., p. 53.; *Pliny's Epistles*, book v. letter 6.; *Félibien, Plans et Desc.*; *Castell's Villas of the Ancients*.)

63. *Pliny's Larian Villa* was situated on the Larian Lake, now the Lake of Como. He expatiates with pleasure upon two, out of several villas which he possessed on this lake, situated, like his villa at Baia, the one on a rock overlooking the lake; the other so close to the edge of it, that he might fish from his bedchamber. G. Lang Meason informs us that, at the distance of fourteen centuries, Paulus Jovius, bishop of Nocera, and contemporary with the great painters, built a residence on the Lake of Como, the Palazzo Giovio, on the very site of the Larian Villa of Pliny, part of the foundations of which were visible in the water. He describes his garden bathed by the waters of the lake, his shady woods, green slopes, and sparkling fountains. The villa, besides other rooms, contained a hall, a library, and an apartment adorned with Doric columns, in which hung a collection of portraits of celebrated men, whose lives he wrote. (*L. Arch. of Italy*.) The descendant of his elder brother Benedetto now inhabits this palace, and possesses the library and collection of portraits nearly in the same state as Paulus Jovius left them, together with a large collection of unedited original letters by the most celebrated men of that age. (*Duppa's Observations*, &c. p. 113.)

64. *The villa of the emperor Adrian, near Tivoli*, appears to have been more a palace than a garden, though its grounds were extensive, and contained a considerable variety of surface. They are said to have included a Vale of Tempe, Elysian Fields, Regions of Tartarus, a Naumachia, or place for the exhibition of mock naval combats, &c.; but there is no evidence of their having borne much resemblance to the Persian paradises. An attempt has been made by some Italian artists to restore the architecture of Adrian's palace; and views of the ruins as they actually exist (*fig. 11.*) have lately been published by different British tourists. These ruins, which we examined in 1819, are standing

evidence of excellent masonry, but afford no proof of refined taste in either architecture or gardening. Adrian died A. D. 138.



65. *The palaces and gardens of the imperial brothers Caracalla and Geta, according to Herodian, covered the greater part of what was once the city of Rome. In other words, these tyrants succeeded in confiscating the greater part of the villas of the opulent and luxurious Roman citizens, and appropriating them to their own use. Geta is said to have had his palace in the Getan gardens in the Janiculum, and Caracalla in those which had belonged to Mæcenas on the Esquiline Hill: the two palaces, Gibbon says, though at the distance of several miles, were connected by means of the gardens, which had once belonged to Sallust, Lucullus, Agrippa, Domitian, and a number of others. Geta died A. D. 212, and Caracalla, A. D. 217.*

66. *Rome was invaded by the Goths under Alaric, A. D. 408. "The city at this time contained 1780 residences of wealthy and honourable citizens (Nardini, Roma Antica, p. 89, &c.), and the precincts of each palace contained not only aviaries, porticoes, and baths, but groves, fountains, hippodromes, temples, and even markets. (Rutil. Claudian. Numatium Itinerar., v. iii.) A moderate palace would have covered the whole four acre farm of Cincinnatus. (Val. Max., lib. iv. cap. 4.) So little space was left for the houses of the plebeians, that they were built many stories high, and each was inhabited by a number of families, more than equal to the stories it contained. Wealth, and consequently landed property, gradually accumulated in the hands of the comparatively few noble families. The estates of the same order stretched over a large space in Italy, as well as in distant provinces. Faustinus, a Roman, as Gale (Antoninus, Itinerary in Britain) conjectures, possessed an estate near the modern Bury, in Suffolk, and a second one in the vicinity of Naples." (Johnson's History of English Gardening, 8vo. 1829. p. 27.) The Goths and Vandals successively plundered Rome from the time of Alaric till A. D. 455, and Italy was soon afterwards parcelled out into a number of petty states.*

67. *That the style of Pliny's villa gave the tone to the European taste in gardening up to the end of the 17th century, is sufficiently obvious. It is almost superfluous to remark, observes the author of the Historical View, the striking resemblance which Pliny's gardens bear to the French or Dutch taste. The terraces adjoining to the house; the lawn declining thence; the little flower-garden, with the fountain in the centre; the walks bordered with box, and the trees sheared into whimsical artificial forms; together with the fountains, alcoves, and summer-houses, form a resemblance too striking to bear dispute. "In an age," observes Horace Walpole, "when architecture displayed all its grandeur, all its purity, and all its taste; when arose Vespasian's amphitheatre, the temple of Peace, Trajan's forum, Domitian's bath, and Adrian's villa, the ruins and vestiges of which still excite our astonishment and curiosity; a Roman consul, a polished emperor's friend, and a man of elegant literature and taste, delighted in what the mob now scarcely admire in a college-garden. All the ingredients of Pliny's garden correspond exactly with those laid out by London and Wise on Dutch principles; so that nothing is wanting but a parterre to make a garden in the reign of Trajan serve for the description of one in the reign of King William III."—The open country round a villa was managed, as the Roman agricultural writers inform us, in the common field system lately prevalent in Britain; there were few or no hedges or other fences, or rows of trees; but what was not under forest was in waste, with patches of fallow or corn. Thus it appears that the country residence of an ancient Roman, not only as to his garden, as Horace Walpole has observed, but even as to the views and prospects from his house, as Eustace, and the translator of Girardin hint, bore a very near resemblance to the château of a*

French or German nobleman in the 18th century, and to not a few in France and Italy at the present day. The same taste, as that displayed by Pliny, appears to have prevailed till the fall of the Roman empire; and by existing in a faint degree in the gardens of religious houses during the dark ages, as well as in Pliny's writings, has thus been handed down to modern times.

68. *The progress of gardening among the Romans was much less than that of architecture.* Professor Hirschfeld remarks (*Théorie des Jardins*, tom. i. p. 25.), that the descriptions of the ancient Roman authors make us better acquainted with their country-houses than with their gardens, as the former appear more readily submitted to certain rules than the latter: the gardens being thus left partly to the imagination, we are apt to bestow on them, the reputation which really belongs to the country-houses; and to give the one a value which properly belongs to the other. The different manner in which the ancients speak of country-houses, and of gardens, may lead us to judge which of the two objects had attained the highest degree of perfection. The descriptions of the first are not only more numerous, but more detailed. Gardens are only mentioned in a general manner; and the writer rests satisfied with bestowing approbation on their fertility and charms. Every country-house had its gardens in the days of Pliny; and it is not too much, taking this circumstance in connection with the remarks of Columella, to hazard a conjecture that even the Romans themselves considered their gardens less perfect than their houses. Doubtless the Roman authors, so attentive to elevate the glory of their age, in every thing concerning the fine arts, would have enlarged more on this subject, if they had been able to produce any thing of importance. To decide as to the perfection which a nation has attained in one of the arts, by their perfection in another, is too hazardous a judgment; the error has been already committed in regard to the music of the ancients, and must not be repeated in judging of their gardens. The Romans appear in general to have turned their attention to every thing which bore the impression of grandeur and magnificence; hence their passion for building baths, circuses, colonnades, statues, reservoirs, and other objects which strike the eye. Besides, this taste was more easily and more promptly satisfied, than a taste for plantations, which required time and patience. In all probability, the greater number contented themselves with the useful products of the soil, and the natural beauty of the views; bestowing their utmost attention on the selection of an elevated site commanding distant scenery. Cicero (*De Leg.*, lib. iii. cap. 15.) informs us that it was in their country villas that the Romans chiefly delighted in displaying their magnificence; and, in this respect, the coincidence in habits between ourselves and that great people is a proud circumstance.

69. *The Roman taste in gardens has been condemned as unnatural;* but such criticism we consider as proceeding from much too limited a view of the subject. Because the Roman gardens were considered as scenes of art, and treated as such, it does not follow that the possessors were without a just feeling for natural scenery. Where all around is nature, artificial scenes even of the most formal description will please, and may be approved of by the justest taste, from their novelty, contrast, and other associations. If all England were a scattered forest like ancient Italy, and cultivation were to take place only in the open glades or plains, where would be the beauty of our parks and picturesque grounds? The relative or temporary beauties of art should therefore not be entirely rejected in our admiration of the more permanent and absolute beauties of nature. That the ancient Romans admired natural scenery with as great enthusiasm as the moderns, is evident from the writings of their eminent poets and philosophers; scarcely one of whom has not, in some part of his works, left us the most beautiful descriptions of natural scenery, and the most enthusiastic strains of admiration of all that is grand, pleasing, or romantic in landscape; and some of them, as Cicero and Juvenal, have deprecated the efforts of art in attempting to improve nature. "Whoever," says Geo. Mason, "would properly estimate the attachment to rural picturesque among the heathen nations of old, should not confine his researches to the domains of men, but extend them to the temples and altars, the caves and fountains dedicated to their deities. These, with their concomitant groves, were generally favourite objects of visual pleasure, as well as of veneration." (*Essay on Design*, p. 24.)

70. *Roman cemeteries.* The Romans, like the Greeks, buried their dead in groves and gardens, or by the borders of the public roads, that their names might be often brought to the remembrance of those who passed by. The tombs of the rich were commonly built of marble, the ground enclosed with a wall, or an iron rail, and planted round with trees. Private persons were frequently buried in their fields or gardens. Where a place of private sepulture was enclosed, there was generally a *cippus*, or pillar, in one corner, on which was marked the name of the owner, and the dimensions of the ground. The magnificent house and extensive gardens of Mæcenas, the patron of Virgil and the favourite of Augustus, were placed on what was previously a public cemetery in Rome; but which had rendered the adjoining places unhealthy from the vast number of bodies deposited there. Burying in churches is an invention of comparatively modern times.

Constantine is said to have been the first who ordered his sepulchre to be erected within consecrated walls, and the superstition which attended the imperfect Christianity of the earlier ages led others to follow his example; the church being regarded as a fortress, whose spiritual defences would keep off the evil spirits, which were always striving to break the rest of the dead. (*N. Amer. Rev.*, Oct. 1831, p. 403.) Two of the most celebrated ornaments of ancient Rome, were the tombs of Augustus and of Adrian. The former, called by way of eminence the Mausoleum, is described by Strabo as being a pendent garden, raised on lofty arches of white stone, planted with evergreen shrubs, and terminating in a point crowned with the statue of Augustus. At the entrance stood two Egyptian obelisks, round which arose an extensive grove cut into walks and alleys. The ruins are still of considerable size, and form a grand and striking object. The platform on the top was for a considerable time employed as a garden, and covered, as originally, with shrubs and flowers. It is now converted into an amphitheatre for bull-baiting. Wood the architect mentions in his *Letters*, (4to, London, 1828,) that he saw a bull-fight in this mausoleum on a Sunday, followed by music and fireworks. The mausoleum of Adrian is the present Castle of St. Angelo. (*Eutance*, p. 266.; *Wood's Letters of an Architect*, vol. i. p. 45.)

SECT. II. Roman Gardening, considered as to the Culture of Flowers and Plants of Ornament.

71. *Flowers were rare in Roman gardens under the kings*, and during the first ages of the republic. But as luxury began to be introduced, and finally prevailed to a great degree, the passion for flowers became so great, that it was found necessary to suppress it by sumptuary laws. Crowns of flowers were forbidden to such as had not received the right to use them, either by the eminence of their situation, or by the particular permission of the magistrates. Some acts of rigour towards offenders did not hinder these laws from being first eluded, and at last forgotten, till that which was originally a distinction became at last a general ornament. Men, the most elevated in dignity, did not hesitate to set up that elegance of dress and of ornament, which is repugnant to the idea of a warlike people; and Cicero, in his third harangue against Verres, reproaches this proconsul with having made the tour of Sicily in a litter, seated on roses, having a crown of flowers on his head, and a garland at his back.

72. *The Floralia, or flower-fests*, were observed on the last four days of April; they were attended with great indecency, but they show that the common people also carried a taste for flowers to excess. (*Pliny*, lib. xiii. cap. 29.; *Tertullian. Opera*.)

73. *The luxury of flowers, under Augustus*, was pushed to the extreme of folly. Helio-gabalus caused his beds, his apartments, and the porticoes of his palace to be strewn with flowers. Among these, roses were the sort chiefly employed; the taste for that flower being supposed to be introduced from Egypt, where, as Athenæus informs us, Cleopatra paid an Egyptian talent (upwards of 200*l.*) for the roses expended at one supper; the floor of the apartment in which the entertainment was given being strewn with them to the depth of a cubit. This, however, is nothing to what Suetonius relates of Nero, who spent upwards of four millions of sesterces, or above thirty thousand pounds, at one supper, on these flowers. From Horace it appears that roses were cultivated in beds; and from Martial, who mentions roses out of season as one of the greatest luxuries of his time, it would appear that it was then the caprice, as at present, to procure them prematurely, or by retardation. Columella enumerates the rose, the lily, the hyacinth, and the gillyflower, as flowers which may embellish the kitchen-garden; and he mentions, in particular, a place set apart for the production of late roses. Pliny says, the method by which roses were produced prematurely was, by watering them with warm water when the bud began to appear. From Seneca and Martial it appears probable they were also forwarded by means of *specularia* (*Talcum schistosum L.*; see § 88.), like certain culinary productions to be afterwards mentioned.

74. *Scientific assemblages of plants*, or botanic gardens, appear to have been unknown to the Romans, who had formed no regular system of nomenclature for the vegetable kingdom. Pliny says that in his youth he acquired his knowledge of plants in the garden of Antonius Casta, a son-in-law of king Dejolanus, who had assembled a great number of plants in his garden. Nearly a thousand plants are mentioned in Pliny's *History* as used in agriculture, gardening, *matéria medica*, for garlands or other purposes; and these appear to be all that were known, or had names in general use. (*Pliny, Nat. Hist.*, lib. xii.—xxvi. inclusive.)

SECT. III. Roman Gardening, in respect to its Products for the Kitchen and the Dessert.

75. The term *Hortus*, in the laws of the *Decemviri*, which are supposed to be as old as the establishment of the Romans as a people, is used to signify both a garden and a country house; but afterwards the kitchen-garden was distinguished by the appellation

Hortus pinguis. Cato informs us that the principal citizens had their *Horti*, or garden-farms, in which their vegetables were grown, near the city. In the first ages these farms were cultivated by the owners by their own hands; and the success of some with particular plants, gave rise to family names, such as *Piso* (from the pea), *Cicero* (from the vetch), *Fabius* (from the bean), *Lentulus* (from the lentil), &c. What was not used by the owner was sold in the *Fora Olitorum*, or vegetable markets. Pliny informs us that a husbandman called a kitchen-garden a second dessert, or a fitch of bacon, which was always ready to be cut, or a salad, easy to be cooked and light of digestion; and judged there must be a bad housewife (the garden being her charge) in that house, where the garden was in bad order.

76. *The principal fruits introduced into Italy by the Romans*, according to Hirschfeld (*Théorie des Jardins*, tom. i. p. 27.) and Sickler (*Geschichte*, 1ster band), are the fig and almond, from Syria, the citron from Media, the peach from Persia, the pomegranate from Africa, the apricot from Epirus, apples, pears, and plums from Armenia, and cherries from Pontus. The rarity and beauty of these trees, Hirschfeld observes, joined to the delicious taste of their fruits, must have enchanted the Romans, especially on their first introduction; and rendered ravishing to the sight, gardens, which became insensibly embellished with the many productions which were poured into them from Greece, Asia, and Africa.

77. *The fruits cultivated by the Romans, in the summit of their power*, are described by Pliny (lib. xv.); and, with the exception of the orange, the pine apple, the gooseberry, the currant, and the raspberry, include almost all those now in culture in Europe.

78. *Of kernel fruits*, they had apples, twenty-two sorts at least; sweet apples (*melimela*) for eating, and others for cookery. They had one sort without kernels. *Of pears* they had thirty-six kinds, both summer and winter fruit, melting and hard; some were called *libralia*: we have our pound pear. *Of quinces*, they had three sorts, one was called *chrysomela*, from its yellow flesh; they boiled them with honey, as we make marmalade. *Of services*, they had the apple-shaped, the pear-shaped, and a small kind, probably the same as we gather wild. *Of medlars*, two sorts, larger and smaller.

79. *Of stone fruits*, they had peaches, four sorts, apricots, and almonds. The *nectarine* was unknown to the ancient Greeks and Romans: there is no word in Greek which signifies a nectarine; nor in the Latin, except what C. Bauhin and other moderns have coined. *Of plums*, they had a multiplicity of sorts, black, white, and variegated; one sort was called *asinia*, from its cheapness; another *damascena*, which had much stone and little flesh: we may conclude it was what we now call *prunes*. *Of cherries*, they had eight kinds; a red one, a black one, a kind so tender as scarcely to bear any carriage, a hard-fleshed one (*duracina*), like our *Bigarreau*, a small one with bitterish flavour (*laurea*), like our little wild black, also a dwarf one not exceeding three feet high. *Of the olive*, several sorts.

80. *Of berries*, they had grapes. They had a multiplicity of these, both thick-skinned (*duracina*), and thin-skinned: one vine growing at Rome produced twelve amphoræ of juice (eighty-four gallons). They had round-berried and long-berried sorts, one so long that it was called *dactylides*, the grapes being like the fingers on the hand. Martial speaks favourably of the hard-skinned grape for eating. *Of figs*, they had many sorts, black and white, large and small; one as large as a pear, another no larger than an olive. *Of mulberries*, they had two kinds of the black sort, a larger and smaller. Pliny speaks also of a mulberry growing on a briar; but whether this means the raspberry, or the common brambleberry, does not appear. *Strawberries* they had wild, but do not appear to have cultivated.

81. *Of nuts*, they had hazel nuts and filberts, which they roasted; beech, mast, pistachio, &c. *Of walnuts*, they had soft-shelled and hard-shelled, as we have. In the golden age, when men lived upon acorns, the gods lived upon walnuts; hence the name *Juglans* (*Jovis glans*). *Of chestnuts*, they had six sorts, some more easily separated from the skin than others, and one with a red skin; they roasted them as we do.

82. *Of leguminous fruits*, the carob bean, *Ceratonia siliqua*.

83. *Of resinous or terebinthinate fruits*, they used the kernels of four sorts of pine, including, as is still the case in Tuscany, according to Sismondi, the seeds of the Scotch pine.

84. *Of cucurbitaceous fruits*, they had the gourd, cucumber, and melon, in great variety. (*Trans. Lond. Hort. Soc.*, vol. v. p. 152.)

85. *The grape and the olive were cultivated as agricultural products with the greatest attention*, for which ample instructions are to be found in all the Roman writers *de re rustica*. Some plantations mentioned by Pliny are supposed still to exist; as of olives at Terni, and of vines at Fiesole. Both these bear marks of the greatest age.

86. *The culinary vegetables cultivated by the Romans* were chiefly the following:—*Of the brassica tribe*, several varieties. Cabbages, Columella says, were esteemed both by slaves and kings. *Of leguminous plants*, the pea, bean, and kidney bean. *Of esculent*

roots, the turnip, carrot, parsnep, beet, skirret, and radish. The skirret is a native of China, and was so much valued in Rome, that it is said, the emperor Tiberius accepted the roots for tribute. Of *spinaceous plants*, they appear to have had at least sorrel. Of *asparagus plants*, asparagus. Of the *alliaceous tribe*, the onion, and garlic of several sorts. Of *salads*, endive, lettuce, and succory, mustard, and others. Of *pot and sweet herbs*, parsley, orache, alisandera, dittander, elecampane, fennel, and chervil, and a variety of others. *Mushrooms* and *fuci* were used; and bees, snails, dormice, &c. were reared in or near to their kitchen-gardens, in appropriate places. (*Trans. Lond. Hort. Soc.*, vol. v. p. 152.)

87. *The kitchen, fruit, and flower gardens of the Romans* appear to have been originally in one common enclosure, except perhaps in establishments of the greatest extent; such as those of Pliny, in which the kitchen-garden and orchards are described as being in separate enclosures. (See the Plan of the Villa Laurentina, fig. 9. p. 18.) Cato and Palladius direct that a garden should have an even, gently sloping surface, a southern aspect, and a small stream of water.

88. *The luxury of forcing vegetable productions*, it would appear, had even been attempted by the Romans. *Specularia*, or plates of the *lapis specularis* (alc.), we are informed by Seneca and Pliny, could be split into thin plates, in length not exceeding five feet (a remarkable circumstance, since few pieces larger than a fifth of these dimensions are now any where to be met with); and we learn from Columella (lib. xii. cap. 3.), Martial (lib. viii. cap. 14. and 68.), and Pliny (lib. xix. cap. 23.), that by means of these *specularia*, Tiberius, who was fond of cucumbers, had them in his garden throughout the year. They were grown in boxes or baskets of dung and earth, placed under these plates; which were removed in fine days, and replaced at night. Sir Joseph Banks (*Hort. Trans.*, vol. i. p. 148.) conjectures, from the epigrams of Martial referred to, that both grapes and peaches were forced; and Daines Barrington supposes that the Romans may not only have had hot-houses but hot-walls to forward early productions. Flues, Sir Joseph Banks observes (*Hort. Trans.*, vol. i. p. 147.), the Romans were well acquainted with; they did not use open fires in their houses, as we do, but, in the colder countries at least, they always had flues under the floors of their apartments. Daines Barrington's conjecture, however, rests upon no authority; nor is Sir Joseph Banks's much better, as far as regards forcing grapes and peaches. That the Romans had flues to their dwelling-houses is certain; but hot-houses and hot-walls appear to be of comparatively modern invention. The Romans had no chimneys to their houses. In the time of Seneca they warmed their apartments by stoves built in the earth under the house, and the heat was conveyed from these into the various rooms by means of pipes enclosed in the walls. (*Seneca, Epist.* 90.) Lysons found the flues, and the fireplace whence they received heat, in the Roman villa he has described in Gloucestershire. Similar flues and fireplaces were also found in the extensive villa lately discovered on the Blenheim estate in Oxfordshire. In Italy, the Romans used flues chiefly for baths or sudatories, and in some of these which we have seen in the disinterred city of Pompeii, the walls round the apartment are flued, or hollow, for the circulation of hot air and smoke.

89. *The luxury of ice in cooling liquors* was discovered by the Romans at the time when they began to force fruits. Daines Barrington notices this as a remarkable circumstance; and adds, as a singular coincidence, the coeval invention of these arts in England. The art of preserving snow for cooling liquors, during the summer, in warm countries, was known in the earliest ages. It is mentioned by Solomon. (*Proverbs*, chap. xiv. v. 13.) Ice was also preserved for the same purpose; but chiefly in the northern countries. Snow is at present employed in Italy, Spain, and Portugal; ice in Persia. The Persian ice-pits are described by travellers. There is no account of Grecian or Roman ice-houses given by any of the ancient writers on agriculture. The cooling of water without snow or ice is very ancient. Pliny gives the invention to Nero; but it was known to Hippocrates, according to Galen; and Aristotle was certainly acquainted with it. (See Beckmann's *Hist. of Inventions*, vol. iii.)

SECT. IV. Roman Gardening, considered in respect to the Propagation and Planting of Timber Trees and Hedges.

90. *The Romans propagated trees by the methods now in common use in our nurseries.* Fruit trees were generally grafted and inoculated; vines, figs, and olives raised by cuttings, layers, or suckers; and forest trees generally propagated by seeds and suckers.

91. Though *forest trees* were reared with great care round houses in the city (*Hor. Ep.*, lib. i. v. 10. 22.), and to produce shady walks for exercise in the country, yet it does not appear clear that they were either planted in masses, or strips, expressly for useful purposes. They were planted in rows in vineyards on which to train the vine; and the sorts generally preferred were the poplar and the elm. Natural forests and copses, then, as now, supplied timber and fuel. Trees which do not *stole* (*arbores cœdus*), were distinguished from such

as being cut over spring up again (*succisa repullulanti*): of the former class was the larch, which was most in use as timber. The greatest tree that had been ever seen at Rome was one brought there for rebuilding the bridge at Naumachia. Tiberius Cæsar laid it open to public inspection, and intended it to remain as a singular monument, on account of its great size, to all posterity. It remained entire and whole, until Nero built his stately amphitheatre. It was the trunk of a larch tree, and was 120 feet in length, and 2 feet in diameter, from one end to the other. There was also a most extraordinary fir tree, that formed the mast of the vessel which, in the time of the Emperor Caligula, transported out of Egypt into Italy the obelisk which was set up in the Vatican hill within the circus there, as well as the four large stones used as supporters to it. This mast was of a height above all others; "and certain it is," say the ancients, "that there never was known a more wonderful ship to float upon the sea than this was." She received 120,000 modii of lentils for the very ballast, and she took up in length the greater part of Ostia harbour; for Claudius the emperor caused it there to be sunk, together with three mighty piles or dams, founded upon it, and mounted to the height of towers, for which purpose there was brought a large quantity of earth or sand from Puteoli. The main body of this mast contained in compass four fathoms full. (*Plin., Nat. Hist.*, lib. xvi. cap. 40.)

92. *Willows* were cultivated for binding the vines to the trees that supported them; for hedges; and for making baskets (*Virg. Georg.*, lib. ii. v. 4. 36.): moist ground (*udum salicetum*) was preferred for growing them.

93. *Hedges* were of various sorts, but we are not informed what were the plants grown in those used for defence. Pliny mentions briars or thorns; but the species intended are uncertain; Virgil mentions the broom. They surrounded chiefly vineyards and gardens; for agriculture was then, as it still chiefly is in Italy, conducted in the common or open-field manner.

SECT. V. *Roman Gardening, as a Science, and as to the Authors it produced.*

94. *The gardening of the Romans was entirely empirical*, and was carried on with all the superstitious observances dictated by a religion founded on polytheism. Almost every operation had its god, who was to be invoked or propitiated on all occasions. "I will write for your instruction," says Varro to Fundasius, "three books on husbandry, first invoking the twelve *dii consentes*." After enumerating the gods which preside over household matters and the common field operations, he adds, "Adoring Venus as the patroness of the garden, and offering my entreaties to Lympha, because culture is drought and misery without water." The elements of agriculture, he says, are the same as those of the world—*water, earth, air, and the sun*. Agriculture is a necessary and great art, and it is a science which teaches what is to be planted and done in every soil, and what lands yield the greatest profit. It should aim at utility and pleasure, by producing things profitable and agreeable, &c.

95. *Lunar days* were observed, and also lucky and unlucky days, as described by Hesiod. Some things, Varro observes, are to be done in the fields while the moon is increasing; others, on the contrary, when she is decreasing; as the cutting of corn and underwood. At the change of the moon, pull your beans before daylight; to prevent rats and mice from preying on a vineyard, prune the vines in the night-time: sow vetches before the twenty-fifth day of the moon, &c. "I observe these things," says Agrasius, (one of fifty authors who Varro says had written on husbandry, but whose writings are now lost,) "not only in shearing my sheep, but in cutting my hair; for I might become bald if I did not do this in the wane of the moon."

96. *Religion and magic were also called in to the aid of the cultivator*. Columella says that husbandmen who are more religious than ordinary, when they sow turnips, pray that they may grow, both for themselves, and for their neighbours. If caterpillars attack them, Democritus affirms that a woman going with her hair loose, and barefooted, three times round each bed will kill them. Women must be rarely admitted where cucumbers or gourds are planted; for, commonly, green things languish, and are checked in their growth, by their handling of them.

97. *Of vegetable physiology* they seem to have been very ignorant. It was a doctrine held by Virgil, Columella, and Pliny, that any scion may be grafted on any stock; and that the scion partaking of the nature of the stock, had its fruit changed in flavour accordingly. Pliny mentions the effect of grafting the vine on the elm, and of drawing a vine shoot through the trunk of a chestnut; but modern experience proves that no faith is to be given to such doctrines, even though some of these authors affirm that they have seen what they describe.

98. *Equivocal generation* was believed in. Some barren trees and shrubs, as the poplar, willow, osier, and broom, were thought to grow spontaneously; others by fortuitous seeds, as the chestnut and oak; some from the roots of other sorts of trees, as

the cherry, elm, bay, &c. Notwithstanding the ignorance and inaccuracy which their statements betray, the Romans were aware of all our common, and some of our uncommon, practices: they propagated plants as we do; pruned and thinned, watered, forced, and retarded fruits and blossoms, and even made incisions, and ringed trees, to induce fruitfulness.

99. *The garden implements of the Romans* were the *ligo*, or *pala*, answering to our spade; the *rastrea*, a rake; the *sarculem*, a hoe or weeding hook; the *marra*, a hoe mattock; the *dolabra*, an adze, apparently the *bénette* of the French; the *securis*, an axe; and the *fabr*, a kind of pruning-knife; the latter was sometimes made in the shape of the half-formed moon, hence *fals semiformis luna*. (*Col.*, lib. ii. cap. 2; lib. iv. cap. 25.)

100. *The practical directions for garden culture* given by the Roman authors are in general excellent; and the remark is still more applicable in agriculture than in horticulture. Cato gives minute directions for cultivating the asparagus; and Pliny and Columella treat at length on grafting and inoculating, on pruning the vine and olive, and on stirring the soil among fruit trees generally. Pliny informs us that the success of one cultivator, C. Furius Cresinus, was so great, that he was accused before the senate of practising magic, and was obliged to justify himself by the exhibition of his tools; exclaiming, as he displayed them, "These are the implements of magic which I use; but I cannot show you the cares, the toils, and the anxious thoughts that occupy me day and night." (See *Owen's Translation of Cato, and of Geoponica, or Agricultural Pursuits*.)

101. *There is no Roman author exclusively on gardening*, but the subject is treated of, more or less, by Cato, Varro, Virgil, Pliny, and Columella.

102. *Cato and Varro died*, the former a. c. 150, and the latter a. c. 28: both wrote treatises on rural affairs (*De Re Rusticâ*); but, except what relates to the vine, the olive, the fig, and the asparagus, these works have little on the subject of gardens.

103. *Virgil's Georgics* appeared about the end of the century preceding the commencement of our era. Virgil was born in Mantua about a. c. 70; but lived much at Rome and Naples. He appears to have taken most of his ideas on gardening from Cato and Varro.

104. *Pliny's Natural History* was written in the first century of our era. Pliny was born at Verona, A. D. 20, but lived much at court. The twelfth to the twenty-sixth books inclusive are chiefly on husbandry, gardens, trees, and medical plants. Pliny's work abounds with what are now known to be absurdities, but which, no doubt, passed for truths in his age. He died A. D. 76.

105. *The Rural Economy of Columella* is in twelve books, of which the eleventh, on Gardening, is in verse. He was born at Gades, now Cadiz, in Spain, and flourished under the emperor Claudius, A. D. 42, passing most of his time in Italy.

CHAP. III.

Chronological History of Gardening in continental Europe, from the Time of the Romans to the present Day, or from A. D. 500 to A. D. 1832.

106. *The decline of the Roman Empire* commenced with the reign of the emperors. In the ages, Hirschfeld observes, which followed the fall of the republic, the violence committed by several of the emperors, the invasion of the barbarians, and the ferocity introduced by the troubles of the times, extinguished a taste for a country life, in proportion as they destroyed the means of enjoying it. So many injuries falling on the best provinces of the Roman empire, one after another, gradually destroyed the country-houses and gardens. Barbarism triumphed over man and the arts; arms again became the reigning occupation; superstition allied itself to warlike inclinations, and spread over Europe a manner of thinking far removed from the noble simplicity of nature. The mixture of so many different nations in Italy contributed to corrupt the taste; the possessions of the nobles, remaining without defence, were pillaged and razed; and the earth was only cultivated from necessity. Soon afterwards those were considered the first countries where one convent raised itself beside another. Architecture was only employed in chapels and churches, or on warlike forts and castles. From the establishment of the ecclesiastical government of the popes in the eighth, to the end of the twelfth century, the monks were almost the only class in Europe who occupied themselves in agriculture; many of these, carried away by their zeal, fled from the corruption of the age, and striving to overcome their passions, or to indulge their gloomy humour, or, as Herder observes, to substitute one passion for another, retired into solitary

deserts, unhealthy valleys, forests, and mountains; there they laboured with their own hands, and rendered fertile, lands, till then, barren from neglect, or in a state of natural rudeness.

107. *Thus the arts of culture were preserved by the monks during the dark ages.* The sovereigns, in procuring pardon of their sins by bestowing on the monks extensive tracts of country and slaves, recompensed their activity as rural improvers. The monks of St. Basil and St. Benedict, Harte informs us, rendered many tracts fertile in Italy, Spain, and the south of France, which had lain neglected ever since the first incursions of the Goths and Saracens. Others were equally active in Britain in ameliorating the soil. Prof. Walker (*Essays*) informs us that, even in the remote island of Iona, an extensive establishment of monks was formed in the sixth century; and that the remains of a corn-mill and mill-dam, built by them, still exist; and indeed it is not too much to affirm, that, without the architectural and rural labours of this class of men, many provinces of Europe, which at present nourish thousands of inhabitants, would have remained deserts or marshes, the resorts only of wild beasts, and the seminaries of disease; and architecture and gardening, as arts of design, instead of being very generally diffused, would have been lost to the greater part of Europe.

108. *At length the dawn of light appeared with the art of printing, A. D. 1440.* Commerce began to flourish in Italy and Holland; and the arts of peace to prevail. Soon after this period the European part of what was formerly the Roman empire gradually assumed those political divisions, which it, for the greater part, still retains. We shall take a cursory view of the progress of gardening in each of these states, from the dark ages to the present day.

SECT. I. *Of the Revival, Progress, and present State of Gardening in Italy.*

109. *The blessings of peace and of commerce, the remains of ancient grandeur still existing, and the liberty which some cities had acquired through the generosity and splendour of some popes and princes, united with other causes in the revival of the arts in Italy, rather than in any other country.* After a long course of prosperity, they may be now said to be on the decline; and they will probably not again revive previously to great political changes, and the establishment of free and liberal institutions, moral, political, and scientific. At present, Italy is one of the most ignorant and enslaved countries in Europe, notwithstanding the number of individuals, which she may still reckon, eminent in science and philanthropy.

SUBSECT. 1. *Italian Gardening, in respect to Design and Taste.*

110. *The earliest notice of Italian gardening is in the work of Pietro Crescenzi, a senator of Bologna: he composed, in the beginning of the fourteenth century, a treatise on agriculture, entitled "Opus Ruralium Commodorum, sive de Agricultura," dedicated to Charles II., king of Naples and Sicily.* In the eighth book of this work the author treats of gardens of pleasure. These he divides into three classes: those of persons of small fortune; those of persons in easy circumstances; and those of princes and kings. He teaches the mode of constructing and ornamenting each; and of the royal gardens observes, that they ought to have a menagerie and an aviary; the latter placed among thickets, arbours, and vines. Each of the three classes ought to be decorated with turf, shrubs, and aromatic flowers.

111. *Gardening, with the other arts, was revived and patronised by the Medici family in the beginning of the sixteenth century; and the most celebrated gardens of these times, as Roscoe informs us, were those of Lorenzo de' Medici, and of the wealthy Bernard Ruccellai.* They were in the geometric and architectural taste of those of Pliny, and served as models or precedents for other famous gardens which succeeded them, till within the last sixty years, when, as Eustace observes, a mixture of the modern or natural-like manner was generally admitted.

112. *The transition from the Roman villas to the Italian castles or monastic establishments of the middle ages is thus given by Castellan and G. L. Meason.* Castellan maintains that several monasteries, built on the ruins of Roman villas, retain the ancient distribution of the parts of the buildings: courts surrounded with porticoes, which are used for walks; the rooms entering upon the portico, without communicating with one another; the basins, with fountains in the courts; the terraces upon arcades; the oratories in the gardens; — all these have a striking analogy to the ancient villa. At an ancient villa near Brundisium our author found the *ambulacrum*, or covered walk, pretty entire. "One of the celebrated villas of Lucullus," observes G. L. Meason, "formerly belonging to Marius, and afterwards an imperial residence of Tiberius, situated on the promontory of Misenum (Capo Miseno), existed A. D. 480. To this retreat was sent, by the clemency of Odoacer, king of the Heruli Goths, the last feeble representative of the Roman emperors of the West, called in derision Augustulus.

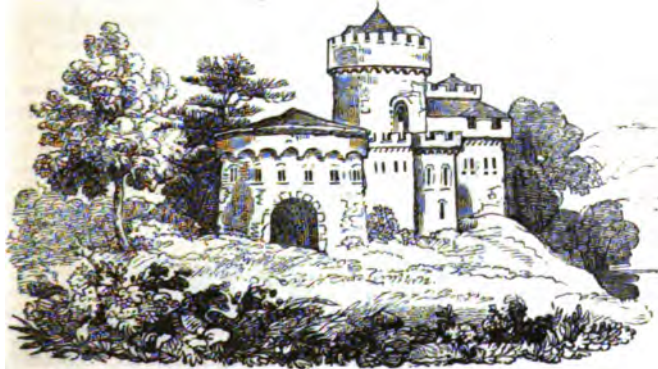
The villa had gradually been changed into a strong castle, to protect it against the sea attacks of the Vandals. These invasions by sea of the Vandals, — and, subsequently, of the Normans and Saracens, — ruined probably the crowd of Roman villas on the Neapolitan shores. The villas on the fertile plains of Italy would suffer from the invasions by land; but many villa castles, or fortified residences, remained after the tenth century, in the hilly districts of the Vicentine and Veronese territories; as their rural nobility descended into the cities of Padua, Verona, Vicenza, and Treviso, and took part with the Guelph faction. In the thirteenth century, 150 castles were computed to be in the Milanese. It was probably to a Roman villa, that Avitus, lieutenant of the emperor Maximus, and afterwards himself a short-lived emperor, retired, A. D. 460. It was situated near Clermont in Auvergne, on the margin of a lake, into which rushed a mountain torrent of cascades. The villa contained baths, summer and winter apartments, and porticoes. Sidonius, the son-in-law of Avitus, has, in imitation of Pliny, given a prolix, but obscure, description of it." (*Landscape Arch. of Italy, &c.*) The same author (G. L. Meason), in his graphic illustrations, has given an example, from a landscape of Giotto, of what appears to be "a monastery, constructed on a more ancient edifice." (fig. 12.) A very good idea of an Italian baronial castle of the fourteenth or fifteenth cen-

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tury also may be obtained from the back-grounds of the eminent painters of those times. G. L. Meason, among several, has given one from Titian, characterised by round towers (fig. 13.); one from Breemberg, characterised by square towers (fig. 14.); and one from

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Julio Romano, in which both round and square towers are combined, with something of the monastic character maintained by gable ends, and a spire-like turret (fig. 15.). A fine example of a picturesque country-house, of the seventeenth or the beginning of the eighteenth century, is given from Francesco Solimene, the last of the old school of Italian painters (fig. 16.). This very picturesque residence was situated at the foot of Mount Vesuvius, and must have harmonised admirably with the surrounding scenery. G. L. Meason has shown, in the work so frequently quoted, with great research and

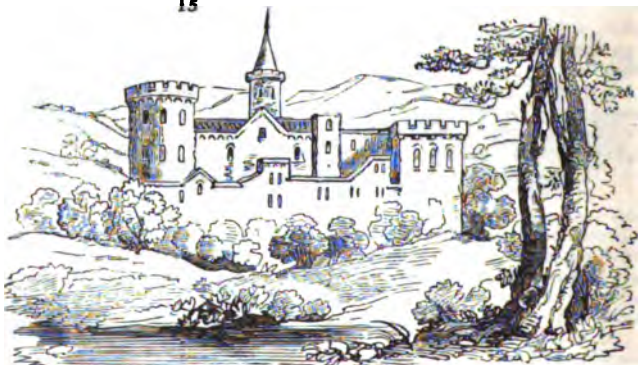
refined taste, how useful the study of the irregular architecture of the Italian villas, from the backgrounds of the great painters of Italy, may be to those architects, whose business it is to design picturesque buildings to embellish the landscapes of Britain.

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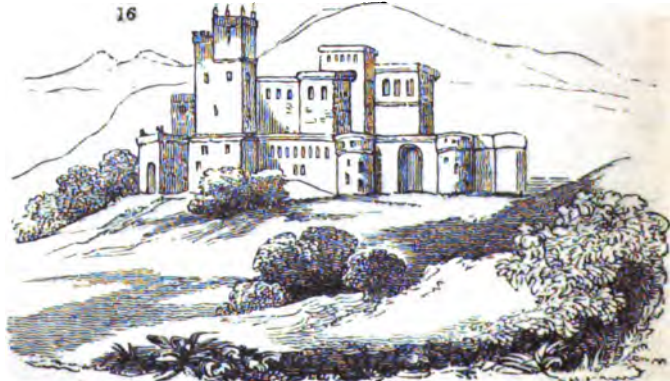
13. *The taste for distributing statues and urns in gardens is said to have been revived, about the beginning of the sixteenth century, by Cardinal d'Este, from the accidental*

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circumstance of his having formed a villa on the site of that of the emperor Adrian, near Rome; where finding a number of antiquities, he distributed them over the newly

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smaged surface. This mode was soon imitated by Francis I. of France, and afterwards adopted in the other countries of Europe. Plants in pots and vases began to be introduced about the same time, and were used to decorate apartments, balconies, and roofs of houses, as at present.

114. *About the end of the sixteenth century* the celebrated Montaigne travelled in Italy, and has left us some accounts of the principal gardens of that age. He chiefly enlarges on their curious hydraulic devices, for which the garden of the Cardinal de Ferrara at Trivoli was remarkable. (*Tour en Ital.*, tom. ii.)

115. *About the beginning of the seventeenth century*, *L'Adamo*, a poem, was written, and published at Milan in 1617, by G. B. Andreini, a Florentine. The prints, Dr. Warton observes (*Essay on Pope*), that are to represent paradise are full of clipped hedges, square parterres, straight walks, trees uniformly lopped, regular knots and carpets of flowers, groves nodding at groves, marble fountains, and waterworks. (See fig. 3. p. 5.) These may be considered as a poetic assemblage of the component parts of a fine Italian garden in the seventeenth century.

116. *After the middle of the seventeenth century*, the celebrated Evelyn, the author of *Aples*, visited Italy, and has described a number of its principal gardens.

117. *At Genoa* he saw the palace of *Hieronymo del Negro*. "On the terrace or hilly garden there is a grove of stately trees, among which are sheep, shepherds, and wild beasts, cut very artificially in a grey stone; fountains, rocks and fish-ponds. Casting your eyes one way, you would imagine yourself in a wilderness and silent country; sideways, in the heart of a great city."

118. *At and near Florence*, he says, there are more than a thousand palaces and country-houses of note. He particularises those of Boboli at the ducal residence (now the palace Pitti), in the town, which still exist, and are kept in tolerable order.

119. *In and near Rome*, he mentions those of the Borgese family, and that of Cardinal Aldobrandini at Frascati, "surpassing, in my opinion, the most delicious places I ever beheld, for its situation, elegance, plentiful waters, groves, ascents, and prospects." He admires several hydraulic conceits, some of which still exist, and also that "of a copper ball, supported by a jet of air issuing from the floor, and continually dancing about."

120. *At Trivoli* he visited the palace and gardens of the family of D'Este, which are mentioned with similar encomiums.

121. *Of the palaces and gardens of Lombardy*, he observes, "noblemen think it no disgrace in this country to be some generations in finishing their palaces, that, without exhausting themselves by a vast expense at once, they may at last erect a sumptuous pile." "An Italian nobleman," Forsyth remarks, "will live on a crown a day, but spend millions for the benefit of posterity, and the ornament of his country."

122. *At Filmarini*, near Vicenza, Evelyn found an orangery, "eleven score paces long, full of fruit and blossoms. In the centre of the garden, a magnificent wire cupola, supported by slender brick piers, and richly covered with ivy. A most inextricable labyrinth." (*Memoirs*, by Bray, vol. i. p. 75—207.)

123. *In the beginning of the eighteenth century*, Italy was visited by Volckamer, a German traveller, whom Hirschfeld considers as a good judge, and deserving credit. Volckamer represents the Italian gardens as inferior to those of France in point of superb alleys, lofty clipped hedges, and cabinets of verdure; but, he adds, that they please the greater part of travellers from the north of Europe more than the French gardens, from the greater variety of plants which they contain, and their almost perpetual luxuriance and verdure. Among the fine gardens of Italy, he includes those of *Venete*, *Stupigni*, and *Vigna della Regina*, near Turin (see § 130.), which do not appear to have been visited by Evelyn. The beauties of most of the gardens near Rome he considers as depending more on their situations, distant views, classic remains and associations, luxuriant vegetation, and fine climate, than on their design, which, he says, exhibits "all the puerilities of the French taste, without its formal grandeur." (*Nachrichten von Italien*, 1ster band.)

124. *About the middle of the eighteenth century*, the English style of gardening began to attract attention in Italy; though, partly from the general stagnation of mind, and partly from the abundance of natural beauty already existing, it has never made much progress in that country. "Unfortunately," observes Eustace (*Tour*, vol. i. p. 426.), a traveller abundantly partial to Italy, "the modern Romans, like the continental nations in general, are not partial to country residences. They may enjoy the description, or commend the representation, of rural scenes and occupations, in books and pictures; but they feel not the beauties of nature, and cannot relish the calm, the solitary charms of a country life." The Italians in general, he elsewhere adds (vol. i. p. 98.), have very little taste in furnishing a house, or in laying out grounds to advantage. Notwithstanding these remarks, and the known paucity of specimens of landscape gardening in Italy, an Italian author of eminence, Professor Malacarne of Padua, has lately claimed for Charles Imanuel, first

Duke of Savoy, the honour of having invented and first displayed an English garden or park in the neighbourhood of Turin. This park he proves, by a letter of Tasso, that poet wished to immortalise "as much as he could," in the well-known stanza of his *Jerusalem*, which Chaucer copied; and which Warton and Eustace suggest as more likely to have given the first idea of an English garden, than Milton's description of Paradise. (*New Mon. Mag.* for July, 1820; *Pindemonte su i Giardini Inglese*, Verona, 1817.)

125. *Of the present state of gardening in Italy, as an art of design*, we shall submit a slight sketch, partly from writers of the present century, and partly from our own inspection in 1819. The grand objects of an Italian nobleman are to produce a huge pile of architecture, externally splendid, and to collect a gallery of pictures and statues. The furnishing of this pile for domestic use, or even the internal finishing of great part of it, he cares little about; and the parks or gardens are inferior objects of attention. The Romans, when at the highest point of power, seem to have had exactly the same taste; as may be gathered from their writings, and seen in the existing ruins of the Villa Adriana, near Tivoli (*fig. 11. p. 21.*), and many others.

126. *The villas of Italy* differ from those of Britain in nothing more than in the disposition of their pleasure-grounds and gardens. "In an elevated situation," Rose observes, "the formal garden, known by the designation of architectural, is sometimes enclosed with a wall too low to impede the view: in ordinary situations this wall is usually higher; but, as the Italian seems to consider a garden merely open at top as we do a room lighted only by a skylight, he usually, besides an iron gate, the spikes of which are often gilt like those of the Tuileries, breaks out two or three windows in the wall. These, which are of course unglazed, are always trellised with iron. The walled garden near the house, which conveys the idea of seclusion and repose, pleases me; the iron gate, too, which serves as a sort of breathing-place, and lets in a peep at the horizon, seems well imagined; but the wall-windows, which are nearly down to the ground, and expose one to a cross battery of starers, appear to take, in a great degree, from the picture of repose and retirement which is suggested by the general design. What is without his garden the Italian wisely leaves to the farmer. He has, indeed, a passion for an avenue, perhaps less on account of its antiquated grace, than the convenience of its sun-proof branches in so broiling a climate; but what has been facetiously called the belted scrubbery (shrubbery) is a monster not yet naturalised in Italy. He has as little idea of the melancholy monotony of the English park, and least of all of a large extent of level lawn. If you should tell him that in this he was to contemplate Nature dressed, he would probably reply, that he saw in it only Nature shaven; an operation which, judging even from her dandies, does not appear to be extremely popular in Italy. In short, the Italian, generally speaking, if he admires the English garden, contents himself with admiring it in Pindemonte's descriptions; though some few are now attempting to bring it into fashion in Italy, at the moment we seem to be returning to the more rational taste of our ancestors in England. One thing, however, is very remarkable, that, even where this has been partially introduced, there are no such thing as toad-stool cottages with double coach-houses, or any of those perverse erections which I should characterise as grotesque; by which I mean a coarse and clumsy order of the picturesque. The cause of this seems to be a thing well worthy of remark in itself. Few models are to be found of it even in the really rustic buildings of the peasantry; for the characteristic of the Italian villages, as well as of the Italian towns, is picturesque elegance. The farm-house, where it is large, is surrounded by arcades; the villa is shrouded with cypresses, which harmonise happily with the building, and make a pleasing break between its formal lines and the dishevelled foliage of the middle ground and distance. The church is such as would form the ornament of a city in England or France; and the oratory under trees, by the roadside, with its fresco paintings, completes the scene. The remote cause of this elegance seems to have been the magnificence of the Italians when 'wealth was theirs;' and the impulse would appear to have continued after the cessation of the cause. Many circumstances have seconded this; and hence, perhaps, Architecture has survived many of her sister arts. One of the most obvious is the plenty of materials, which are furnished by stream and mountain, and the cheapness of manual labour. Other causes, too, have indirectly contributed to this effect. Thus, the proprietors (at least in the plains), being almost always rich, naturally seek to give stability to their farm-houses, and to adapt them to the purposes which they are to answer. These purposes themselves, in this climate, come in aid of architecture: for here porticoes and arcades form the cheapest and pleasantest apartments during the greater part of the year, and are, moreover, conducive to the purposes of husbandry; as such, for instance, in affording a place of deposit for the ears of the Indian corn, where it is laid to dry, and afterwards beat out for use." (*Letters from the North of Italy*, p. 147.)

127. *The Italians when they speak of the villa* do not mean the house, which is *palazzo*, *palazzino*, or *casino*, but the whole enclosure, containing, besides the small place appropriated merely to pleasure and show, a large garden cultivated for profit; and frequently

vineyards, olive grounds, and cornfields. It was disputed at a Roman academy what constituted the difference between a *villa* and a *signa*; and it was decided that they are the same thing. The ornamental part usually consists of a few terrace walks, with clipped edges of bay, or sometimes shaded with *l'lex*; and it is only a few of the principal, immediately about Rome, which considerably differ from this description. (*Wood's Letters*, &c., vol. ii. p. 83.)

128. Near Turin, the palace and gardens of Venerie still exist, but are only remarkable for their extent, and for an old orangery nearly six hundred feet in length. The surface of the park is irregular, and the trees are distributed in avenues, alleys, and geometrical figures; the grounds of some of the numerous white villas near the city are romantic, and command extensive prospects; but very few aspire to the character of fine gardens. The Carignano Palace is the most considerable in Turin, and its façade is one of those innumerable instances where architecture has been made subservient to the fashion of the day, after the style of the Borromini, rather than conformable to any principles of good taste. (*Duppa's Observations*, &c., p. 180.) "Turin," the same author observes, "looks like a city planned by a royal architect, whose subjects, of equal wealth and station, were already made for his buildings, and not as if it had grown, like other cities, out of the varied circumstances and conditions of human life. A town built in this manner loses its individuality and its interest. Turin and Mannheim, and the city of Washington in America, are the same; to which several others might be added." (*Ibid.* p. 177.)

129. *La Vigna della Regina*, or Queen's Villa, at Turin, Lady Morgan found conspicuous for the beauty of its situation. It rises on one of the many lovely acclivities which swell in endless undulations round the capital. This retreat, when Lady Morgan saw it, was half neglected and half adorned; just not falling in ruins, and just sufficiently wild and solitary to banish all idea of a royal residence and a town vicinage. Though frequently visited by the queen, it exhibits a strange mixture of discomfort and magnificence. (*Lady Morgan's Italy*, vol. i. p. 46.)

130. *The island of Sardinia* is extremely fertile, and the climate is remarkably fine; but, notwithstanding these advantages, from the want of resident landed proprietors, and the general poverty of the inhabitants, gardening can scarcely be said to be cultivated as an art of design and taste. The public promenades to some of the principal towns form the sole exceptions. The viceroy resides at Cagliari. (*Assevi, Histoire Géographique, Politique, et Naturelle de la Sardaigne*.)

131. *The island of Elba* received an impulse of general improvement at the time of its occupation by the English, in 1799. All the good houses have been built since that period, before which it contained only mud cottages. Elba has, however, even now, little to boast of in the way of gardening as an art of design and taste. Napoleon's country house, at San Martino, is two stories high, with a broad flat terrace in front, commanding, through a valley filled with vines, a distant view of the harbour of Porto Ferrajo. (*Williams's Travels*, &c.)

132. At Genoa the best garden is that of Signor del Negro, situated within the city. It is elevated, irregular, and singularly varied; rich in views of the town, the sea, and the mountains; and abounds in fruits, botanical riches, shady and open walks, turrets, and caves. There is one large cave in which dinner-parties are frequently given by the proprietor; and once a year, we believe on his birthday, or the fête day of his patron saint, this grotto is decorated with some hundreds of religious puppets, in gilt dresses, accompanied with pictures of saints, skulls, crucifixes, relics, tapers, and lamps. This forms a part of the gardener's business, who preserves these paraphernalia through the rest of the year in a sort of museum. We mention the circumstance, as characteristic of the Italian taste for spectacle, so different from that of the English. The gardens of Hipólito Durazzo, and of Grimaldi, are more extensive, but less select, than those of Signor del Negro. Like them, they are singularly varied in surface, and rich in marine views. In the neighbourhood of Genoa there are many very beautifully situated villas. The garden of the Prince Doria Panfilì is a beautiful wilderness; and the Sommelini gardens, furnished with a theatre, grottoes, and Chinese temples, are in decay, and the walks and parterres are fast returning to the state of nature out of which they were made. (*Duppa's Obs.*, &c., p. 187.) The whole coast from Savona to Genoa, and from Genoa to Nervi, is naturally very irregular, and abounds in beautiful gardens, abundantly stocked with orange trees, partly in pots; but, in warm situations, trained against walls, or planted as standards. We visited many of these gardens in 1819; and the only general fault seemed to be the want of order and keeping, properties which are essential to the full effect of every style in every country.

133. In Lombardy, the gardens of Monza, and of the Isola Bella, are the most remarkable for picturesque beauty; those of the Brenta still retain marks of their ancient celebrity.

134. *The extent and beauty of those of the Isola Bella* (fig. 17.) have been greatly

exaggerated by Eustace and other travellers. "Nothing," says Wilson, "can be so noble as the conversion of a barren rock, without an inch of earth on its surface, into a

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paradise of fertility and luxury. This rock, in 1640, produced nothing but mosses and lichens; when Vitaliano Borromeo conceived the idea of turning it into a garden of fruits and flowers. For this purpose, he brought earth from the banks of the lake, and built ten terraces on arches, one above the other, to the top of the island, on which the palace is placed. This labour has produced a most singular pyramid of exotics and other plants, which make a fine show, and constitute the chief ornament of this miracle of artificial beauty (fig. 18.). The orange and lemon trees are in great luxuriance, and the grove of bays (*L. nobilis*) is hardly to be equalled any where in Europe; two of them, in particular, are said to be the largest known in existence." (*James Wilson's Journal of Two successive Tours on the Continent in 1816 and 1818*, 3 vols. 8vo, 1820, vol. iii. p. 449.) Many travellers imagine that the orange trees in the Isola Bella, and on the shores of the Lago Maggiore and other lakes, stand the winter without protection, because they are planted in the open ground. But the truth is, that these trees are regularly defended in winter by temporary sheds of wood or straw, or both; and in extremely severe weather have even artificial heat. (*Gard. Mag.*, vol. vii. p. 309.)

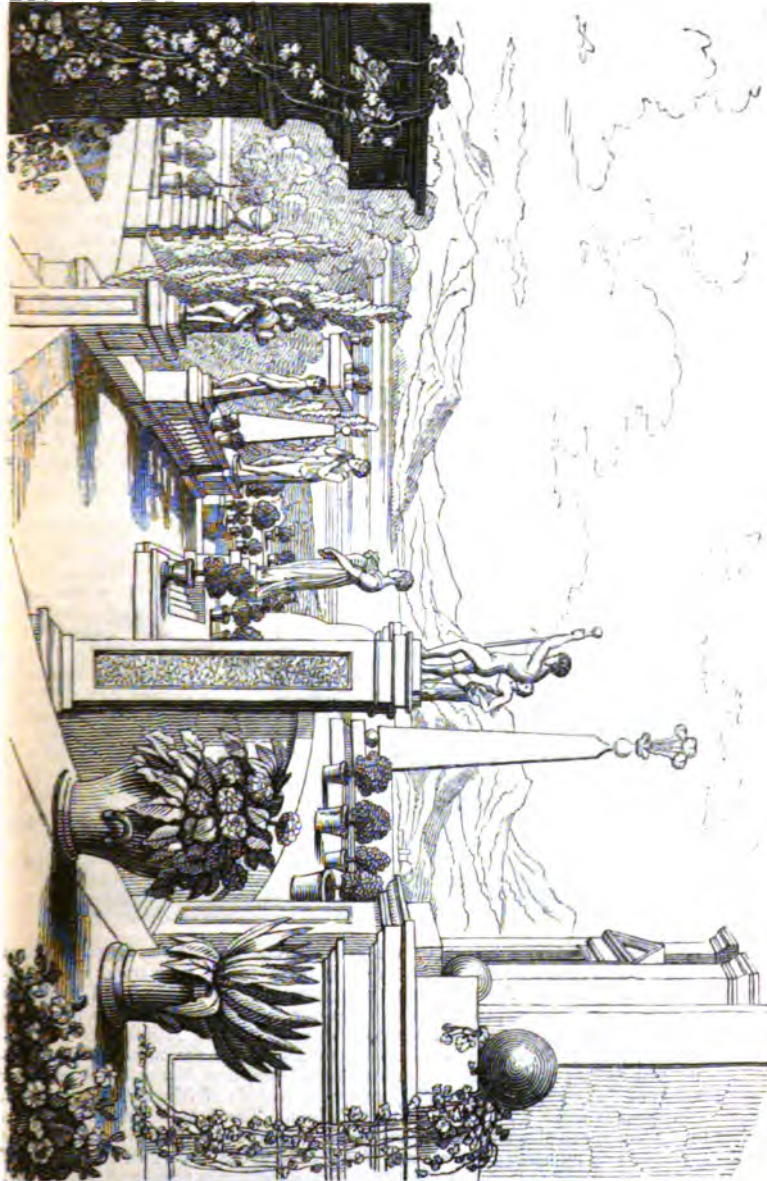
135. *The beauties of the Isola Bella* have been differently estimated by different travellers. A French author writes:—"L'Isola Bella est digne de son nom: elle ressemble à une île enchantée; palais merveilleux, magnifiques jardins, arbres odoriférans, fontaines cristallines, statues, bosquets, fleurs choisies; tout s'y trouve." Another:—"L'Isola Bella est d'un genre de beauté qui tient du prodige. C'est une merveille et de l'art et de la nature en même temps, une véritable île enchantée. Les bosquets ne peuvent être comparés qu'à ceux d'Idale; ses jardins qu'à celui des Hespérides; son palais qu'à celui d'Armide." Galiffe says, "The Isola Bella is altogether artificial, and contains a large but ill-looking palace, in the worst taste of architecture, with a pyramid of terraces and flower-gardens raised one above another. There is no shade, except in one place near the margin of the lake, where some very fine laurel trees grow; on one of which Bonaparte's name was carved, it is said by himself, on his way to or from Marengo." (*Italy and its Inhabitants in 1817*.) Wood says, "The Isola Bella contains a magnificent villa of the Borromean family, in sublimely bad taste both inside and out; but the profuse and extended scale on which art has exerted itself in the grounds, joined to a luxuriant vegetation, produces no small effect of grandeur. The views from the terraces are most beautiful, both up and down the lake, and up the bay." (*Letters of an Architect*, vol. i. p. 201.) Mr. Hazlitt was "utterly disappointed in the Borromean Isles." "Isola Bella," he says, "resembles a pyramid of sweetmeats ornamented with green festoons and flowers." He had supposed this a German conceit, but found it a literal description. (p. 368.) Brockenden says, the Isola Bella "is only worthy of a rich man's misplaced extravagance, and the taste of a confectioner." (*Illustrations of the Passes of the Alps, &c.*, 1828.)

136. *The statue of St. Charles Borromeo* is one of the strangest sights in Italy. "On a hill above Arona, a very picturesque little place, near the Borromean Isles," says Wood, "is the statue of St. Charles Borromeo; sixty-six feet high, on a pedestal of above thirty; so that the whole is about one hundred English feet in height. As I walked along the road below, the pedestal was quite lost; and the great priest walking among the woods, which reach only to his middle, and holding up his fingers in the act of blessing the people, had a very singular effect. The statue is made partly of cast bronze, and partly of plates of copper on timber framing; and the execution is very good. The views from it are exceedingly fine." (*Wood's Letters, &c.*, vol. i. p. 201.)

137. *At Monza*, the royal residence, near Milan, is the finest garden scenery in Italy. The park contains upwards of 3000 acres, of a gently varied, fertile surface. It is chiefly laid out in the regular style; but contains also an English garden of considerable extent and beauty. It is well watered, and the walks are not so numerous as to

disturb the unity and repose of the scene. The culinary, flower, botanic, and fruit gardens, orangeries, and hot-houses, are all good, and as well managed as the circumstances of the present vice-king will admit. Very fine avenues lead from this residence to Milan. The whole was greatly enlarged and improved in Beauharnois's time, under

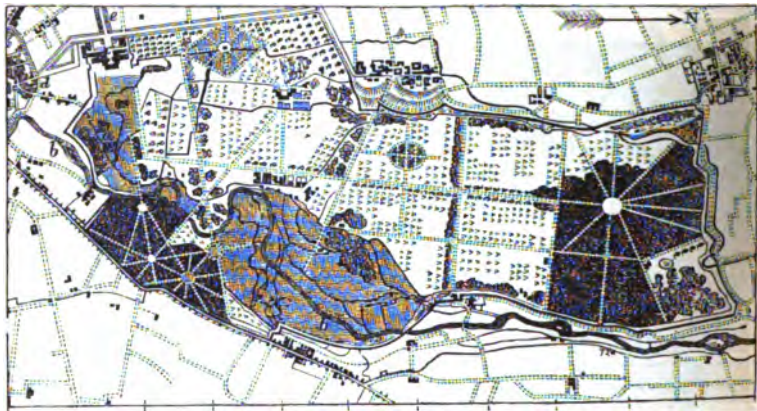
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the direction of the late Signor Villaresi, one of the most scientific gardeners in Italy; and was managed by him, though latterly with greatly diminished resources, till his death in 1823. A plan of the park of Monza (*fig. 19.*), with a description, and views of the palace and gardens, was published in 1827. Its chief features appear to be in the

ancient style; but that portion of it which is laid out in the English manner (a) contains some interesting views, particularly a grotto scene, and the island in the lake.

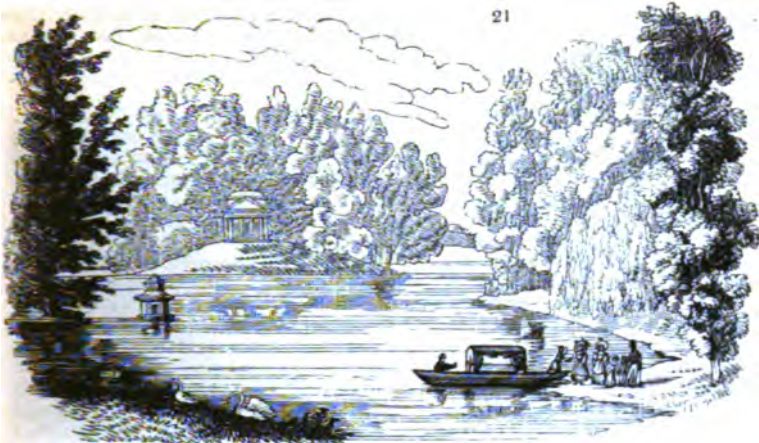
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(figs. 20. and 21.) The river Lombro (fig. 19. b), which passes through the grounds, adds greatly to their interest in a picturesque point of view; and is, at the same time, employed for irrigating part of the park. The palace (c), finished in 1780 by Piermarini, is a large building (fig. 22.); but loses much of its effect as a country residence



from being placed at one corner of the grounds, and near to the town of Monza (fig. 19. d). The double avenue to Milan (e) is composed of tulip trees, magnolias, melias, robinias, and other flowering trees, interspersed with evergreen and American oaks, and has a very beautiful effect both in summer and autumn, and even in winter, from the number of evergreens. (*Promenade dans le Parc de Monza, par F. Loe. 12mo, Milan, 1827.*) Mr. Clare, an Englishman resident in the north of Italy, informs us, that among the exotic trees in the English garden at Monza, there are some good cedars of Lebanon, and a shrubbery composed entirely of *Magnolia grandiflora*, some specimens of which have attained a great height. The botanic garden, which is close to the house, contains a numerous collection from every part of the world. The hot-houses are very numerous, and are also placed close to the house: besides plants of ornament, they contain an immense quantity of orange and lemon trees, and pine-apples. In the park there are a great many enclosures, some of which are arable, and others are vineyards or orchards. There are a number of ornamental cottages occupied by peasants; and in the garden there is a tower appropriated to a collection of cryptogamous plants, and other subjects of natural history, modelled in wax. The present viceroy



is known to be attached to natural history, and he introduces every year new plants with a view to acclimatising them. (*Gard. Mag.*, vol. ii. p. 460.)



These are various gardens pointed out to strangers as English (*ceramie Inglesi*), near Milan, and also at Verona, Vicenza, Brescia, Porto, &c.; and Bonaparte caused a small public garden to be made in Venice. "In many of the villas on the Lake of Como," Wilson observes, "it is most delightful to behold lofty crags frowning over the highly cultivated gardens; with hot-houses of exotic plants, neat terraces, and ornamental summer-houses, subduing the natural wildness of the situation." The Villa Pliniana, on the Lake of Como, belongs to the Marquis Carnarati, and contains a room so constructed as to command a view of the intermittent fountain spoken of by Pliny in his letter to Licinius. (*Duppa's Observations, &c.*, p. 113.)

139. *Petrarch's house at Arquè* (*fig. 23.*) still remains, without appearing to have



undergone any material alteration since his time. It is pleasantly situated among the Euganean hills, in a picturesque village about ten miles from Padua. (*Dugga's Obs.*, p. 162.) The plan shows no arrangement. The habitation of Ariosto in Ferrara, is still shown. It was built by himself. "It is a pity," Wood observes, "that he had not a better architect." (*Letters, &c.*, vol. ii. p. 120.)

140. *Most of the villas in Lombardy*, which we visited in 1819, were too much ornamented, and too full of walks, seats, arbours, and other ornaments, for that repose and simplicity which, according to our ideas, is essential to an English garden. Art, in most of these gardens, is as much avowed as in the French style; whereas, in the true English garden, though art is employed, yet it is not avowedly and ostentatiously displayed; on the contrary, the grand object is to follow the directions of the Italians themselves, and study that the art "*che tutto fa, nullo si scopre.*"

141. *At Florence*, the ducal gardens of Boboli are the most remarkable. They occupy two sides of a conical hill, and part of a bottom, and consist of three parts: a botanic and exotic garden close to the Palace Pitti, and to the celebrated museum; a kitchen-garden, near the hill top; and a geometric garden, which occupies the greater part of the hill. The scene abounds in almost every ingredient of the style in which it is laid out. The ground being very steep, almost all the walks slope considerably; but a few, conducted horizontally, are level, and serve, if the expression be admissible, as resting walks. There are abundance of seats, arbours, vases containing agaves and orange trees, and a prospect tower on the summit, from which, as well as from many other points, are obtained fine views of Florence and its environs. In the lower part or bottom is a handsome basin of water, with an island and fountains in the centre, bordered by a marble parapet ornamented in summer with vases of orange trees, and surrounded by shorn hedges and statues. On the whole, nothing has been spared to render these gardens complete of their kind: and the effect is perhaps as perfect as the situation, from its irregularity and steepness, will admit. There are numerous private gardens round Florence, but none of them remarkable. The fortuitous scenery of Vallombrosa and other romantic situations are the grand attractions for strangers. On Mount Fiesole, and thence to Bologna, are some country-seats, with lodges, and winding approaches, which, considering the arid soil, are highly beautiful, and come the nearest to those of England of any in the warmer regions of Italy. The Tuscans, Sismondi observes (*Tab. de l'Agr. Tosc.*), are the more to be condemned for having neglected gardening, since their countryman, Proposto Lastri, had rendered Delille's poem into Italian in a style equal to the original. But the *gens à leur aise*, and the nobles, he says, have no love of rural nature, and only come into the country after vintage to shoot for a few days, and indulge in feasting. They come in large parties with their ladies, and in a few weeks expend what they have been niggardly laying aside during the rest of the year. He mentions the Chevalier Forti, at Chiari, and Signor Falconcini, at Ceretto, as having delightful gardens; adding, that the country-seats of the Luquois are in the best taste of any in Italy.

142. *Pratolino*, a villa of the grand duke, near Florence, Mr. Wood found in a ring fence of five miles in circumference, and "really in the English style; with too many serpentine walks perhaps, a defect not uncommon in our country; but without all the ins and outs, and crinum-craniums of what is usually called on the Continent an English garden. The mixture of fine trees and lawns, with the views of the deep and cultivated valley below, and occasionally the wider vale of the Arno, form a delightful scene." (*Wood's Letters*, vol. ii. p. 302.)

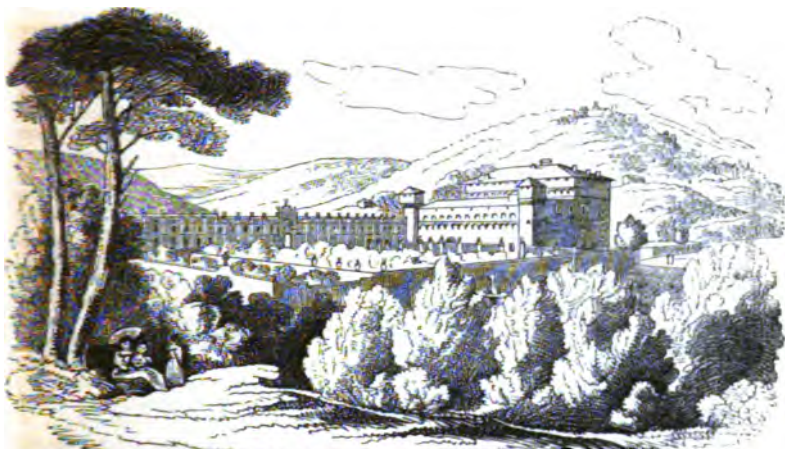
143. *The villas of Rome*, Forsyth observes, are to this day the "*ocelli Italiani.*" Their casinos generally stand to advantage in the park; light, gay, airy, and fanciful. In the ancient villas the buildings were low, lax, diffused, and detached. In the modern, they are more compact, more commodious, and rise into several stories. In both, the gardens betray the same taste for the unnatural, the same symmetry of plan, architectural groves, devices cut in box, and tricks performed by the hydraulic organ. (*Rem. on Italy*, p. 173.) A few cardinals, he elsewhere observes, created all the great villas of Rome. Their riches, their taste, their learning, their leisure, their frugality, — all conspired in this single object. While the eminent founder was squandering thousands on a statue, he would allot but one crown for his own dinner. He had no children, no stud, no dogs to keep; he built, indeed, for his own pleasure, or for the admiration of others; but he embellished his country, he promoted the resort of rich foreigners, and he afforded them a high intellectual treat for a few pauls, which never entered into his pocket. This taste generally descends to his heirs, who mark their little reigns by successive additions to the stock. How seldom are great fortunes spent so elegantly in England! How many are absorbed in the table, the field, or the turf! — expenses which centre and end in the rich egotist himself! What English villa is open, like the Borghese, as a common drive to the whole metropolis? (*Rem. on Italy*, p. 216.)

144. *The gardens of the Quirinal Palace* occupy a fine situation, overlooking great

part of Rome; and art has adorned them with the Papal arms in coloured sand, slugs, broken pots, and other beauties of that sort. (*Wood's Letters, &c.*, vol. i. p. 452.)

145. *The Villa Borghese* (fig. 24.) is the most noted in the neighbourhood of Rome.

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It has a variety of surface formed by two hills and a dell, and a variety of embellishments, casinos, temples, grottoes, aviaries, modern ruins, sculptured fountains, a crowd of statues, a lake, an aqueduct, and a circus; but it wants the more beautiful variety of an English garden; for here you must walk in right lines, and turn at right angles, fatigued with the monotony of eternal *I'lex*. (*Remarks, &c.*, p. 216.) Eustace says these gardens are laid out with some regard both for the new and the old system, because winding walks are to be found intersecting the long alleys. This is true; but the whole is so frittered down by roads, walks, paths, and alleys, and so studded with statues and objects of art, as to want that repose, simplicity, and massive appearance, essential, at least, to an Englishman's idea of an English garden. Simplicity, however, is a beauty less relished among the nations of the Continent than in this country, and less relished by the Italians than by any other continental nation. The Villa Borghese, Wood observes, is a garden, or pleasure-ground, said to be three miles in circumference, with shady walks, which he found delightful as early as the 4th of February, and tall stone pines scattered about the more open parts. These trees, and the *I'lices*, are the most important circumstances in the beauty of the place. There is a pretty lake, and a considerable variety of ground and of scenery; and several buildings, not perhaps very beautiful in themselves, but assisting the general character of the place. Art appears every where, but not obtrusively, and without pretence. (*Letters of an Architect*, vol. ii. p. 28.)

146. *The Villa Panfilii* displays the most architectural gardens of any about Rome. Here, as Forsyth observes, hedges of laurels, porticoes of *Quercus I'lex*, green scutcheons, and clipped coronets, are seen vegetating over half an acre, with theatres of *jets d'eau*, geometrical terraces, built rocks, and measured cascades.

147. *The Villa Adriana*. On a hill, nearly detached, amidst tall cypresses, magnificent stone pines, and other products of a luxurious vegetation, appear the ruins of the Villa Adriana (fig. 11. p. 21.). The extent is immense. "We walked," says Wood, "for above a mile among arches, great semi-domed recesses, long walls and corridors, and spacious courts, through an amazing number of small apartments, and some large halls. In many places the painted stucco remains, with the ornaments upon it in relief, the rich marbles and porphyries which incrust the walls, the marble columns and cornices, and the numerous statues which once adorned the spacious porticoes, are all gone; much has been taken to Rome, much has been burnt to lime, and a great deal has been carelessly or wantonly destroyed. The varied forms of the remaining masses, the pines, the cypresses, the olives, the *I'lices*, and the deciduous trees, with the different shrubs growing on the ruins themselves, and by which they are more or less shaded, and whose colouring contrasts admirably with the warm brown of the buildings, together with the advantages of the natural situation, form a succession of the most beautiful and picturesque scenery. All the magnificence of this spot does not, however, seem to have been merely for one individual. Besides the imperial apartments, and the habitations of the officers and guards, there were apartments provided for men of science, and every

thing necessary for study and instruction as well as for amusement. Here were three theatres, besides a circular building, which is called, on account of some figures of Scamander found there, a maritime theatre. Nibby pronounces it a bath for swimming; to me it seems a little amphitheatre, and I saw no indication that it had ever contained water. There were also a stadium, baths, public libraries, and places of exercise, an academy, and I will not pretend to tell you how many temples; at least, you are shown ruins which go by these names, and there is no deficiency of room, or of fragments of masonry, to be assigned to each." (*Wood's Letters*, vol. ii. p. 54.)

148. *The Villa d'Este*. Tradition says that Ariosto lived here, with his friend Cardinal Ippolito, and wrote great part of his Orlando. (*Graham's Three Months in the Mountains near Rome*.) The construction of this villa, Wood observes, "is on a scale which may entitle it to be mentioned among these ancient productions. Terrace rises above terrace, and a copious supply of water rushes down an artificial rock 34 feet in height, spreading in a beautiful manner as it descends; while the whole is crowned by the long façade of the palace." (*Letters of an Architect*, &c., vol. ii. p. 67.) Cadell found this villa, in 1818 (as we did in 1819), in a very neglected state. (*Travels*, &c., p. 457.)

149. *A number of other villas* might be enumerated; but, as far as respects gardens, the description, if faithful, would be tiresome and monotonous. Even Eustace allows that, "howsoever Italian gardens may differ in extent and magnificence, their principal features are all nearly the same; the same with regard to artificial as well as natural graces. Some ancient remains are to be found in all, and several in most of them. They are all adorned with the same evergreens, and present, upon a greater or less scale, the same Italian and ancient scenery. They are in general much neglected, but for that reason the more rural." (*Classical Tour*, vol. i. p. 18.)

150. *At Frascati*, Belvidere, a villa of Prince Borghese, commands most glorious prospects, and is itself a fine object, from the scenic effect of its front and approaches. Behind the palace is an aquatic stream, which flows from Mount Algidus, dashes precipitately down a succession of terraces, and is tormented below into a variety of tricks. The whole court seems alive at the turning of a cock. Water attacks you on every side: it is squirted in your face from invisible holes; it darts up in a constellation of jets d'eau; it returns in misty showers, which present against the sun a beautiful iris. Water is made to blow the trumpet of a centaur and the pipe of a cyclops; water plays two organs; makes the birds warble, and the muses tune their reeds; sets Pegasus neighing, and all Parnassus on music. "I remark," says Forsyth, "this magnificent toy as a specimen of Italian hydraulics. Its sole object is to surprise strangers; for all the pleasure that its repetitions can impart to the owners, is but a faint reflection from the pleasure of others."

151. *The celebrated villa built by Palladio* for the Marquis Capra, near Vicenza, which has been universally admired, and of which Chiswick and others in England are imitations, is now (1822) a melancholy spectacle: the stucco is ragged, the window-shutters are decayed and patched, and grass is growing between the steps of all the porticoes up to the entrance doors. It is tenanted by an Austrian general at the rate of tenpence a day. (*Druppa's Observations*, &c., p. 159.)

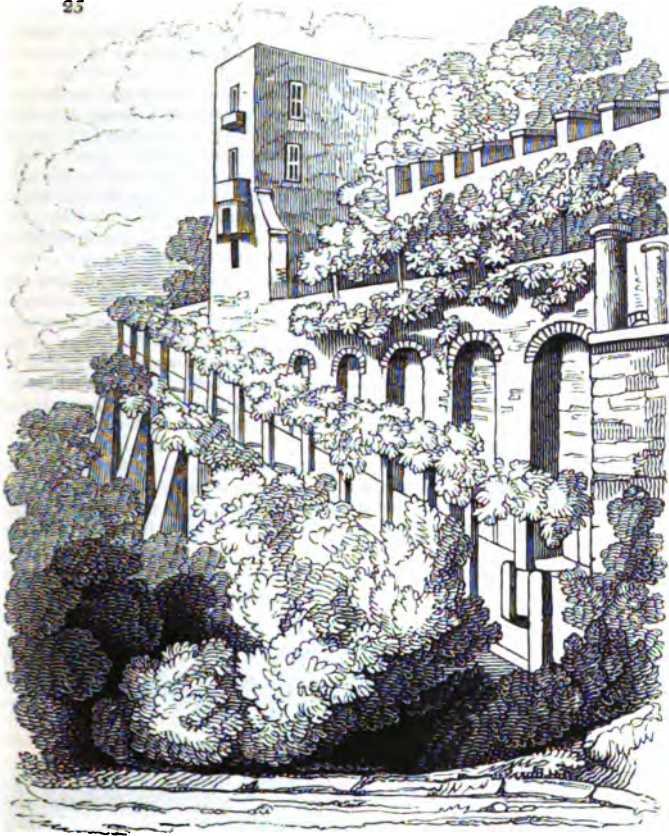
152. *At Naples* the gardens possess the same general character as those of Rome, though, with the exception of Caserta, they are less magnificent. They are more indebted to their architecture, and the luxuriance of vegetation, than to the gardener; and their greatest beauty is to be found in the combination of trellised vines, and piers, pillars, and arches of masonry. A villa on the steep bank on the coast of Pausillipo (fig. 25.) affords a fine example of this description of beauty.

153. *The royal gardens of Portici*, in 1819, were chiefly walled cultivated enclosures, abounding in oranges, figs, and grapes, with straight alleys and wooded quarters entirely for shade. There is one small department, of a few perches, devoted to the English taste; but it is too small to give any idea of that style. There is also a spot called *La Favorita*, in which, says Starke (*Letters*, vol. ii. p. 125.), the late king placed swings and wooden horses, or hurly-burlies (such as are to be seen at our fairs), for his own particular amusement, and that of his nobility. The approach to this garden is through the palace court, great part of which is occupied as a barrack by troops. The filth and stench of this court is incredible; and yet it is overlooked by the windows of the king's dining-room, where he was sitting at dinner, on his return from the chase, when we passed through the palace, on the 2d of August, 1819. We know no scene to which it could be compared, but that of the court of some of the large Russian inns in the suburbs of Petersburg.

154. *The gardens of Prince Leopold at Villa Franca* almost adjoin those of the king. They are less extensive, but, in 1819, were kept in much better order, by a very intelligent German. The orange groves and trellises in both gardens were particularly fine; and in that of Prince Leopold there was a tolerable collection of plants. There is in

Naples a royal garden, in the geometric style, combining botany, and some specimens of the English manner, which has the advantage of an elevated situation and fine marine views, and when we saw it (in 1819) was being enlarged.

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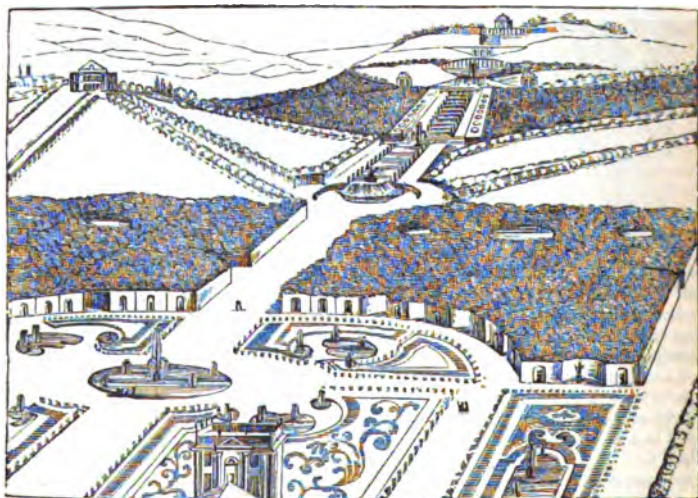
155. *Extensive gardens of pots and boxes* are common on the roofs of the palaces and other houses in Naples. Viewed from the streets they have a singular effect, and, retaining their beauty and fragrance, from the fresh breezes in these elevated regions, and the comparative absence of that stench with which the lower atmosphere of Naples is almost continually charged, they are very agreeable to the possessors.

156. *The royal residence of Caserta* is about seventeen miles from Naples. This palace, in which, as Forsyth observes, the late king sought grandeur from every dimension, is situated in an immense plain, and is a quadrangle, the front of which is upwards of seven hundred feet long. It was begun in 1752, roofed in 1757, but in 1819 was not, and probably never will be, finished. The park extends from the palace to a range of mountains at two miles' distance, some of which it includes. It may be said to consist of four parts: open pasture, almost without trees, near the palace; woody scenery, or thick groves and copses, partly near to, but chiefly at a considerable distance from, the palace; mountainous scenery, devoted to game and the chase, in the extreme distance; and an English garden on one side, skirting the mountains. There are, besides, St. Lucio, a large village, a silk-manufacture, a farm, &c.; all of which are described by different tourists, — minutely by Vasi, in his *Guide to Naples and its Environs*; and plans of the whole are given by L. Vanvitelli, in his *Disegni del Reale Palazzo di Caserta*.

157. *The cascade and canal of Caserta* constitute its most remarkable feature, and that which renders this park, in our opinion, the most extraordinary in Europe. The water is begun to be collected above thirty miles' distance among the mountains, and, after being conducted to a valley about five miles from Caserta, is carried over it by an

aqueduct consisting of three tiers of arches, nearly two hundred feet high, and two thousand feet long. The volume of water is four feet wide by three and a half feet deep, and moves, as near as we could estimate, at the rate of one foot in two seconds. Arrived at the back of the mountain Gazzano, a tunnel is cut through it, and the stream, bursting from a cave about half-way between the base and the summit, forms a cascade of fifty feet directly in front of the palace. The waters are now in a large basin, from which under-ground tunnels and pipes proceed on two sides, for the purpose of supplying the lakes or rivers in the English garden, the fish-ponds, and various jets d'eau; also for irrigation, to maintain the verdure of the turf. From the centre of this basin proceeds a series of alternate canals and cascades of uniform breadth, in a direct line down the slope of the hill, and along the plain to within a furlong or little more of the palace. Here it terminates abruptly, the waters being conveyed away under ground for other purposes. The effect of this series of canals and cascades, viewed from the garden-front of the palace, or from the middle entrance-arch, through that "long obscure portico or arcade which pierces the whole depth of the quadrangle, and acts like the tube of a telescope to the waters," is that of one continued sheet of smooth or stagnant water resting on a slope; or of a fountain which had suddenly burst forth and threatened to inundate the plain; but for this idea the course of the water is too tame, tranquil, and regular, and it looks more like some artificial imitation of water than water itself. In short, the effect is still more unnatural than it is extraordinary; for though jets and fountains are also unnatural, yet they present nothing repugnant to our ideas of the nature of things; but a body of water seemingly reposing on a slope, and accommodating itself to the inclination of the surface, is a sight at variance with the laws of gravity. Unquestionably the cascade at the extremity is a grand object of itself; but the other cascades are so trifling, and so numerous, as in perspective, and viewed at a distance, to produce this strange effect of continuity of surface. As a proof that our opinion is correct, we refer to the views of Caserta, which are got up by the Neapolitan artists for sale: had these artists been able to avoid the appearance in question, even by some departures from truth, there can be no doubt they would not have hesitated to do so. A bird's-eye view of this canal, in Vanvitelli's work (*fig. 26.*), gives but a very imperfect idea of the reality

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as seen from the surface of the ground, and especially from the palace and lower parts of the park. A sketch showing the palace on the right side, and part of the canal on the left, which a friend sent us in 1828 (*fig. 27.*), is not very correct as to the lines of the canal; but it shows its position on the side of a hill, and the immensity of the palace, doubtless the largest habitation of the kind in Europe. Forsyth seems to have paid little attention to this water, having been chiefly struck with the palace. Eustace says, "The palace is one of the noblest edifices of the kind in Europe; the gardens extensive, regular, but, except a part in the English style, uninteresting. From a reservoir on the mountain Gazzano, the water is precipitated down the declivity to the plain, where, collected in a long straight canal, it loses its rapidity and beauty, and assumes the appearance of an old-fashioned stagnant pool." (*Tour in Italy*, vol. i. p. 602.) Wil-

soon says, the cascade of Caserta might have been made the finest of its kind in the world; but it has been spoiled by a love of formality, which has led the copious stream



drizzling over regular gradations of steps into a long stagnant canal. (*Tours, &c.*, vol. ii. p. 217.) Wood says, "The aqueduct of Ponte delle Maddalena conveys water across a deep valley to the foolish cascade at Caserta, and renders no further service, notwithstanding its great elevation. The palace of Caserta is an enormous pile of building, but with no effect externally corresponding to its vast size. The gardens are not beautiful; and a feeling of dissatisfaction is produced when we see the enormous expense of the aqueduct employed to produce an ugly and ill-placed cascade. The palace is placed too low, for though the ground rises gradually towards it for a great distance, the slope is not of itself perceptible; and if it had been erected on part of the still gentle, but sensible ascent, behind the present edifice, the situation would have been admirable, both for the appearance of the building, and the pleasantness of the views from it." (*Letters, &c.*, vol. ii. p. 120.) Spence says, Caserta is among the few old gardens, which one would not regret to see converted into an English garden. There are, he says, (writing in 1832,) no trees of the luxuriant growth of those which adorn the Boboli garden at Florence, or that of the Villa Borghese at Rome; and the rows of evergreen oaks on each side of the great canal, being kept clipped to the height of only about 15 ft., have a very stunted and paltry look. (*Gard. Mag.*, vol. viii.)

158. *The English garden of Caserta* was formed by Græffer, a German, author of a *Catalogue of Herbaceous Plants*, who had been some time in England, where he was first a gentleman's gardener, and afterwards a nurseryman at Mile End, near London. He was sent to the king of Naples, about 1780, by Sir Joseph Banks; and has formed as perfect a specimen of English pleasure-ground as any we have seen on the Continent. The verdure of the turf is maintained in summer by a partially concealed system of irrigation; and part of the walks were originally laid with Kensington gravel. Every exotic which at that time could be furnished by the Hammersmith nursery, was planted; and many of them formed, when we saw them, in 1819, very fine specimens. Among these the camellias, banksias, proteas, magnolias, pines, &c., have attained a large size, and ripened their seeds. There is a good kitchen and botanic garden, and extensive hot-houses, chiefly in the English form; but, in 1819, they were much out of repair. Indeed, this remark will apply to the whole place excepting the palace. Græffer laid out the gardens of the Duke de San Gallo, at Naples, and various others. He was not liked by the peasants of St. Lucio, who, taking the advantage of him when thrown from a cabriolet, stabbed him mortally, before he could recover himself, in 1816.

159. *In Calabria* there are but few gardens remarkable for either design or taste; though almost every family in Castel Nuovo has a good garden, planted with fruit trees (which produce as good fruit as that grown in any part of Italy), and well stocked with all kinds of excellent vegetables. (*Elmhirst's Travels in Calabria*, p. 56.)

160. *Policoro*, a large house and farm belonging to the family of Grimaldi, has some "well planted gardens near the house, watered by a copious fountain, which only make us regret that they are not kept in better order: but neatness and regularity will be in vain looked for in the south of Italy." (*Craven's Tour, &c.*, p. 199.)

161. *Cassano, in Calabria*, not far from Amendolara, is the residence of the Duke of Casano. The mansion is a modern, substantial, and commodious building; the view from it extends over an extensive range of luxuriant gardens; and out of their thick and shadowy recesses, a solitary Roman tower rears its majestic form between two immense palm trees. A stream winds its clear and rapid course round this scene; and in the distance is the sea. (*Ibid.*, p. 212.)

162. *In Sicily* are some gardens of great extent. A few are mentioned by Swinburne; and an account of one belonging to a Sicilian prince, remarkable for its collection of

monsters, is given in Brydone's Tour. "On Sicily," Sir Richard Colt Hoare observes, "Nature has lavished all the necessities and luxuries of life; the most fertile soil, and the most advantageous and excellent sea-ports in Europe: yet the inhabitants are sluggish, indolent, and ignorant, and their dwellings (those of the peasants) sordid, and even loathsome." The abundance of streams and springs in the neighbourhood of Palermo would furnish the means of forming the most delightful gardens; but for this species of decoration the inhabitants have no taste; the only ornaments of their extensive pleasure-grounds are orange, lemon, and a few other kinds of fruit trees. Many parts are happily situated for vegetation, as is sufficiently proved by the flora; but the soil of the Bagaria is too shallow and rocky. "Among the numerous villas which distinguish the neighbourhood of Palermo," says Sir Richard Colt Hoare, "two have particularly attracted the notice of travellers, Valguernara and Palagonia; the former from its charming situation, the latter (that referred to by Brydone) from the absurdities with which it is marked. Few of the villas round Palermo evince any taste in architecture, being overloaded with ornament in the Sicilian style." Sir R. C. Hoare excepts only that of the Duca di Villarosa, which is unfinished.

163. *The Villa Valguernara*, the same author continues, "is built on the largest part of the Bagaria, an eminence commanding on one side the extensive view of the sea-coast towards Termini, Cefalù, the Lipari Islands, &c.; and on the other a prospect equally beautiful, of the bay and city of Palermo, Monte Pellegrino, &c. No dwelling was ever more happily placed; and I believe no other in Europe commands a view equivalent in beauty and effect. The gardens are extensive; the villa is in a tolerably good style of architecture; and the whole is maintained in the most perfect repair and order by the dowager princess of Valguernara."

164. *The villa of the Prince of Palagonia* "is equally remarkable for absurdity, novelty, and singularity. A long avenue, with a balustrade on each side, is adorned, if I may use the term, with groups of the strangest shapes, human and brutal, as well as a mixture of the two, which the brain of a poet, or perhaps a madman, ever conceived. The metamorphoses of Ovid are here multiplied and surpassed. The court-yard before the palace, the entrance gates, fountains, and the palace itself, — even the chapel, and apartments within, — are all decorated in the same taste. The predecessor of the present owner, on being questioned concerning the original ideas of such monsters, replied, 'Non sapete che il fumo Nilo, in Egitto, quando calano le acque, lascia delle ove in abbondanza, quali, con la forza del sole regenerano e nascono, e producono quelli stessi animali che vedete qui rappresentati?' — 'Do you not know that when the waters of the Nile, in Egypt, subside, they leave abundance of eggs, which, regenerated and animated by the powers of the sun, produce those very animals that you see represented here?' At another time this prince sent for an *abate* from Palermo, who was not highly favoured by nature in regard to features: he entertained him with some trivial discourse, while a painter secretly drew his portrait, which was soon afterwards exalted to an honourable post amidst the groups of men and monsters. The wayward fancies of this singular character gave birth to an ingenious sonnet by the modern Anacreon and Sicilian poet, Meli: —

"Jove look'd down from his lofty palace
On the beautiful villa of the Bagaria,
Where art had petrified, eternised, and condensed
The abortions of a whimsical imagination:
'Behold,' said he, 'my insufficiency:
I invented as many monsters as I was able, —
But where my power ended
There began that of Palagonia.' "

"When I first visited the Bagaria, soon after my arrival in Sicily," continues Sir Richard Colt Hoare, "the war with these Centaurs and Lapithæ was not begun. In the course, however, of three months, the balustrade was stripped of a great part of its grotesque decorations; and their total destruction will shortly be completed. The present owner, who has a considerable number of marble vases, has ranged them on the balustrade, in place of the hideous busts which had graced them before; but these being in a taste equally grotesque, and diminutive in their proportions for the posts they occupy, the general view is not much improved by the alteration. Orange trees are to be planted on the high pedestals which supported the groups of figures; the chapel is already destroyed, and a great part of the house itself modernised. The hall is still ornamented with a ceiling of looking-glass, and columns or pilasters of china! Numerous other extravagances still exist, which are destined to undergo a total change. The former owner spent an extensive fortune, and burthened his family with a load of debt, in the creation of a world of monsters and follies: his heir employs his money in destroying them." (*Sir R. Colt Hoare's Classical Tour, &c.*)

165. *The garden of the Villa Scabrosa*, belonging to the Prince of Biscaris, has been formed out of a dreadful sea of lava; and a vegetation, not very luxuriant, produced by

means of transporting earth. Here are two reservoirs of water, supplied by fresh springs, and abundantly stocked with fish. On the verge of one grows the Papyrus, transplanted from the banks of the Annessus; though, from the effect of the sea breezes, it does not grow very vigorously. (*Sir Rich. C. Hoare's Class. Tour*, p. 431.)

166. *Public gardens or parks for promenades.* In all foreign cities, from the most insignificant village to the greatest metropolis, the public walk is considered an object of primary importance. They are numerous in Italy, and when the French were there, they remodelled those of several of the principal cities on the plan of the gardens of the Tuileries and those of the Luxembourg.

167. *At Turin*, the space formerly occupied by fortifications is now converted into gardens and public walks; which are a great embellishment, by opening, in every direction, the pleasing view of rich verdure and fine trees. (*Bell's Obs. on Italy*, &c., 1835, p. 92.)

168. *At Sassari, in Sardinia*, the public promenades are between alleys of fine trees, among which there are abundance of fountains. Several of these are richly decorated with marble statues and other ornaments; and one, called Rosillo, is remarkable for its size and magnificence. Nothing can exceed the beauty of the surrounding country, which appears one vast grove of orange and lemon trees. (*Azzuni, Hist. de la Sardaigne*, p. 57.)

169. *At Milan*, the public walk is on the ramparts, and is planted with Platanus, horse-chestnut, and *Acer Negundo*. (*Cadell's Travels*, &c., vol. ii. p. 103.)

170. *At Padua*, the public walk before the church of St. Justina is a noble monument of patriotic feeling in the higher classes. It consists of a large circular road, surrounded by a canal, on both sides of which are erected the statues of all those who have contributed to illustrate the city or the university, by eminence of any description. The whole has a very fine effect. (*Galiffe's Italy and its Inhabitants*, p. 108.)

171. *At Venice*, the ground formerly occupied by the monastery of St. Antonio was laid out by the French with alleys of trees, and is still resorted to as a public walk. This garden forms the south-east point of the city, and commands a view of some of the islands in the Laguna, and of the land islands that bound the Laguna. (*Cadell's Travels in Carniola and Italy*, p. 69.)

172. *At Florence*, the walk styled the Casino, or Royal Farm, being perhaps the finest in Europe, is well deserving mention. It is situated just beyond the gates of the city; by its tall trees, chiefly elms and chestnuts, and varied pathways, offering a deep, refreshing shade; and, being several miles in extent, affords an opportunity of solitude, among rich foliage, even in the busy evening hour, when assembled throngs crowd its wide and splendid walks. In the centre of the Casino, among flowering shrubs and lofty trees, stands a royal rural palace, of simple, plain, but pretty architecture; where the dairy is kept, the vintage gathered, the wine (the chief produce of the farm) made; and where, also, from time to time, entertainments are given by the court. In the evening hour these walks are the resort of the whole city; and on Sunday, or on "jours de fête," the scene is gay and rural. Every variety of equipage may be seen, from the suite of the grand duke to the little two-wheeled calash; while the footpaths at each side of the road, under the shade of the trees, are filled with citizens of every age and class; all well dressed, happy, and placid. (*Bell's Obs. on Italy*, p. 307.)

173. *At Leghorn* there are some delightful public walks about the town, from one of which there is a view of the Mediterranean, and the Cevennes mountains, the esplanade, and the botanic gardens. The city is also surrounded by boulevards. (*Holmen's Travels*, &c.)

174. *At Rome*, the Corso is the principal public walk; but Monte Testaccio is a place of great resort for the Roman populace in fine weather, and at the foot of the hill are a number of drinking-houses for the guests. The hill is said to be formed of the broken pottery of the ancient Romans, which was collected together outside of the city, that it might not be thrown into the river, and so injure the depth of the channel. (*Eustace's Classical Tour*.)

175. *The Chiaja* is a public garden on the quay, used as a promenade. The outline is a parallelogram, the area arranged in three alleys, with intermediate winding walks, fountains, rockworks, basins, statues, parterres with and without turf, and oranges, flowers, &c. in pots. It is surrounded by a parapet, surmounted by an iron fence, and contains casinos for gambling, *cafés*, baths, taverns, &c. The view of the bay, and the breezes arising thence, are delightful. It is justly reckoned one of the finest walking promenades in Italy.

176. *At Monte Leone, in Calabria*, the public walk is on a hill, on which seats are placed for the accommodation of the inhabitants. That called the Grand Centsine commands a fine view of the sea, Cape Palinuro, Mounts *Ætna* and *Strombolo*, the *Lipari Isles*, &c. The surrounding country has the appearance of one entire garden. (*Blunkier's Calabria*, p. 116.)

177. *Cemeteries.* The emperor Constantine was the first who introduced burying in churches (see § 70.); and this unhealthy practice was continued for many centuries, from a superstitious notion that in holy places the body was protected from evil spirits. The first attempt to establish a public and park-like cemetery was in the Low Countries, by an edict of the enlightened and benevolent emperor Joseph. The example was followed soon after in France and Italy.

178. *At Genoa*, the protestant burial-place is a small enclosure on a hill, surrounded by walls, and planted with roses and other shrubs. (*Morton's Protestant Vigils*, p. 218.)

179. *At Leghorn*, the English burying-ground has some of the tombs surrounded by cypress trees, others by neat railings of ironwork. The ground is enclosed by a wall, and the entrance kept locked. Among other tombs is that of Smollett. (*Holman's Journey*, &c.)

180. *At Bologna* is a public burying-ground a little way out of the town, made out of the suppressed convent of Certocina: it was first applied to this purpose in 1802. It is an effort to give a kind of characteristic elegance to the different conditions of life after death. Rich dignitaries of the church are classed, and inferior clergy are arranged at a respectful distance. Arched recesses are made to receive statues and sarcophagi for the wealthy, and headstones have their allotted district. Sepulchres are marshalled for exhibition, with quaint fancies and insipid allegories; — bad monitors to the living, and destitute of any feeling for the dead. Here, in a room appropriated to skulls, is the skull of Guido, mounted on a bracket. (*Duppa's Observations*, &c., p. 135.)

181. *At Pisa*, the Campo Santo is a large burying-ground, in form a rectangle, about 406 feet by 116 feet, enclosed within an arcade. It has its name from the holy earth which the Pisans brought from Palestine, in the year 1192, but the building was not erected till 1283; and it contains, besides the tombs, a number of pictures by the old masters. (*Duppa's Observations*, &c.)

182. *At Rome*, Eustace tells us that the fields called Prati del Popolo Romano are used as a burying-place for foreigners: — "They are planted with mulberry trees, and adorned by the pyramidal tomb of Caius Cestius." This ancient monument, which is supposed by Galiffe to have been only an ornament to the garden, is described by Eustace as being about 120 feet in height, and standing upon a basis of about ninety feet square. "Its form on the whole is graceful, and its appearance very picturesque, supported on either side by the ancient walls of Rome, with their towers and galleries venerable in decay, half shaded by a few scattered trees; and, looking down upon a hundred humbler tombs interspersed in the neighbouring grove, it rises in lonely pomp; and seems to preside over these fields of silence and mortality. The other tombs are in various forms; sepulchral stones, urns, and sarcophagi, — some standing in good repair, others fallen and mouldering, half buried in the high grass that waves over them." (*Galiffe's Italy*, &c., p. 369.; and *Eustace's Classical Tour*, &c., p. 226.)

183. *At Naples*, Eustace tells us, "the two principal hospitals have each a cemetery for the burial of the dead." The sum of 48,500 ducats was raised by voluntary contribution for the latter; and a piece of ground was selected half a mile from the city, on a rising ground. A neat little church is annexed to it, with apartments for the clergy, &c., and the road that winds up the hill to it is lined with cypresses." This burial-ground Blunt describes as "consisting of 365 separate vaults. Each morning, the large slab of lava which closes the mouth of some one of these receptacles for the dead is heaved aside, and is not replaced before the approach of night. To this pit all the corpses destined for burial that day are promiscuously committed. Thus the revolution of a year sees them all receive their victims in succession; while an interval so considerable allows one corpse to moulder before another is laid low." (*Eustace's Classical Tour*, p. 500.; and *Blunt's Italy*.)

184. *At Venice*, the practice of burying in churches has been relinquished for some years; and the burying-ground of that city now occupies the small island of San Cristoforo, situated in the Laguna, between Venice and Murano. The burying-ground of the Jews, on the sandy islands of Lido, is covered with tombstones bearing Hebrew epitaphs. The burying-ground of the protestants is within one of the bastions of the fortress of Liddo, and contains several tombs of English and Germans. (*Cadell's Journey in Carniola, Italy*, &c., in the *Years 1817 and 1818*.)

185. *The Italian taste in gardening* affords excellent hints to the English designer for the composition of ornamental garden buildings, and for the disposition of vases, sculptures, and other mural or lapidarian ornaments in pleasure-grounds. For all that relates to terraces it also affords excellent hints; and, as Gilbert Laing Meason has shown, not only the villas of Italy, but the landscape architecture of her great painters, (fig. 28. from Claude, and fig. 29. from Domenichino,) afford the most beautiful combinations of architectural forms and verdant scenery.

186. *The union of architecture and gardening* has been better managed in Italy than

in any other country. Speaking of the examples which Italy and her artists afford to the rest of Europe, G. L. Meason observes, "that there are no petty ornaments to



detract from the effect of simplicity and breadth in the architecture. There are none of the sky lines broken by trifling turrets or meagre pinnacles. The towers are plain, or simply embattled; and the varied line is produced by the different heights of large



massive parts. The projections in the façade may be considered, in many of these buildings, as too sudden and unconnected, owing no doubt to the additions made at different times; but the architect has to study the value of bold breaks in a picturesque composition, which may produce strong light and shade in almost every position of the sun, yet so as not to interfere with the interior convenience of the mansion. The various forms of projections by which the parapets, whether of towers or of the whole façade of the building, may be supported, deserve the particular attention of the architect; and here the Tuscan architecture of Florence, and that of many existing Italian villas of the fifteenth century, will supply him with excellent examples. These objects in irregular architecture, combined with the power of the owner of the future mansion to arrange his apartments in any way that his taste, or fancy, or habits may guide him, give to the architect an endless variety of architectural compositions, in which his genius has ample room for display. Such edifices spread over the country would contribute most essentially to the beauty of British landscape. But in following out this style, our artists ought to work on a large scale; no tower, round or square, should be elevated that cannot be made into useful rooms of proper dimensions, so that effect and utility may always be combined. The upper parts of the towers should never be loaded with unmeaning hanging watch-turrets, nor the grandeur of the general outline be broken down by ill-placed tasteless pinnacles. We must condemn the present taste for pinnacles, rising above the simple square tower, of the new churches around the metropolis. In correct Gothic architecture no pinnacle was uselessly introduced. 'An Italian,' Rose observes, 'wisely considers the architecture of a house as connected with its position, precisely as he meditates a picture with reference to the light in which it is to be placed.' (*Land. Arch. Italy, &c.*)

187. The present country seats of the Italians have been, more or less, copied by most civilised nations of Europe, celebrated by poets, and "visited and admired by travellers: they have not, however, been described or represented as they deserve. They are arranged so as to produce the best effect; and advantage of the nature of the site has been taken with admirable skill. The regularity of the gardens is, as it were, an accom-

panying decoration and support to the architecture. The architecture, sculpture, and gardens of these villas are often designed by the same hand, and concur in the general effect to produce perfect harmony. Many of the great painters besides Michael Angelo were architects; Raphael superintended the building of St. Peter's for a time: he built a few palaces and churches; and we hope to see published a collection of his original architectural designs, found in the valuable library at Holkham. Julio Romano planned several buildings at Mantua. Domenichino is said to have been too picturesque in his city buildings; Paul Veronese was an architect of great merit; and even Pietro da Cortona practised extensively in this branch of the fine arts." (*Land Arch. Italy, &c.*)

188. *Chimney tops in Italian landscape.* The modern Italians are much alive to the decoration which may be given to chimneys. British architects are too apt to neglect this important part of our edifices. Williams, the eminent landscape painter, extols the variety and taste which is occasionally displayed in the chimneys both in the houses of Italy, and those of Greece. "In approaching buildings so situated, that the lower part of them is concealed," he says, "we find that their character depends wholly or chiefly on the form of the roof and chimney. This is particularly the case in Florence, where more variety and taste is occasionally displayed in chimneys than in the buildings to which they belong. These chimneys are as peculiar and characteristic of the places where they occur, as palm trees are of a tropical climate." (*Williams's Italy*, p. 74.) We have copied from his engravings six of these beautiful chimneys; viz., one from

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Rome (fig. 30.); one from Perugia (fig. 31.); one from Florence (fig. 32.); one from Lecce (fig. 33.); one from Zante (fig. 34.); and one from Corfu (fig. 35.); with a view of inspiring architects and their employers with more taste in regard to these essential parts of all human dwellings. We refer them also to our *Encyclopædia of Cottage, Farm, and Villa*

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Architecture, part i. book i. ch. 2., for reasons why chimney tops should always be conspicuous features in a dwelling; and why, when ornament is to enter into the composition of an edifice, it should be placed on the chimney tops in preference to most other parts, at least, of humble buildings, such as cottages.

189. *Choice of situation.* The landscapes of the great painters even instruct in the choice of architecture with reference to situation. Claude selected the most picturesque buildings for landscapes of long-extended, smooth scenery; while Gaspar Poussin, whose scenery is generally more picturesque than that of Claude, placed in it buildings

of a plainer description. Both these great painters were in all probability influenced by the principle of contrast.

SUBJECT. 2. *Italian Gardening, in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.*

190. *Flowers appear to have been little cultivated by the Italians previously to the tenth century.* The introduction of the Christian religion as a national worship, though at present favourable, was at first adverse to the use of flowers. Tertullian and Clement of Alexandria, in the second century, inveighed against them with all their eloquence: and the rites of religion, then carried on in gloomy vaults, were not, as now, accompanied by bands of music, statues, pictures, and enriched altars decorated with flowers. Pietro Crescenzi, in the beginning of the fourteenth century, mentions only the violet, lily, rose, gillyflower, and Iris. Commerce began to flourish in the century which succeeded, and various plants were introduced from the Eastern countries, by the wealthy of Venice and Genoa.

191. *The earliest private botanic garden was formed at Padua, by Gaspar de Gabrieli, a wealthy Tuscan noble, at considerable expense.* It was accomplished in 1535; and, though not a public institution, it was open to all the curious. To this garden succeeded that of Cornari at Venice, and Simonetta at Milan; those of some convents at Rome, and of Pinella, at Naples, with others enumerated by botanical historians. (C. Spreng. *Hist.*, lib. iii.; Haller, *Bibl. Bot.*, vol. i. p. 264.; Tiraboschi, *Stor. della Lett. Ital.*; Gesner, *Hort. German.*; Stephanus de Re Hortensæ.)

192. *The first public botanic garden established in Europe appears also to have been at Padua; though a degree of uncertainty exists as to its exact date, some giving it as 1533, and others as 1545.* It appears from Tiraboschi (*Lett. Ital.*, vol. vii. part. ii. p. 50.), that Francis Bonasides possessed a garden at Padua in 1533, where he demonstrated his simples; and, according to Belon (*Chus. Exot.*, p. 239.), that Daniel Barbarus ordered a green-house (viridarium) to be built: hence the origin of this date for the public garden, which Haller and Adanson both countenance; but Tiraboschi, whom Sprengel is more inclined to believe, dates its origin from 1545, from their own deeds. Probably 1545 was the first period that public professors were appointed: the first was Aloysius Anguillara; then Melchior Guilandin; afterwards Jos. Ant. Cortusus, and Prosper Alpinus. It is therefore probable that 1533 is the date of the private garden, and 1545 of the public garden. The garden at Padua contained, in 1581, 400 plants cultivated in the open air, besides a number kept in pots to be taken into houses or sheds during winter. The botanic garden at Pisa was begun, according to Deleuze, in 1544, by Cosmo de' Medici; and Ghini and Cæsalpini, celebrated botanists, were successively its directors. Belon, a French naturalist, who was at Pisa in 1555, was astonished at the beauty of the garden, the quantity of plants it contained, and the care taken to make them prosper. In the beginning of the eighteenth century, a great accession was obtained to the garden by the double flowers of Holland, then introduced into Italy for the first time. (Celsio, *Hist. Plant.*) The garden of Florence was established in 1544. (Targioni, *Prod. Chorograph. Toscan.*) That of Bologna, under Pope Pius V., by Lucas Ghinus, the first professor of botany in Europe, in 1547, or, according to some, in 1568; and that of Rome soon afterwards. From that time to the present day, the numbers of botanic gardens have been continually increasing, so that there is now one belonging to almost every principal city in Italy; an exertion the more remarkable, as botanic gardens in that country are proportionably more expensive than in England, from the necessity of conveying a stream of water to them, and forming a regular system of irrigation.

193. *The botanic garden at Venice, formerly the garden of the monastery of San Giobbe, possesses no great collection of plants.* There is another small botanic garden near Venice, belonging to a gentleman who cultivates botanical science. (Cadell's *Carniola*, p. 69.)

194. *The very neat little botanic garden Della Sapienza is near the Aqua Paolo, one of the finest fountains in Rome.* In this garden Galiffe saw many flowers in bloom in the month of January; and the gardener gave him very large, and what would have been in London very costly, nosegays for a few bacciochi. (Galiffe's *Italy*, p. 403.)

195. *At Palermo there is a good botanic garden, in which the sugar-cane, the Papyrus, the banana, and the date palm will be found growing in the open air.* (Wood's *Letters of an Architect*, vol. i. p. 341.)

196. *Some private botanic gardens of the sixteenth century deserve to be mentioned.* Those of Jo. Vincent Pinelli, at Naples, were celebrated by Maranto; that of Cæsar Nicleada, near Verona, has been described by Pena; and those of Julius Moderatus at Arimani, and Scipio at Rome, are both mentioned by Conrad Gesner. Belon likewise mentions a rich garden of Vincent de Monte Catino, near Lucca, celebrated for exotic trees; and also that of Nicolas Geddi at Florence, under the care of Benincasa.

197. *A taste for flowers and ornamental plants has thus become general in Italy*; and, at the same time, the means of gratification have been afforded, by the superabundant plants and seeds of these gardens being given away, or sold at very moderate prices, to the curious. About the middle of the sixteenth century, the Dutch made regular exchanges of their bulbous roots for the orange trees of Genoa and Leghorn; and the double night-smelling jessamine was introduced at Pisa from Spain, and so highly prized as to have a sentinel placed over it by the governor. (*Evelyn.*) The use of flowers, it is probable, was never entirely laid aside in Italy as ornaments to female dress; but, in the progress of refinement, their application in this way became more general, and more select sorts were chosen: they became in demand, both gathered in bouquets, and with the entire plants in pots; they were used as household ornaments, both internal and external; and the church, thinking that what pleased man must be pleasing to the gods, or conforming to the taste of the times, and desirous of rendering religion as attractive as possible to the multitude, introduced flowers as decorations of altars and statues, and more especially in their fêtes and processions. Pots and boxes of orange trees, pomegranates, bays, oleanders, myrtles, and other plants, are now let out by the day, for decorating the steps and approaches of altars; or sold for ornamenting roofs, balconies, verandas, courts, yards, passages, halls, staircases, and even shops and warehouses, in most of the large towns of Italy. Notwithstanding this, there is a recent instance on record of a lady residing in Rome commencing a lawsuit against a neighbour for filling her court-yard with orange trees, the smell of the flowers of which was by the other considered as a nuisance.

198. *For the church the white lily* (*Lilium candidum*) is in great demand, with which the *Madonna*, or *Madre di Dio*, is decorated, as an emblem of her virginity. The typha (*T. latifolia*) is much used when in seed, to put into the hands of statues of Christ; being considered as the reed on which the soldiers handed to him a sponge of vinegar. In Poland, when the typha has not been easily procured, we have seen leeks in the flower-state used as a substitute. *Lachenalia pendula* is cultivated in Sicily as the common hyacinth is in Britain. It is planted in November, and its fine coral red flowers appear in the middle of December, and last till the end of January.

199. *On occasions of public rejoicing*, flowers are also much used in Italy. Favourite princes and generals are received into towns, and even villages, through triumphal arches decorated with flowers; and the ground is also sometimes strewn with them. The lives of Bonaparte, Murat, and Beauharnois afford many examples. At Milan, a very gay city, flowers are greatly prized; and in the winter season are procured from the peculiarly warm and ever verdant gardens between Genoa and Nervi. A *louis-d'or*, we were informed, is sometimes paid for a single nosegay. During the carnival the demand is great throughout Italy.

200. *Florists' flowers*, especially the bulbous kinds, do not succeed well in the dry warm climate of Italy. Fine varieties of the hyacinth, tulip, ranunculus, auricula, polyanthus, &c., are soon lost there, and are obliged to be renewed from more temperate countries. The Italians excel, however, in the culture of the tuberose, which forms an article of commerce at Genoa, as does the paper narcissus (*N. orientalis*) at Naples. In roses, jessamines, oleanders, and oranges, they also excel; and also in most single flowers not natives of cold climates. Signor Villaresi, already mentioned, had, when we saw him in 1819, raised from seeds of the Bengal rose (*Rosa indica*), impregnated promiscuously with other roses, upwards of fifty distinct varieties, many of which were of great beauty, and very fragrant. In general, flowers and ornamental plants are most in demand, and are cultivated to the greatest degree of perfection, in Lombardy; of which the flower-markets of Milan and Venice afford most gratifying proofs. Many of the Chinese, New Holland, and some of the Cape trees and shrubs thrive well, and blossom luxuriantly in the open air in the warmer regions, as in S. del Negro's garden at Genoa, and the gardens of Pisa and Caserta. Evelyn says, he saw at Florence, in 1664, a rose grafted on an orange tree: the same tricks are still played off with the rose, jessamine, oleander, myrtle, &c. at Genoa, and even in some parts of Lombardy. The following is the manner in which this trick is accomplished:—Take up an orange tree, shaking all the earth from its roots, and cutting off a few of its branches, not far from the main stem. From the places where the branches were cut off, bore holes through to the centre of the main stem. Next hollow out the main stem, from the root as high up as the highest amputated branch, taking care not to injure the bark or young wood. Then introduce through the root up the stem of the orange tree, small but rooted shoots, of any kind of shrub, and, by means of a piece of wire, pull them through at the different amputated parts, concealing the wound with green wax. The plant, &c. and the whole will live at least a year or two. *Chamaerops humilis* is the only palm that can endure the winter in the open air at Florence. It also grows at Genoa. At Rome the date palm thrives in the open air. The common whin is cultivated as a shrub in the gardens of the Villa Panfilii, and in other places near Rome and Florence. (*Cadell's Travels*, vol. i.

p. 434.) Manetti says the *Nelumbium flavum* and *speciosum* are grown in the open air in the north of Lombardy; and that the *Agave americana* is naturalised on the rocks near the Lake of Como, where, instead of flowering only once in a hundred years, as is commonly alleged, it has flowered, and ripened seeds, in sixteen years. (*Gard. Mag.*, vol. viii. p. 69.)

301. *The taste for flowers and plants of ornament is rather on the decline than otherwise in Italy.* Much depends on the taste of the princes in this, as in every other matter; and, unfortunately, those of Italy are at present mere ciphers.

302. *The flowers and plants of ornament supplied by Italy to Britain* are chiefly orange and lemon trees from Genoa and Leghorn. A few bulbs of Narcissi and other flowers are also imported; and within the last twenty years the tuberose has been grown for this purpose. The seeds of balsam, carnation, French and African marigolds, and a few other floricultural articles, are also sent to England.

SECT. 3. *Italian Gardening, in respect to its Products for the Kitchen and the Desert.*

303. *The great variety of soil and climate in Italy* enables the Italians to cultivate all the European fruits and vegetables. In Sicily, the pine-apple can be grown with very little protection, and the date palm ripens its fruit in the open air. The grapes of that island, and of the Neapolitan territory, are, or may be, equal to any in Europe; the figs are not surpassed by those of Senyria. The orange and lemon are ripened in the open air at Naples and Genoa. The carob or locust bean tree (*Ceratonia Siliqua*) is cultivated as far north as Genoa, and its long, compressed, and very sweet pods, Spence informs us, are both eaten by the common people and given to horses. (*Gard. Mag.*, vol. viii.) The broccoli and lettuce of the south of Italy are as celebrated as the cabbages and savoy of the North. The gardens of Lombardy are the most luxuriant in vegetation, not only in Italy, but perhaps in Europe. The climate is not so favourable for the perfection of the grape and the orange as that of Naples, nor for the production of large turnips and succulent cabbages as that of Holland; but it possesses a medium of temperature and humidity between the two climates, which is perhaps favourable to a greater number of vegetable productions, than any one climate on the face of our globe.

304. *The Italian fruits are nearly those of the Romans*, to which the modern Italians have made but few additions, if we except the orange and the pine-apple. The orange is supposed to have been introduced between the time of Pliny and that of Palladius; it is the fruit in which they excel, more from climate and soil than science. From several passages in the works of Pontano, who lived in the fourteenth century, we may discover that this author devoted himself to the practical study of nature; and his poem, in two books, on the cultivation of the lemon, orange, and citron, entitled *De Hortis Hesperidum*, sufficiently demonstrates that he was acquainted with some of the most curious operations in horticulture. Among other observations, there is one which particularly deserves the attention of the practical gardener. He asserts, on his own experience, that if a graft be cut from the extremity of a fruit-bearing branch, it will itself bear fruit the first year of its being ingrafted; but that, if it be taken from a sucker, or unripe part of the tree, it will be many years before it bear fruit. His words are:—"Quippe ubi e ramo fragifero, atque ad solem exposito, ex ipsoque rami acumine lecta fuerint, etiam primo insitionis anno frugem proferunt." (*Pontan. Opera*, p. 18.) This has since been observed by other naturalists; and the reason is explained in *Darwin's Phytol.* sect. ix. (*Roscoe's Leo X.*, vol. iv. p. 132.)

305. *There are supposed to be nearly a hundred varieties of oranges in Italy*; but in the orange nurseries at Nervi, it is not easy to make out more than forty or fifty distinct sorts, exclusive of lemons, citrons, and limes. These have mostly been obtained from seeds. The Italians had not till lately the mandarin orange, nor some varieties of shaddock (*Citrus decumana*), which we have long possessed. The most regular and systematic orange orchards are at Nervi; and the largest trees are around Naples, at Sorrento, Amalfi, &c. The more rare sorts are kept in conservatories at Rome; and the largest house, with the best collection, is that of the Borghese. At Florence and Milan, all the sorts require to be housed during winter; but at Hières and Nice, in France, and at Genoa and Nervi in Italy, they stand the common winters in the open air. Five thousand oranges have been gathered from one tree as far north as Savona. At Elba, the *Opuntia* and the date palm thrive in the open air, and, it is said, are to be found nowhere else growing without protection in the same latitude. (*Williams's Travels*, &c.) It is a remarkable fact, that the Italians give a decided preference to unripe fruit. (*Wood's Letters*, &c., vol. i. p. 123.) In Sardinia, near Melis, there is an orange forest three miles long and one broad. (*Asuni, Hist. &c. de la Sardaigne*.)

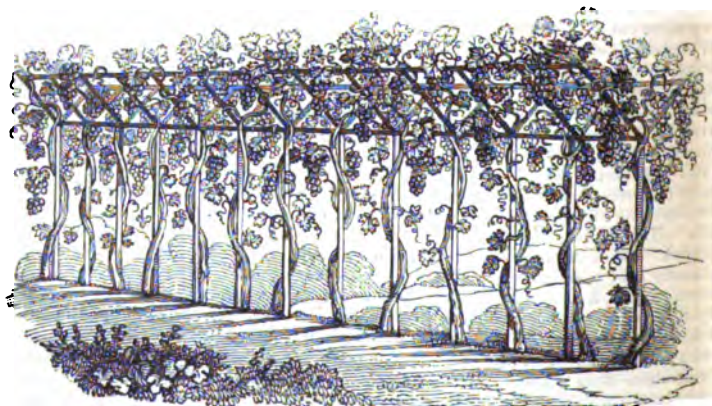
306. *The orange trees of the Isola Bella* occupy the south and east sides of the island, which sides are formed into terraces; against the walls of which are planted a great variety of kinds of the genus *Citrus*; or, as plants of this genus are generally termed in Italy, of

Agrumi. "These trees," Cadell observes, "are covered with houses of boards during six months of the year. The houses are put over the plants in the beginning of November; and now, on the 20th of April, the gardeners are preparing to take them off. The front of the houses has wooden doors on hinges, that are opened in fine weather to give light and air to the plants. In very cold weather, a fire of charcoal is made on the floor within the wooden house. The oranges are inferior to those produced in a warmer climate, as at Genoa. The lemons are succulent, and more acid than those of Genoa, but not so fully ripened." (*Travels in Corsica, &c.*, vol. ii. p. 144.)

207. *The stone fruits* in which the Italians excel are the peach and the cherry. There are above twenty varieties of peaches cultivated in the neighbourhood of Rome and Naples; and these fruits, grown on standard trees, as apples and pears are in this country, arrive at a very high degree of perfection. They have few sorts of apricots and nectarines, and not many plums; but their Regina Claudia, or greengages, are excellent. Cherries are every where excellent in Italy, especially in Tuscany. The Milan or Morella cherry is noted for its prolific qualities, and for having a consistency and flavour somewhat resembling the *Morchella esculenta*, or morel, whence the name. The olive is every where extensively cultivated. It is propagated by cuttings both of the shoots and roots; and these take root so readily, that sometimes a stake, or a trunk of an olive tree which has been put into the soil to serve as a support to a vine, or any other plant, will grow, and in three or four years bear a tolerable crop of fruit. Luigi Manetti, however (*Gard. Mag.*, vol. vii. p. 68.), says, that the best mode of propagation is by seed; that this method is practised by the olive growers in Tuscany, and that it invariably produces the largest, strongest, and best young trees. The same author informs us that the olive trees on the sides of the hill of Lario, on the Lake of Como, although originally placed in a vertical position, incline, by degrees, towards the horizon, until their trunks become perpendicular to the side of the mountain, instead of being perpendicular to the horizon. Manetti attributes this inclination of the trees to their want of tap roots, a deficiency, he says, occasioned by their being raised from cuttings. This may be the case; but we are more inclined to attribute it to the natural character of the tree, which even in level situations is seldom found with a well-balanced top.

208. *The chief berry of Italy* is the grape: the varieties are not so numerous as in France or Spain; and are, for the most part, the result of long growth on one soil and situation. Vineyard grapes are indifferent to eat in most parts of Lombardy, and in the best districts are equalled, if not excelled, by the muscats, sweetwaters, muscadines, and other sorts grown in hot-houses in this country. The grape is the only berry that thrives in Italy. It is not kept low, as in France; but elevated on rude trellises near houses and in gardens (*fig. 36.*), and trained up long poles, or on trees in the fields. Collections of gooseberries from Lancashire have been introduced at Leghorn, Genoa, and Monza; and, grown in the shade, they thrive moderately at the

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gardens of the latter place. The currant, the raspberry, and the strawberry, though natives of the Alps and Apennines, do not thrive in the gardens, but are brought to market from the woods; and so is the red mulberry, which is there cultivated for the leaves, as hardier than the white. It does not appear that the berries of the *Arbutus* are much used, though they are occasionally brought to market. Cadell saw them exposed for sale at Trieste; but notwithstanding that he found the pods of the carob eatable, and even sweet, he thought the berries of the *Arbutus* unpalatable (*Travels*

etc., p. 17.) Mr. Wood (*Letters of an Architect*, &c., vol. ii. p. 223.) informs us that at Santa Maura, in Sicily, he made a meal of the berries of the *A. rbutus* without inconvenience, though the natives told him they would occasion madness. The berries of the *Sorbus domestica* are abundant about Genoa, Milan, and Trieste; and those of the *Azerole* thorn, *Laxeroni*, *Lazarini*, or *Azzerola* (*Crataegus Azarolus*), are not uncommon.

209. *Kernel fruits* in general, especially pears, are excellent in the north of Italy, but indifferent in the warmer regions. Services, in considerable variety, abound in Piedmont, and part of Lombardy. In Sardinia the quince attains a very large size; many have been gathered more than two pounds, and some more than three pounds, in weight. The kernels of the *Pinus Pines* are produced generally at the desert throughout Italy. They are much esteemed, and bear a high price.

210. *Nuts*. The chestnut is wild on the Apennines, and cultivated throughout the central and northern hilly regions of Italy. The best varieties in Tuscany and about Genoa and Savona are propagated by budding. Chabrol de Volvic informs us that the varieties of the sweet chestnut are between fifty and sixty in number; and that the fruit about Savona, as in different parts of the Apennines, forms a principal source of nourishment for the mountain population. They eat the chestnuts either with milk or water, fresh in autumn, or kiln-dried in winter and spring. (*Statistiques des Provinces de Savona*, &c.) In many parts of Italy flour is made from chestnuts; and in the coffee-houses of Lucca, *piâtés*, muffins, tarts, and other articles are made of this flour, and considered delicate. (*Ency. of Agr.*, 2d ed., § 293.) The walnut is cultivated extensively in Savoy, where, as Bakewell informs us, in his very instructive *Travels*, it is crushed for oil, which is much used by landscape painters.

211. *The pine-apple* is cultivated in a few places in Italy, but with little success, except at Florence and Monza. In 1819 there were a few in the royal gardens at Portici, but weak, yellow-leaved, and covered with insects. The few grown in the Pope's garden, and in one or two other villas near Rome, were then little better. By far the best and greatest quantity we found in the viceregal gardens of Monza. A former king of Sardinia sent his gardener, Brochieri, to England, to study their culture. He returned, and in 1777 published a tract on them, with a plan of a pit for their reception; and in this way they are universally grown in Italy. Such, however, is the exhalation produced in this dry climate from leaves so full of pores as are those of the pine, and such the want of attention to supplying large pots and plenty of water, that the plants are generally of a pale sickly hue, and the fruit of a very small size.

212. *Of the melon tribe* the variety in Italy is endless, of every degree of flavour, from the richness of the cantaloupe, to the cool, icy, sub-acid taste of the *citrouille*, or water melon. Too little care is bestowed in selecting good fruits for seeds, and preventing hybridism from the promiscuous intercourse with surrounding varieties; and hence, seeds sent from Italy to this country are little to be depended on, and generally produce varieties inferior to those of British growth. There are few sorts of cucumbers; and though there is a great number of gourds and pompions cultivated, the sorts, or conspicuous varieties, of both are less numerous than in this country. Italian cucumbers are never so succulent as those grown in our humid frames by dung heat.

213. *The love apple, egg plant, and capsicum* are extensively cultivated near Rome and Naples for the kitchen; the fruit of the first attaining a large size, and exhibiting the most grotesque forms. It is singular that, in Sicily, this fruit, when ripe, becomes sour, and so unfit for use, that the inhabitants are supplied with it from Naples.

214. *Want of demand for the fruits of the northern climates* precludes their production. Were it otherwise, there can be no doubt means would soon be resorted to, for producing them in as great perfection as we do the fruits of southern climates here: all that is necessary is to imitate our climate, by abstracting or excluding heat, and supplying moisture; but luxury in Italy has not yet arrived to the degree adequate to produce this effect.

215. *Of culinary vegetables*, the Italians began with those left them by the Romans, and they added the potato to their number, not long after we did. They now possess all the sorts known in this country, and use some plants as *salada*, such as the succory, oxeye daisy (*Chrysanthemum leucanthemum*), *ruccola* or rocket (*Eruca sativa*), which are little used here. At Rome, the roots of the fennel, which grow there to a large size, are eaten as we do celery. (See § 227.) The turnip and carrot tribe, and the cabbage, savoy, lettuce, and radish, thrive best in the northern parts; but the potato grows well every where, and the Italian autumn is favourable to the growth of cauliflowers and broccolis, which are found of large size at Rome, Florence, and Bologna, in the months of September and October; and very large at Milan, all the summer and autumn. Evelyn mentions, that in his time the Italians roasted the bulbs of *Ornithogalum*, especially the wild yellow sort, and ate them with oil, vinegar, and pepper. The tubers of *Cyperus esculentus* they both roast, and use in soups. Near Pavia, the fagioli, a species of *Dolichos*, the lentil (*Ervum Léns*), and the *Cicer arietinum* are cultivated; the latter produces a saline exhalation from the stalks at the summer solstice, which is used as a remedy

in cutaneous diseases. (*Cadell's Travels*, &c., p. 125.) The leguminous tribe thrive every where; but in some places the entire pod of the kidney-bean is so dry and hard, as to prevent its use as a substitute for peas. In short, though the Italians have the advantage over the rest of Europe in fruits, that good is greatly counterbalanced by the inferiority of their culinary vegetables. Much to remedy the defect might be done by judicious irrigation, which in the south of Italy, and even in Lombardy, is so far necessary as to enter into the arrangement of every kitchen-garden. Shading, blanching, and change of seed would effect much; but the value of good culinary vegetables is not known to the greater part of the wealthy Italians.

216. *The culture of edible fungi in Italy is somewhat remarkable.* At Naples, a stone called the *pietra fungaja* is made use of to produce the *Bolëtus Tuberaster*. At Brescia the *Amanita incarnata* is produced from its own fragments bruised. The *Agaricus ostreatus* is produced at pleasure from the husks of the berries of the sweet bay, after they have been boiled in order to extract the oil. The husks are buried in a trench, firmly pressed down, and a layer of earth about six inches thick is placed over them, and also firmly pressed. The bed is guarded from excessive rains. It will produce mushrooms during the October, November, and December of that, and of the two succeeding years. About January, mushrooms are produced in a similar manner, by using the remains of olives which have been pressed for oil, instead of the husks of sweet bay berries. In the north of Italy, and in the Landes in the south of France, the gardeners water the earth under oak trees with water in which has been boiled the *Bolëtus edulis*, and this is said to produce an abundant crop of that species. (*Bull. des Sciences Agr.*, Oct. 1837.)

217. *Bees* are kept in most parts of Italy in straw hives, similar to those in use in Britain. They are also kept in wooden boxes of various kinds; and in the neighbourhood of Placentia, Cadell informs us, the hives are formed of the hollow trunk of a tree one foot in diameter, and two feet high. These hives are placed on a shelf fixed to the outer wall of the house, high up, being eight or ten feet from the ground. (*Travels*, &c., vol. ii. p. 144.) Sardinia has long been celebrated for its bees, one species of which produces a bitter honey. (*Asuni, Hist.*, &c.)

218. *Ice-houses* are common in Italy, and in that country, as in Britain, are generally under the care of the gardener. They are usually sunk deep in dry ground or rock, and their entrance protected from the exterior air by a quantity of loose straw. Besides the ordinary domestic purposes to which ice is applied in Britain, it is used in Italy to preserve fish, meat, and vegetables, fresh. These are carried to the ice-house in appropriate vessels, and set down upon the ice.

219. *Horticulture has made little progress in Italy.* It is not in Italy, Simond observes, that horticulture is to be studied; though nowhere is more produced from the soil by culture, manure, and water: but forcing or prolonging crops is unknown; every thing is sown at a certain season, and grows up, ripens, and perishes together. The variety is not great; they have only three or four sorts of cabbage, not more of kidney-beans, and one of pea; the red and white beet, salsify, scorzonera, chervil, sorrel, onion, shallot, Jerusalem artichoke, are in many parts unknown: but they have the cocomers, or water-melon, every where. In Tuscany and Lombardy, it is raised on dung, and then transplanted in the fields; and its sugary, icy pulp forms the delight of the Italians during the whole month of August. Though they have walls round some gardens, they are in many places ignorant of the mode of training trees on them. (*Tableau de l'Agriculture Toscane*, 8vo, 1801.)

220. *The horticultural articles with which Italy supplies Britain are chiefly the seeds of cauliflowers, of broccoli, of lettuce, and sometimes of onions.* Orange trees have been included under floricultural productions.

SUBSECT. 4. *Italian Gardening, in respect to the planting of Timber Trees and Hedges.*

221. *The self-sown forests of the Alps and Apennines* are the chief resources of the Italians for timber; and timber trees are chiefly propagated for parks, public walks, and lining the great roads. The vine is still, in many places, trained on the poplar and elm; but in Tuscany and Lombardy, where the culture is deemed superior, the common maple (*Acer campêtre*) and flowering ash (*Oïrus europæa*) are preferred. (*Simond, Tab. de l'Agr. Toscane; Chateauxvieux, Lettres*, &c., 1813.) In Sicily, plantations of the manna tree are numerous and extensive: on the very worst of soils, even mere beds of stones, each tree, Hoare informs us, produces manna to the value of an ounce of gold. (*Class. Tour*, &c., p. 394.) The most common tree for every other purpose is the narrow-leaved elm, which lines the road from Rome to Naples, for upwards of twenty miles together. Near Milan, the Lombardy poplar is a great deal used; but a late author, Gautieri (*Dello Infusso del Boschi*, &c., 1817), argues in favour of cutting down, rather than planting, in the Milanese plains. The finest avenues and public equestrian promenades in Italy are those around Milan and at Monza; the trees are of various sorts, as the tulip tree, *Platanus*, lime, *Acacia*, *Melia Azedarach*, various oaks,

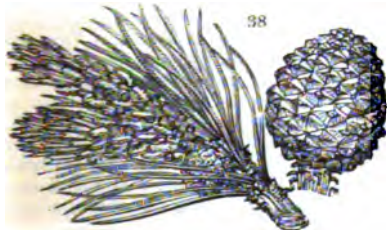
chestnuts, beeches, &c. The sorts are every where mixed, in order that the failure or defective growth of one species may have a chance of being compensated by the growth of that or those adjoining; so that, if a malady were to attack one sort of tree, it might not lead to continuous defalcation. Most of those trees were planted by the late Villaresi, who, before the political changes in 1815, had constantly under his direction not fewer than three thousand men for public and royal improvements.

222. *The timber trees of the native forests of Italy are chiefly oak, chestnut, and beech; the undergrowths are of numerous species, including the *Arbutus*, *Ilex*, and myrtle. This class of forests skirts the Alpine mountains, and covers, in many places, the Apennine hills. Humboldt observes, that wherever the chestnut tree flourishes, and arrives at a large size, it is a sure indication that the soil is chiefly, if not entirely, formed of volcanic matter. (Graham's *Three Months near Rome*, p. 69.) In higher regions the larch abounds, and in sheltered dells the silver fir. The stone and cluster pine are confined to the lower regions, as the hills of Tuscany, the vales of Arno, Tiber, &c.*

223. *Hedges are in general use in Italy, but are very imperfectly formed and managed. In Lombardy the hawthorn is a good deal used; but in Tuscany, the States of the*



bullata, &c. &c., all in full flower,



*in the first week of March, 1832. (Gard. Mag., vol. viii.) The hedges in Sicily are frequently formed by *Agave americana*, which, Wood informs us, makes an excellent fence for one or two years before flowering; yet, as the old plant dies immediately afterwards, two or three years elapse before the offsets are sufficiently advanced to supply its place effectually. The cactus is also employed as a fence; but after some time the lower parts of the stem lose their prickles, and men and animals may creep through. (Letters of an Architect, vol. i. p. 354.)*

224. *The principal hardy trees for which Britain is indebted to Italy are the larch, the stone pine (fig. 38.) and other pines, evergreen oak, the Lombardy poplar, the sweet bay, and the *Arbutus*.*

SUBJECT. 5. *Italian Gardening, as empirically practised.*

225. *Gardens in Italy are common to the rural class of citizens. It is a general remark of travellers, and of acknowledged truth, that the state of cottage gardens indicates the state of the cottagers; and those of Italy confirm the justness of the observation. Almost the only plants grown in them are gourds and Indian corn. In Tuscany and Lombardy some of the cabbage tribe, the kidney-bean, and occasionally the potato, are to be seen, but rarely any thing else. The gardens of the farmers are somewhat better, especially in the northern districts, where they often contain patches of hemp, potatoes, parsneps, and lettuce, with some flowers, and fruit trees. The gardens of the small proprietors are still better stocked; those of wealthy bankers and merchants are generally the best in Italy. The gardens of the more wealthy nobles are distinguished as such, by having more or less of an accompanying park; but generally are only superior by their extent. The gardens of the convents are, in general, well cultivated, and rich in fruits and culinary vegetables, with some flowers and evergreens for church decorations. The priests assist in their cultivation, and some of them are much attached to gardening.*

226. *For commercial purposes gardening is chiefly practised by market-gardeners, who also grow flowers, act as orchardists, and often make wine. There are hardly any nurseries for trees and shrubs in Italy, if we except those for orange trees at Nervi, and two small ones for general purposes at Milan. Those who form new gardens are chiefly supplied from France, or from their friends, or from the proprietors of private gardens; most of whom sell whatever they have to spare.*

227. *Market gardens*, of more or less extent, are to be found in the neighbourhood of all the large cities; and every farm is more or less an orchard. The gardens round Genoa are celebrated for oranges and chestnuts; those round Florence for peaches and cherries; round Naples for figs and tomatoes. There are several market gardens within the walls of ancient Rome; and Galiffe informs us (*Italy, &c.*, p. 294.) that the man who farms the Farnese Gardens, on Mount Palatine, has a yearly crop of 30,000 artichokes, and other vegetables in proportion. By far the larger portion of the market-gardens of Rome, Spence observes (*Gard. Mag.*, vol. viii.), are within the walls of the ancient city, which are twelve or fourteen miles in circuit, without having more than one third of the enclosed space covered with houses. On the Naples road, as within the gates, they present the same general features: industrious though not very neat cultivation, and the soil kept constantly cropped under great breadths of lettuces, endive, leeks, broccoli, superb cauliflowers; and especially two articles which occupy more space than all the rest, viz., *gobbo* and fennel. *Gobbo* (hunchback) is the appellation which the Italians, in their well-known love of nicknames, have given to the gibbous footstalks of the first set of leaves, just as they branch from the ground, of a variety of artichoke; which are blanched by hoeing up the earth against them, and of which a far larger quantity is consumed than of the heads of the plants. Fennel is cultivated to a great extent for precisely the same part of the plant, namely, the blanched footstalks (and roots) of the first set of leaves; and both it and *gobbo*, when stewed in the Italian method, form excellent dishes. These fennel roots and footstalks are eaten also raw, as a salad, with oil and vinegar. What most distinguish the Roman (and, indeed, Italian) gardens from those of Northern Europe, are the shed, and wheel which it covers for drawing up water, by means of an ass or ox, from the adjoining well, for the purpose of irrigation; and the clump of fine reeds (*Arundo Donax*), each fifteen or twenty feet high, and one inch in diameter, and as strong as a bamboo of similar thickness (which they resemble), which are employed as props and trellises for vines, fences, garden-sticks, and various other uses. The vegetable market of Naples, the same accurate observer found, in March, 1832, abounding with the same vegetables which he had found in Rome, with an equal abundance of *gobbo* and fennel roots, and green peas in greater plenty. Grapes, of several varieties, kept through the winter, were not much shrivelled, and quite free from mouldiness. There were two or three sorts of apples, but only one of winter pears, as is the case also at Florence, Pisa, and Rome, and apparently the same variety, which is good, but hardly so superexcellent as to deserve to exclude all other kinds. Oranges, in glorious profusion (chiefly from Sorrento, fifteen miles distant), and so cheap, as to allow the poorest of the poor to enjoy (what Dr. Johnson complained he had never had of peaches but once) their fill of them, and that daily. The middle-sized ones (which are the best) sell at four for a *grano*, which is at the rate of ten for a penny English; and the poor get twice as many of those beginning to decay. A brilliant display of flowers at the flower-stalls in the Toledo, consisting of roses, ranunculuses, anemones, carnations, stocks, hyacinths, asphodels, &c. &c. (*Gard. Mag.*, vol. viii.)

228. *The operative part of gardening* in Italy is performed more by labourers than by regular apprentices and journeymen; and thus good practical gardeners are more the result of accident than of design. The great defect of both is the want of a taste for order and neatness. The Italians are particularly unskilful in the management of plants in pots; and especially of such exotics as require protection by glass. These are put into houses with upright, or slightly inclining glass fronts, and opaque roofs; there they remain during a winter of from three to five months; want of light and air renders their leaves yellow and cadaverous; and when they are taken out, they are placed in the most exposed parts of the garden, often on parapets, benches, or stages. Here the sudden excess of light soon causes them to lose their leaves, which they have hardly time to regain before the period arrives for replacing them in the conservatory or hot-house. We know of few exceptions to this censure, except at Monza and Caserta, where the plants are kept in winter in glass-roofed houses, as in England, and placed out in summer under the shade of poplars, or high walls. Dr. Oct. Torretti, professor of rural economy at Florence, who lectures in a garden, in which specimens are displayed of the leading sorts of Italian field and garden culture, acknowledged to us, in 1819, the justness of this remark.

229. *The artists or professors* are of two classes. First, The architects, who adopt the rural branch of their art (*architetti rustici*), and who give plans for parks, chiefly or almost entirely in the geometric style, to be executed under their direction, and that of the head gardener. Secondly, The artist-gardeners (*artisti giardinieri*), who are generally the gardeners, or directors of gardens, of some great establishment, public or private, and who give plans for gardens, chiefly in what is there considered the English manner, also for kitchen-gardens; and, as in England, either direct by occasional visits, or undertake by contract, their execution and future inspection.

220. The nurserymen of *Genoa, Nervi, and Leghorn* supply Britain chiefly with orange and lemon trees; but they send also some bulbs and other flower roots and silver seeds. Culinary seeds have been already mentioned, § 220.

SUMMARY. 6. Italian Gardening, as a Science, and as to the Authors it has produced.

231. *By the establishment of professorships of botany and botanic gardens, in the sixteenth century, the Italians have materially contributed to the study of the vegetable kingdom, without some knowledge of the physiology of which, the practice of gardening must be entirely empirical.* Malpighi is considered the father of vegetable physiology in Italy. It must be confessed, however, that the scientific knowledge of the Italians is chiefly confined to their professors and learned men: the practical gardener is yet too ignorant either to study or to understand the subject; too much prejudiced by old opinions to receive new ideas; and, partly from climate, but chiefly from political and religious slavery, too indifferent to wish to be informed. Some exceptions must be made in favour of such gardeners as have been apprenticed in botanic and eminent gardens, or under intelligent Germans, who are here and there to be found superintending the gardens of the nobles. The hybridising the *Cucumis* tribe by proximity, and the striking phenomena of the male and female hemp, have introduced some vague idea of the sexuality of vegetables; but the use of leaves, by far the most important knowledge which a gardener can possess, seems nowhere understood by ordinary master-gardeners. Grafting and layering are practised without any knowledge of the effects of the returning sap, or of the exclusion of air and light. Nothing can be worse than the practice of budding orange trees at Nervi; to be convinced of which, it is only necessary to compare the plants imported thence with those brought from Malta or Paris. The culture of the vine, the olive, and the fig belongs to the rural economy of the country; that of the vine is abundantly careless; and the practice of the caprification of the fig, though laughed at by the professors, is still followed in various places near Rome and Naples.

232. *Religious and lunar observances are still followed by the gardeners in most parts of Italy.* With the Romans it was customary, before any grand operation of agriculture was undertaken, to consult or invoke the god of that department; as of *Flora, Pomona, &c.*, and to pay attention to the age of the moon, and to other signs. A good deal of this description of ceremony is still carried on, in general economy, by the priests and farmers; and gardening has not yet entirely thrown off the same marks of ignorance and religious slavery. Many gardeners regulate their sowing of kitchen-crops by the moon; others call the priests to invoke a blessing on large breadths of any main crop; some, on minor occasions, officiate for themselves; and we have seen a poor market-gardener at Savona muttering a sort of grace to the Virgin over a bed of new-sown onions. Father Clarici, a priest, who published *Istoria e Coltura delle Piante, &c.* so late as 1726, countenances most of these practices; and describes many absurd and foolish ceremonies used for procuring good crops, and destroying insects.

233. *Of the Italian authors on gardening, few or none are original.* Filippo Rê has written a great many books, and may be compared to our Bradley. Silvo Sigismondi, of Milan, has written a work on English gardening, resembling that of Hirschfeld, of which it is, in great part, a translation. Clarici is a very copious writer on culinary gardening, and on the culture of flowers; and the most approved Italian writer on the orange tribe is Gallezio of Savona. The same author has lately commenced a splendid work on the fruits of Italy, in folio, which appears in quarterly numbers. A journal of agriculture is published monthly at Florence; and a horticultural review has lately been commenced at Placentia. (*Gard. Mag.*, vol. vii. p. 663.)

SACR. II. Of the Revival, Progress, and present State of Gardening in Holland and the Netherlands.

234. *Gardening was first brought to a high degree of perfection in Holland and the Netherlands.* The crusades, in the twelfth century, are generally supposed to have excited a taste for building and gardening in the north of Europe. But from Stephanus and Gesner it would appear that the Dutch had had some taste for plants even previously to this period. It is to be regretted that scarcely any materials are to be found from which to compose such a history as this interesting circumstance requires. Harte (*Essays on Agriculture*) conjectures that the necessities arising from the original barrenness of the soil (that of Flanders having been formerly like what Arthur Young describes Norfolk to have been nearly a century ago), together with a certain degree of liberty, the result of the remoteness of the situation from kings and priests, may have contributed to improve their agriculture; and that the wealth acquired by the commercial men of Holland, then the most eminent merchants in the world, enabled them to indulge in country houses and gardens, and to import foreign plants. It is certain that the Dutch flowers principally cultivated are all Oriental, as the ranunculus, anemone, tulip,

hyacinth, narcissus, &c. These no doubt came to them from Constantinople, perhaps not before 1453, at the fall of the Eastern Roman Empire, when the Greeks fled into Italy. Thence the flowers might have migrated to Vienna, and into Holland; or perhaps might have been carried by the Arabians into Spain, and thence transplanted by Charlemagne into Holland and the Netherlands. Beckmann says, "I think I may with great probability assert, that the modern taste for flowers came from Persia to Constantinople, and was imported thence to Europe, for the first time, in the 16th century." By whatever means, however, the bulbous flowers of the East may have reached the Dutch, it is certain that one cause why they have at an early period excelled in their culture is, that the climate and soil of Holland are singularly favourable for horticulture and floriculture; the two departments of gardening in which the Dutch are most eminent.

235. *The taste for gardening in Holland and the Netherlands has greatly increased since the peace of 1815.* The Horticultural Society of the Netherlands is, perhaps, one of the richest in Europe, having a capital of nearly 20,000*l.*; and possessing, at Brussels, one of the handsomest gardens on the Continent. A horticultural society has also been formed at Ghent, which is in a most flourishing condition; and both these societies are in correspondence with a great number of minor ones in the provinces. (*Gard. Mag.*, vol. i. p. 202.)

SUMMARY. 1. *Dutch Gardening, as an Art of Design and Taste.*

236. *The Dutch are generally considered as having a particular taste in gardening; yet their gardens, Hirschfeld observes, appear to differ little in design from those of the French.* The characteristics of both are symmetry, and abundance of ornaments. The only difference to be remarked is, that the gardens of Holland are more confined, more covered with frivolous ornaments, and more intersected with still and often muddy pieces of water. The gardens of Ryswick, Houslaerdijk, and Sorgvliet were, in the beginning of the last century, the most remarkable for geometrical beauty of form, richness in trees and plants, and careful preservation. It is singular, our author observes, that the Dutch are fond of intersecting their gardens with canals and ditches of stagnant water, which, so far from being agreeable, are muddy and ugly, and fill the air with unwholesome vapours. Yet they carry this taste, which has no doubt originated in the nature of their country, to the East Indies; and the numerous country houses belonging to the Dutch settlement in Batavia are all furnished with gardens and canals like those in the neighbourhood of Amsterdam; as if to render the unwholesome air of that country still more dangerous. Every field is there crossed by a canal; and houses on eminences are surrounded at great expense by moats and drawbridges like those of the Hague. Such is the influence of habit, and the love of country.

237. *Grassy slopes, green terraces, and straight canals, are more common in Holland than in any other country of the Continent, because the climate and soil are favourable for turf; and these verdant slopes and mounds may be said to form, with their oblong canals, the characteristics of the Dutch style of laying out grounds.* "In the Netherlands most of the ancient country houses are surrounded with water, have a regular drawbridge, a tower gateway beyond it, leading into a square court. The principal living rooms are on the first floor; and the windows of the ground floor are small, and secured by iron gratings. Many examples may be seen in the fine etchings of Rademaker." (*G. Laing Meason.*)

238. *As a specimen of the Dutch style of laying out grounds in the seventeenth century, we shall here give a short account of the palace and gardens at Loo (fig. 39.), during the time of William III., abridged from Harris's Description of Loo, 4to, London, 1699.*

a. The palace has a broad green walk in front between a double row of oaks half a mile long, and terminating at each end in a gate of iron rails between coupled columns. Directly in front of the gate which enters the court of the palace are three avenues, or green walks, between trees, upwards of a mile in length.

b, c. The stables, which are of great extent, and comprise coach-houses, a guard-house, a riding-house, &c.

d. Domestic offices, including extensive lodgings for the servants of visitors.

e. Orangery.

f. Fountain.

g. Lower garden, having a terrace walk on three sides, ascended by steps.

h. Upper garden, separated from the lower garden by canals, by a low wall, and by a broad cross walk, planted with oak trees. The fountain in this upper garden has 33 jets, and the middle one throws up the water 45 feet high. There is another fountain, from which the water rises in the form of a peacock's tail; near which are two large porticoes or semicircular cloisters.

i. The king's garden, with a large fountain.

k. Bowling-green.

l. The queen's garden, having a fountain similar to that of the king's. Adjoining this garden southward there are various arbour walks, with five fountains in the middle of as many parterres.

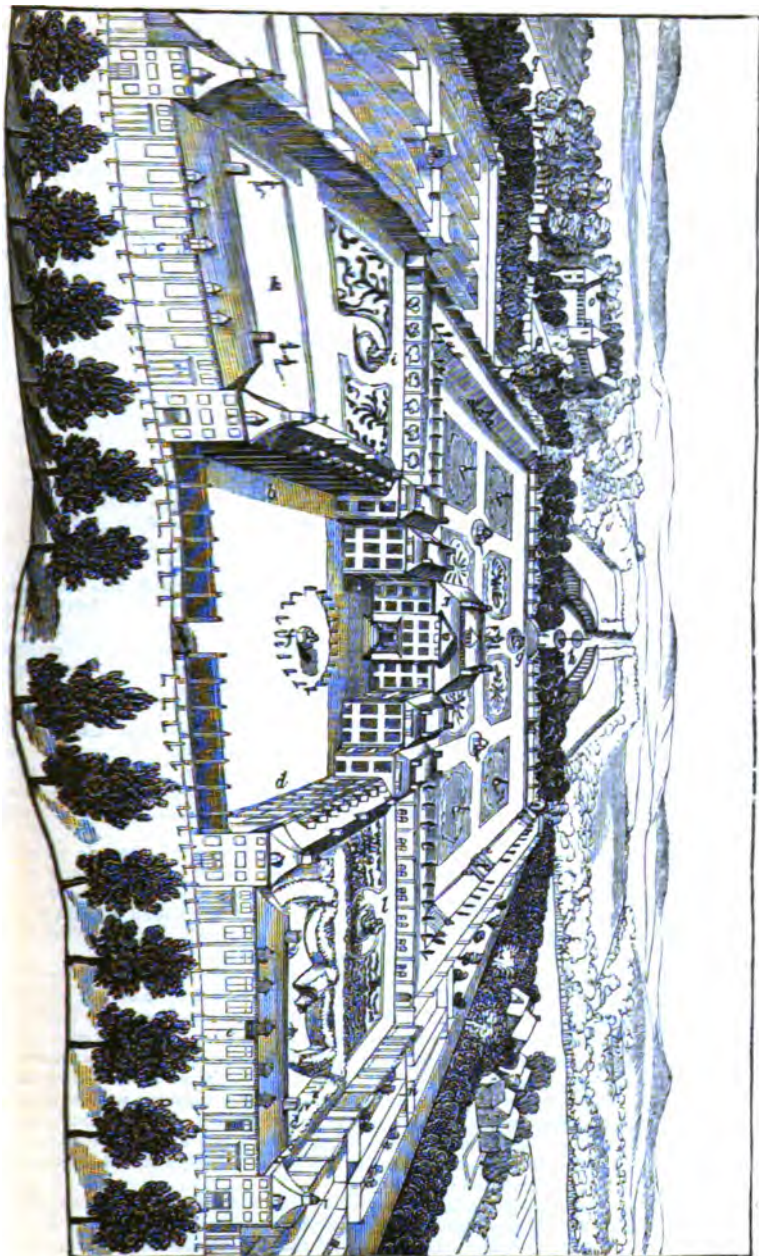
m. The king's wilderness or labyrinth of clipped hedges, with sandy walks between.

n. The queen's wilderness or labyrinth of retirement, in which are fountains, statues, walks, &c.

o. The old *hooft*, court, or castle, the residence of the Seigneur de Laeckhuysen, till the property was purchased by William.

p. The voliere, or fowl-garden.

q. The *deer*, vivarium, or park, containing a fountain, and "divers pleasant and long green walks, nurseries of young trees, groves, and canals; and westwards of this park there is a fine grove for retirement, called The Queen's Grove."



239. *The foundation of the palace of Loo was laid by Mary II., of England, about 1690, and it was completed by William during the seven years' war. Dr. Harris describes it as ranking with the first palaces in England and on the Continent. "The gardens are," he says, "a work of wonderful magnificence, most worthy of so great a monarch; a work of prodigious expense, infinite variety, and curiosity; and, after nine years' labour by abundance of workmen, they were, some years ago, entirely finished and brought to perfection in all respects."* The situation is on the east side of a large

sandy heath, in the province of Guelderland, and 12 leagues from Utrecht. The heath is said to be an excellent country for hunting, fowling, and hawking; a large decoy, and six large fish-ponds, "somewhat after the model of those in Hyde Park," supply ducks, teal, and fish.

240. *Of the trees, shrubs, and flowers planted in these gardens*, very little is said. In the lower garden the slopes of turf are described as being crowned with junipers cut into pyramids, and intermixed with curious shrubs. One of the numerous basins of water is ornamented with "a pine-apple cut in stone;" another with the celestial globe, and one with the terrestrial, having Europe, Asia, Africa, and America distinctly marked on it. The parterres are said to contain divers figures in box, with beds of flowers and shrubs of marsh mallows (*Althæa frutex*), all cut into pyramids. "In the spring there is a variety of the finest tulips, hyacinths, ranunculuses, anemones, auriculas, narcissuses, jonquils, &c. In the summer there are double poppies of all colours, gillyflowers, lark-spurs, &c. In the autumn, the sunflower, nasturtium, stocks, marigolds, &c. On the walls are peaches, apricots, cherries, pears, figs, plums, muscadine grapes, &c. The hedges are chiefly of Dutch elms; and the avenues of oaks, elms, and limes. The figures into which the trees and shrubs are cut, are, for the most part, pyramids. On the walls fresco paintings are introduced in various places between the trees. In the arbour walks of the queen's garden are seats, and opposite to them windows, through which views can be had of the fountains, statues, and other objects in the open garden. The parterres in the queen's garden are surrounded by hedges of Dutch elm about four feet high. The seats and prop-work of all the arbours, and the trellis-work on the fruit-tree walls, are painted green. All along the gravel walks, and round the middle fountain, are placed orange trees and lemon trees in portable wooden frames, and flower-pots about them." "In a corner of the queen's garden, next to the terrace walk in the great garden, and under one corner of the palace, there is a fine grotto, consisting of the roots of trees, flints, and shells, disposed in a rough, grotesque manner, and in one corner of this grotto is an aviary; connected with it is also a china room." The ironwork is painted blue, and the ornaments gilt. Every hedge, when it is planted, has fixed along its centre a prop, or line of trellis, of the height it is intended to grow, which regulates the gardener in clipping the hedge. In the park, are not only walks, groves, nurseries, fountains, canals, cascades, and a place for enclosing and feeding game, but "cornfields for his majesty's diversion in shooting, setting, &c." In one of the basins of water in the park there is a jet which throws up a large inverted bell of water; round which are lesser inverted bells of water: round the basin are little stone canals of seven inches in breadth, with borders of two inches. These little canals, "besides the flourish they make on each side, do form the letters R. W. M. R.; and above those letters, the said small canals are so disposed as to form the representation of a crown." Close by these royal letters are fourscore minute jets, concealed in the ground, which, by turning two cocks, "divert the spectators, by causing a small rain to fall unawares on those who shall advance within the compass of their reach."

241. *All the fountains and cascades* here are supplied from a natural reservoir, on an eminence at some distance. "Whence it comes to pass that the famous waterworks at Versailles have in this regard a very great disadvantage and inconvenience; because they soon contract corruption, and, after they are forced to play, are found to cause an ill stench in the gardens. At Loo, the water is always sweet; but where water is forced up by engines into great cisterns, as at Versailles, it soon corrupts and stinks."

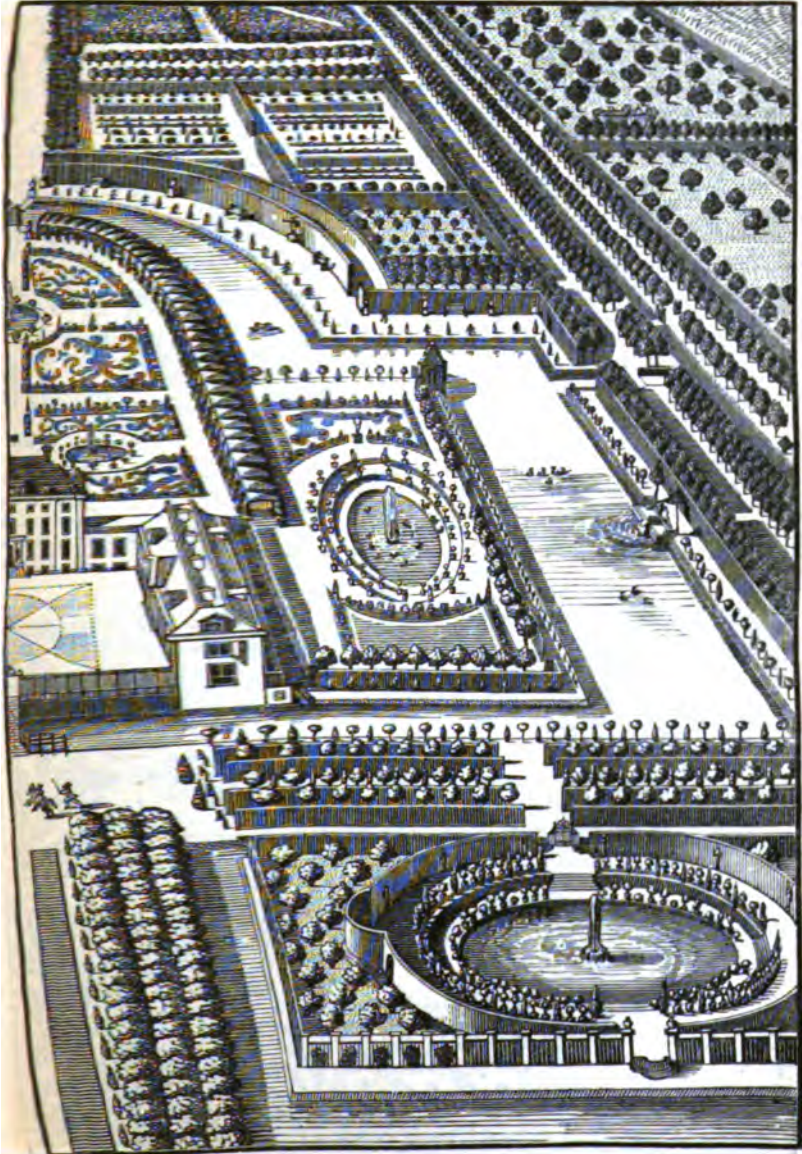
242. *The six viviers or fish-ponds* in the park, lie on six different levels, the water flowing from the first through all the others. They are dug six feet deep, and the earth taken out forms a bank of three feet; so that the depth of water is nine feet. The banks are every where planted with willows. The first vivier is 842 feet long; the second 612 feet; the third 434 feet; and the fourth, fifth, and sixth 396 feet each. "These viviers are provided for the supplying of different sorts of fish. They were finished from a model of Monsieur Marot, a very ingenious mathematician, who is the same person that first designed all these gardens and fountains; but the orders relating to them were from time to time given by the Right Honourable the Earl of Portland; and his lordship's directions were punctually observed by Monsieur de Marais, his majesty's chief architect, a gentleman of great endowments and capacity."

243. *This picture of an ancient palace and garden*, however magnificent in its time, is not presented as at all worthy of imitation in the present age; even if a proprietor had the requisite sum of money to spare. Considered relatively to nature and utility, the style of the ornaments are absurd, and even injurious to health; but considered historically, or relatively to the age which produced them, they are good enough; or rather they could not be otherwise. Italy, on the revival of arts and commerce, took the lead in architecture and gardening; and as her gardens abounded in statues and fountains, so did all those which sprung from them. A modern popular writer (*Tour by a German Prince*, &c., vol. iv. p. 178.) observes, that "a little age can only form little things."

A profusion of basins and fountains would never have been resorted to, by the natural taste or feeling of mankind, in a cold, moist country like Holland. In the progress of improvement, the career for a long period is that of imitation; but the time will at last come, when every people will think for themselves, and adopt modes of building and gardening suitable to the climate, and other physical circumstances of the country in which they live. A greater advance has been made towards this state of things in England, and, perhaps, in North America, than in any other countries of the world; for wherever there are really free civil institutions, they will be followed by freedom of taste in the arts.

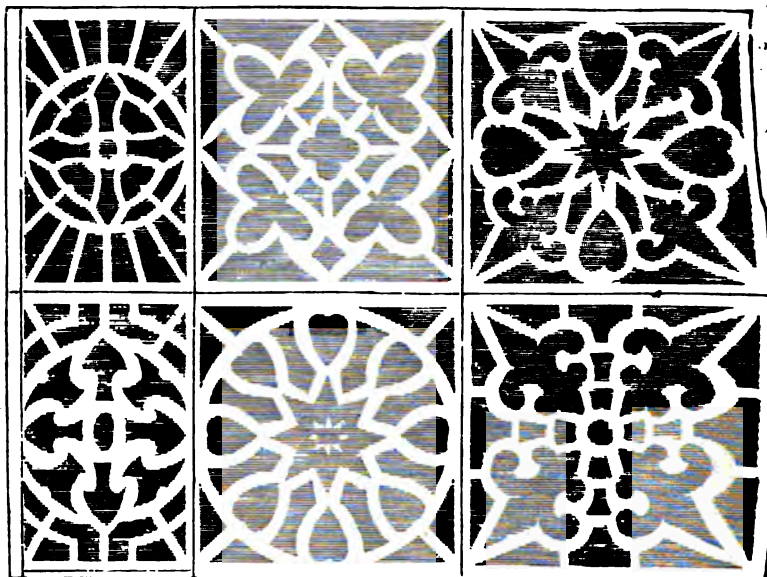
244. The garden of the Count de Nassau (fig. 40.) affords a very favourable specimen

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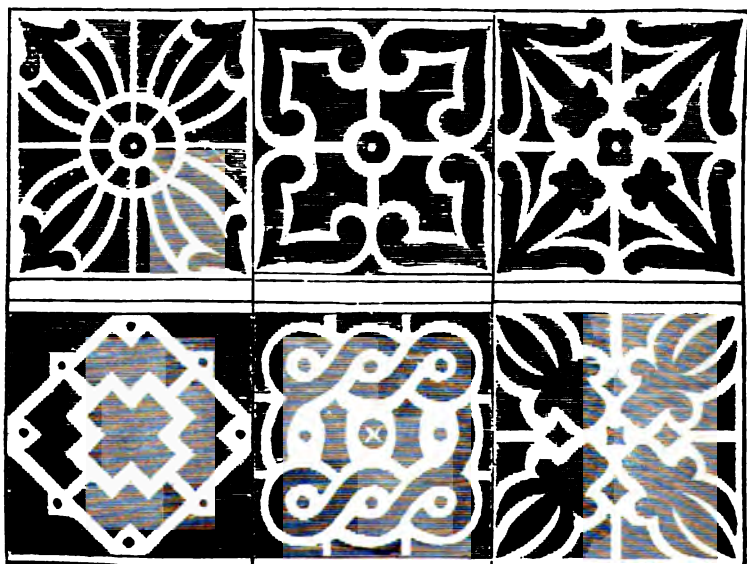
of the genuine Dutch taste. A remarkably good engraving of it is given in *Le Rouge's Collection of Designs*, from which the accompanying figure is copied; and it will stand in our pages as a faithful representation of a style which is now no longer to be seen in such perfection in any country.

41



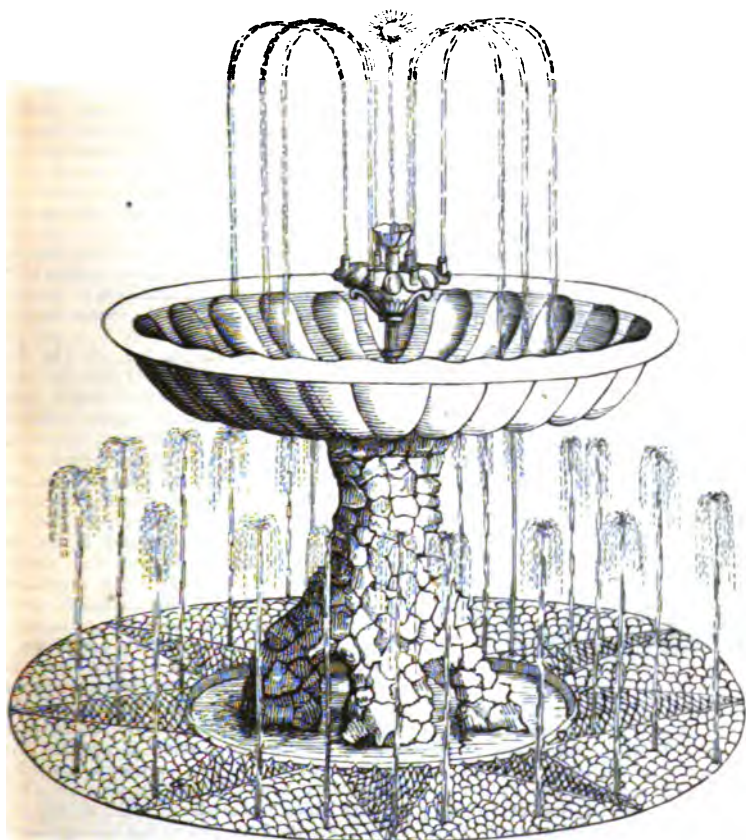
245. Some curious designs for laying out and planting country residences are given by Vander Groen, gardener to the Prince of Orange in 1672. The great object at that time, it appears, was to follow the French. Fontainebleau and St. Germain are held out as models; and the garden of Bournonville at Brussels, and of the Duke d'Arschot at Enghien, as among the best in the Netherlands. In Holland, those of the Prince of

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Orange are said to be equal to any in France. Among the plates given are four birds-eye views of houses with gardens in front, 24 "models" of parterres, and 900 other "models" for parterres of another kind; "models" for trellis work, for clipping trees into shapes; and various other garden ornaments. Among the latter are several designs for sundials to be planted in box, with a small tree for the gnomon. As a specimen of the parterres we shall give a copy of p. 98. (figs. 41, 42.); and, as an example of the other ornaments, we shall insert the view of a fountain, which, it is said, may be erected at very little expense (fig. 43.).

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246. *Hague*, the Versailles and Kensington of Holland, and, in fact, the most magnificent village in Europe, contains two royal palaces, with their gardens in the ancient style. Evelyn, in 1641, describes them as "full of ornaments, close walks, statues, marbles, grottoes, fountains, and artificial music;" and of the village he says, "beautiful lime trees are set in rows before every man's house." Sir J. E. Smith (*Tour on the Continent*, vol. i.) described them, in 1783, the one garden as full of serpentine, and the other as full of straight, lines. In 1814 these gardens had lost much of their former beauty, partly from age and decay, but principally from neglect. Jacob (*Travels in Germany*), in the same year, found them formal, and crowded with high trees. Neill, in 1817, found in them nothing becoming royalty. Near the Hague are some considerable country residences, on surfaces containing some little inequality. The mansions generally stand at the end of long avenues, and in a few places these avenues are varied by coppice wood and clumps.

247. *At Broeck and Alkmaar* the ancient style is still maintained in its purity in the villa gardens. M. Seterveldt's garden, near Utrecht, is also a carefully preserved specimen. Here the grand divisions of the garden are made by tall thick hedges of beech,

hornbeam, and oak, and the lesser by yew and box. There are avenue walks, and *berceaux* walks, with openings in the shape of windows in the sides, verdant houses, rustic seats (fig. 44.), canals, ponds, grottoes, fountains, statues, and other devices; "and," adds

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statues, and root-houses." This park was considerably enlarged some years ago; the then decayed root-houses, grottoes, and more curious waterworks were removed, and the whole was divided by broad sanded paths, and decorated with good statues, seats, fountains, and *cafés* for refreshment.

249. *The modern or English style of gardening*, Sir J. E. Smith informs us, was "quite the fashion" in Holland, in 1783; but he adds, "that neither the surface of the ground, the confined limits of territorial property, nor the general attention to frugality and economy, are favourable to this style;" alluding, no doubt, to the extent required to imitate an English park.

250. *An example of a Flemish garden in what is there called the English style* (fig. 45.)

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is given by Kraft: it is of small size, but varied by the disposition of the trees, rustic seats, and raised surfaces; and surrounded, as Dutch and Flemish gardens usually are, by a canal. It was laid out by Charpentier, gardener to the senate of France, in the time of Napoleon.

251. *The villa of M. Bertrand of Bruges* is thus noticed in *Neill's Horticultural Tour*:—It has extensive grounds, and is flat, but well varied by art. Where the straight walks cross each other at right angles, the centre of the point of intersection is shaped into an oblong parterre, resembling a basket of flowers, and containing showy geraniums in pots, and gaudy flowers of a more hardy kind planted in the earth. Some things are in very

bad taste. At every resting-place, some kind of conceit is provided for surprising the visitant: if he sit down, it is ten to one but the seat is so contrived as to sink under him; if he enter the grotto, or approach the summer-house, water is squirted from concealed or disguised fountains, and he does not find it easy to escape a wetting. The dial is provided with several gnomons, calculated to show the corresponding hour at the chief capital cities of Europe; and also with a lens so placed, that, during sunshine, the priming of a small cannon falls under its focus just as the sun reaches the meridian, when of course the cannon is discharged.

252. *The principal ornament of M. Bertrand's villa* consists in a piece of water, over which a bridge is thrown; at one end of the bridge is an artificial cave fitted up like a lion's den; the head of a lion cut in stone peeping from the entrance. Above the cave is a pagoda, which forms a summer-house three stories high. At the top is a cistern which is filled by means of a forcing-pump, and which supplies the mischievous fountains already mentioned. The little lawns near the mansion-house are decorated with many small plants of the double pomegranate, sweet bay, laurustinus, and double myrtle, planted in large, ornamented flower-pots, and in tubs. These plants are all trained with a stem three or four feet high, and with round bushy heads, after the manner of pollard willows in English meadows. The appearance produced by a collection of such plants is inconceivably stiff to an eye accustomed to a more natural mode of training. Eight American aloes (*Agave americana*), also in huge Dutch flower-pots, finish the decoration of the lawn, and, it must be confessed, harmonise very well with the formal evergreens just described. A very good collection of orange trees in tubs was disposed along the sides of the walks in the flower-garden: two of the myrtle-leaved variety were excellent specimens. All of these were pollarded in the style of the evergreen plants.

253. *The soil of M. Bertrand's grounds* being a mixture of fine vegetable mould, resembling surface peat-earth, with a considerable proportion of white sand, seems naturally congenial to the growth of American shrubs; and, indeed, rhododendrons, magnolias, and azaleas thrive exceedingly. In the open border of the flower-garden we saw georginas in great vigour and beauty. Several kinds of tender plants were planted in the open border for summer, particularly the Peruvian heliotrope (*Heliotropium peruvianum*), the specimens of which were uncommonly luxuriant, and, being now in full flower, spread their rich fragrance all around. The European heliotrope (*H. europæum*) is likewise not uncommon in the flower-borders. In the fruit garden we first saw pear and apple trees trained *en pyramide* or *en quenouille*; i. e. preserving only an upright leader, and cutting in the lateral branches every year. The hot-houses cover the north side of the fruit garden. In the centre is a stove or hot-house for the most tender plants; on each side of this is a green-house for sheltering more hardy exotics during winter; and at each extremity is a house partly occupied with peach trees, and partly with grape vines. In the space of ground before the houses are ranges of pine pits and melon frames. One frame is dedicated to a collection of cockscombs (*Celosia cristata*), and these certainly form the boast of M. Bertrand's garden: they are of the dwarfish variety, but large and strong of their kind; and in brilliancy and variety of colour they can scarcely be excelled. (*Neill's Hort. Tour*, p. 74.)

254. *M. Bertrand's villa was visited in June, 1830*, by Mr. T. Rivers, an English nurseryman. He was gratified to find some fine specimens of *Magnolia tripetala* and *acuminata*, *Pinus Cembra*, and *Æsculus humilis*. There were also, in tubs, *Eriobótrya japonica*, *Cléthra arborea*, twelve to fourteen feet high, and a fine collection of oranges, some of them very large. A clump of *Rhododendron ferrugineum* formed an exceedingly gay mass. There was a summer-house on a large mound, the ascent to which was by circuitous shaded paths, into which pipes from a fountain were thickly introduced, for the purpose of wetting to the skin any loiterers. When Mr. Neill visited this garden it 1817, it was famous for cockscombs; but in 1830 it presented a sad contrast: the pines, also were bad in the extreme; not a fruit weighed more than half a pound. The contrast which this place presented to an English pleasure-ground, by its black, soft, sandy paths, and unweeded grass, was striking and uncouth. (*Gard. Mag.*, vol. vii. p. 279.)

255. *The villa of M. Meulemeester, and that of Marieleerne*, in the neighbourhood of Ghent, are described by Neill as being both in very bad order, though tolerably laid out, and having a good many hot-houses.

256. *The villa of M. Hopsomere* is remarkable for three acres covered with groups of American plants of great size, and in the highest degree of luxuriance. An irregular piece of water expands itself among the groups, and forms numerous bays, islets, sinuosities, &c. The surface is generally of turf, but in some places in earth, with edgings of heath to the walks; the walks are without gravel; and the gardener, as in the other places visited, was wretchedly habited, without shoes or stockings, and could not read. (*Hort. Tour*, p. 74.)

257. *The town gardens of Bruges* are described by Mr. Rivers as surrounded by very high walls: one belonging to a convent was pointed out to him, which contained sixteen acres; and the soil was so black, soft, and unctuous, that the men were digging it with large long shovels, without the application of the foot. But although from this appearance it seemed fertility itself, yet neither vegetables nor fruit trees appeared to thrive in it, with the exception of pears. (*Gard. Mag.*, vol. vii. p. 279.)

258. *The country seat of Mr. Chantrell*, Mr. Rivers states, was formerly the residence of a bishop; and, with the grounds, it forms a perfect specimen of a Flemish country residence, surrounded by a moat of clear, dark, stagnant water, with long straight avenues diverging from the house, like the rays of a circle. The grounds are quite flat, and the paths a soft black sand; but these soft paths and shady avenues, though so completely at variance with English picturesque ideas, felt most exceedingly agreeable in a sultry July day; and as the Flemings, from the nature of a great part of their country, must have tame gardens, Mr. Rivers admires their taste in consulting their comfort more than their eyes. In these grounds was a pole, perhaps twenty-five feet high, closely covered with the twining stems of the *Aristolóchia sipho*, which formed a most beautiful verdant column. In the kitchen-gardens, the pear trees were, as usual here, flourishing; but the apples were sadly cankered and unhealthy; lettuces, in a number of successive crops, were the principal vegetable; the cabbage tribe did not flourish, especially the cauliflower, which will not grow in this neighbourhood so as to form a head.

259. *The garden of the Comtesse de Carnen, at Nalde*, is utterly at variance with the taste of an English gardener: the orange trees and green-house plants Mr. Rivers found placed in straight single lines in a square, enclosed with tall thin hedges, each plant fastened by the stem to a small painted rail, and all trained with naked stems as standards. The effect was curious; and it did really seem quite ridiculous to see the

poor myrtles, laurustinus, bays, pomegranates, oleanders, arbutuses, and aucubas, with numerous oranges, looking more like mops than plants, with some of the stems of the myrtles not larger than a reed, and from four feet to six feet high; the heads of all being cut round as a ball: but the gardener appeared to think them the summit of perfection, and his eyes glistened at the praises which Mr. Rivers gave him for the ingenuity and perseverance he had displayed; but when he explained to him that in England they would all have been left in a state of nature, which the English thought most ornamental, he shook his head most significantly, and seemed to pity us for having no taste.

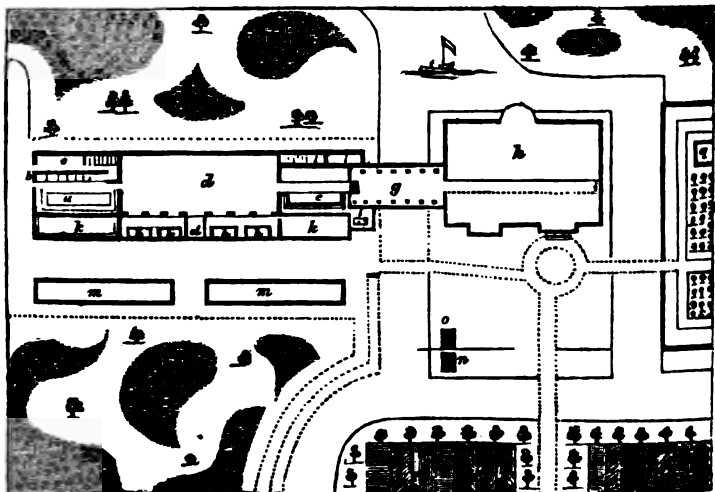
260. *The seat of Madame Vilain Quatorze* (fig. 46.), like most of the others mentioned, and like villas in general in this country, is interspersed with water; and the boundary of the demesne, instead of being a wall, hedge, or belt of plantation, is a broad canal, over which of course is seen the adjacent country. The grounds are of considerable extent, and include a farm, pleasure-ground, kitchen and flower-garden. A plan of a part of the grounds round the house has been given in the *Horticultural Tour*, in which the following objects are indicated:—

- a. A hot-house for exotic plants.
- b. An aviary, with shrubs for the birds to perch upon.
- c. Gardener's room.
- d. Green-house. Entrance by flight of wooden steps.
- e. Stove for exotic plants.
- f. Dry stove.
- g. Picture gallery of a considerable height. It has an arched roof, and is lighted from the top.
- h. Dwelling-house.
- i. A large mirror is placed at the end of the passage. Lamps are suspended from the ceilings of the house, gallery, green-house, and stoves, at different places. When lighted, the whole line, from the one extremity to the other, must be reflected by the mirror.

- k, k. Grapes and peach houses. Peach trees are planted at the back wall of each, and vines at the front.
- l, l, l. Pits for green-houses and stove plants.
- m, m. Pits for melons, cucumbers, and other tender plants.
- n. Large barn.
- o. Stable and cow-houses.
- p. Part of the kitchen-garden.
- q. Part of the pine-apple stove.
- r. Cornfields, and a crop of Indian corn, wheat, hemp, &c.

The principal floor of the house and the picture gallery are upon the same level; but there is a rise of a few steps to the floors of the stove and green-house, which are elevated above the ground more than nine feet.

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261. *The place of M. Smets* is the finest near Antwerp. It was laid out in 1752, partly in the Dutch and partly in the English taste, and contains, at present, scenes of tonsile evergreens, vistas, canals, lakes, secret waterworks, caves, tombs, a lawn with a flock of stone sheep, a shepherd and dogs, dwarfs, a drunkard, and other paltry contrivances. There are, however, good span-roofed hot-houses, rustic seats, fine exotic trees, especially the purple beech, (which here seeds freely, and comes purple from the seed,) catalpa, and liquidambar, fine collections of georginas, *Asclèpias tuberæsa*, and *Lilium superbum*, in extensive groups; and on the whole "as many natural beauties as can be expected in a flat country, and instances of good taste and judicious management more than counterbalanced by those of an opposite description." (*Neill's Hort. Tour*, p. 110.)

262. *The villa of M. Cuters de Wolfe*, near Antwerp, is remarkable for two elegant curvilinear hot-houses, erected by Messrs. Bailey of London, and glazed with plate glass (fig. 47.). Their effect surpasses any thing of the kind on the Continent. A rich collection of the choicest exotics was procured from the Hackney Nursery, about 1826.



263. *The gardens round Rotterdam* are generally many feet below the level of the canal. On the Cingle, a public road which surrounds the city, are a continued series of garden-houses nearly a mile in extent; these miniature villas being separated from each other only by wooden partitions, which are generally neatly painted. To these the citizens with their wives retire on Sunday, to smoke and take coffee. (*Neill's Hort. Tour*, &c. p. 127.)

264. *The gardens and villas between Rotterdam and Amsterdam* are thus described by a recent tourist: — "The road, as is generally the case in Holland, was paved with a particular kind of brick, called a clinker, set closely on edge, very neatly fitted together, and as level as a bowling-green. After running for some distance along the side of the canal, the road branched off; and here commenced a continued succession of neat, and sometimes very handsome, villas on both sides, and at no great distance from it. Here and there an elegant château occurred, surrounded by an extensive domain, well planted with trees, but generally in straight lines; the mansion being commonly approached through a grand avenue. The boundaries also of these large estates are frequently terminated by avenues of trees, each row belonging to separate proprietors; but the division of property is mostly marked by a dike and a ditch. Most of these country houses, whether large or small, have a ditch of stagnant water dividing the little front garden from the road; and close to this ditch, generally indeed rising out of it, and not unfrequently bestriding it, is sure to be found a small building, square or octagonal, called a *lust-huis*, or pleasure-house, with a window on each side, commanding a complete view of the road. These little buildings or pleasure-houses are so very numerous as to form a characteristic feature in this part of the country. They occur, indeed, as we afterwards found, by the sides of the roads throughout South Holland. In the summer and autumn evenings they are the common resort of families, where the men enjoy their pipes with beer or wine, and the females sip their tea; and both derive amusement in observing and conversing with the passengers on the road. In any other country these (the summer and autumn evenings) would be considered as just the seasons of the year, and the time of day, when these ditch-bestriding pleasure-houses would be shunned; the effluvia from the stagnant water being then strongest, and the frogs, which are every where seen skipping about, most lively and noisy. But the same vitiated taste, which has selected the ditch for the site of the pleasure-house, may deem the croaking of the frogs when in full song, just as melodious to their ears as the notes of the nightingale is to their more southern neighbours. As there is no want of water in any part of Holland, the flower-gardens attached to these villas have generally a fish-pond in some part of them; and when they happen to face the road, the pleasure-house is frequently placed on a hillock in the middle of the garden, and is accessible only by a bridge or flight of steps. Each villa has its name, or some motto, inscribed over the gateway, the choice of which is generally meant to bespeak content and comfort on the part of the owner; and they afford a source of amusement to the stranger as he passes along. Thus, among others we read 'lust en rust,' pleasure and ease; 'wel te vrede,' well contented; 'myn genegenheid is voldoen,' my desire is satisfied; 'myn lust en leven,' my pleasure and life; 'niet zoo gnaalyk,' not so bad; 'gerustelyk en wel te vrede,' tranquil and content; 'vriendschap en gezelschap,' friendship and sociability; 'het vermaak is in't hovenierin,' there is pleasure in gardening. And over the entrance to one of the tea-gardens at Rotterdam was inscribed, 'het vleesch potten van Egypte.' Some of the larger gardens abound with fruits and vegetables, and beds and borders of flowering shrubs and plants are laid out in all the grotesque shapes that can be imagined. It must be confessed, however, that an air of comfort presides over these villas. Most of the dwelling-houses are gaily painted in lively colours; all the offices and outhouses are kept in neat order; while the verdant meadows are covered with the finest cattle, mostly speckled brown and white. (*Tour through South Holland*, 12mo, 1831, p. 68.)

265. *The whole country around Delft*, with the exception of some contiguous gardens and potato beds, consists of rich pasturage; and a great number of very fine cattle were grazing in the meadows. No appearance of tillage, except small patches of stubble here and there, and a few enclosures of clover. The same kind of villas, parks, and gardens as those we had passed, continue from Delft to the Hague. (*Ibid.* p. 71.)

266. *The environs of Leyden* are extremely beautiful, and the whole country around is

studded with villas, gardens, and pleasure-houses, standing, as usual, over ditches, or in the middle of ponds. (*Ibid.* p. 78.)

267. *The palace-garden at Haarlem*, formerly occupied by King Louis, and originally the property of the celebrated banker, Hope, is in no respect remarkable as to design; but pines are grown there better than in most gardens in Holland, and strawberries are successfully forced.

268. *The Duc d'Arenberg's seat, near Enghien*, like many others in Flanders and Holland, was ruined during the excesses of the French revolution; but the Duke is now restoring it, and has begun with the gardens rather than with the house. Extensive hot-houses are erected, and many new fruit trees planted. The finest part of the park was not injured, when Neill visited it in 1817. He thus describes the celebrated temple of the *grande étoile*:—"This temple is of an heptangular shape, and at the angles on every side are two parallel columns placed about a foot apart. From the seven large sides proceed as many broad, straight and long avenues of noble trees, affording rich prospects of the distant country in all these directions; and from the seven angles, and seen between the columns, proceed an equal number of small and narrow alleys, each terminated by some statue, vase, bust, or other ornament. The temple is surrounded by a moat lined with polished marble. The old orange grove is situated at the end of the avenue. It is one hundred and seventy feet long, and twenty-seven feet wide, and contains one hundred and eight orange trees in tubs, many of them, as is the case in different old family seats of the Netherlands, presents from the kings of Spain 200, 300, and 400 years ago. The trees show straight stems of six or eight feet, and globular heads, from which, according to continental practice, protruding shoots and blossoms are pinched off as soon as they appear, for culinary and perfumery purposes." (*Neill's Hort. Tour*, p. 324. 372.)

269. *Cemetery gardens*, though first commenced, in modern times, by the Emperor Joseph, in the Netherlands, are not yet become common. Trees, however, are frequently planted in churchyards. A citizen of Amsterdam, N. Philippe Bosquet, who died there on the 8th January, 1829, bequeathed 2000 florins to the Benevolent Society of the northern provinces of the Netherlands, on the condition that two fruit trees of full growth should be planted over his grave, the fruit to be publicly sold by auction every year; in order to prove that the receptacles of the dead may be rendered useful and beneficial to the living. (*Gard. Mag.*, vol. vi. p. 595.)

270. *Public gardens and promenades*. These are to be found in, or round, most of the towns in Holland and the Netherlands. One of the characteristic features of modern city improvements on the Continent is that of converting ramparts into gardens and shady walks. The public promenade at Brussels has been formed, or at least greatly enlarged, by the removal of the old ramparts; and by substituting in their place lines of elm and lime trees, enclosing three distinct parallel roads, for foot passengers, carriages, and horses. The public are thus supplied with delightful rides, walks, and drives, of several miles in length, and every where shaded by trees. The park at Brussels, mentioned by Evelyn (§ 248.), has undergone great improvements, including the removal of the clipped trees and the hornbeam hedges. (*Gard. Mag.*, vol. ii. p. 87.) A beautiful park, near the town of Rotterdam, well wooded and drained, affords a variety of pleasant promenades. At the extremity of this park, which is two miles long, stands the summer residence of the Princes of Orange, called "The Palace in the Wood." The approach to it is through a forest of oaks which are regarded with superstitious veneration, and never submitted to the pruning hand of the woodman. (*Elliott's Travels*, 1832, p. 10.) The *voorhout*, or principal street, at Rotterdam, is also used as a promenade, and has several rows of trees in the centre, with a carriage-way on each side, while walks in the middle, covered with shells, are assigned to pedestrians. (*Ibid.* p. 10.)

271. *The improvement* which a British gardener may derive from the study of the landscape gardening of Holland and the Netherlands, is not great. Perhaps it may be limited to the employment of water in artificial forms, and to the use of hedges and avenues as parts of pleasure-ground scenery. So much is to be learned from the Dutch in the other branches of gardening, that they may well be excused for not excelling in one for which their country presents no particular facilities.

SUBJECT. 2. *Dutch Gardening, in respect to Botanic Gardens and the Culture of Flowers and Plants of Ornament.*

272. *The taste for flowers, so prevalent in Holland*, is thought to have originated with their industry early in the twelfth century; the study of flowers being in some degree necessary, as affording patterns for the ornamental lace and linen manufactures. Matthias de l'Obel, physician to James I. of England, states, in the preface to his *Plantarum Stirpium Historia*, published in 1576, that the taste for plants existed among the Flemings in his time in the greatest degree; that they brought home plants from the Levant and the two Indies; that exotics were more cultivated by them than by any

other nation; and that their gardens contained more rare plants than all the rest of Europe besides, till, during the civil wars which desolated their country in the sixteenth century, many of their finest gardens were abandoned or destroyed. L'Obel, in the second part of his *Adversaria*, Lond., 1605, p. 514., gives a catalogue, from Clusius, of 38 varieties of the anemone; a striking proof of the florist's art in the end of the sixteenth century, about which period it is certain, from L'Obel's works, that many persons were very anxious in the cultivation of exotics. Deleuze observes, that Holland had at the end of the seventeenth century a crowd of distinguished botanists; and was then, as during a century preceding, the country the most devoted to gardening. (*Discours sur l'Etat ancien et moderne de l'Agriculture et de la Botanique dans les Pays Bas. Par Van Huthem*, 1817; *Extrait du Discours prononcé, &c. à Gand, par M. Cornelissen*, 1817.)

273. The botanic garden of Leyden was begun in 1577, forty-four years after that of Padua, supposing that to have been founded in 1533 (see § 192.). It was confided to Outger Cluyt, or Augerius Clusius, who was succeeded by Petrus Paaw in 1589. Paaw published *Hortus Publicus Academicus Lugduno-Batavæ*, 8vo, 1601: it has a plan of the garden. Ger. Bontius succeeded Paaw in 1592; and L'Ecluse, from Frankfort, was appointed professor of botany. In 1599 a green-house was constructed, and in 1633 the catalogue of the garden contained 1104 species. At this time, the magistrates, the learned men, the wealthy citizens, were occupied in facilitating the progress of botany and the introduction of new plants. A ship never left the ports of Holland, Deleuze observes, the captain of which was not desired to procure, wherever he put into harbour, seeds and plants. The most distinguished citizens, Beverning, Favel, Simon de Beaumont, and Rhede, filled their gardens with foreign plants, at great expense, and had a pleasure in communicating those plants to the garden of Leyden. This garden, in Boerhaave's time, who, when professor of botany there, neglected nothing to augment its riches and reputation, contained (*Index alter Plant.*, 1790) upwards of 6000 plants, species and varieties. Boerhaave here exemplified a principle, which he laid down (*Elements Chémie*) for adjusting the slope of the glass of hot-houses, so as to admit the greatest number of the sun's rays, according to the latitude of the place, &c. These principles were afterwards adopted by Linnaeus at Upsal, and by most of the directors of botanic gardens in Europe. It was in this garden, about the beginning of the eighteenth century, that the Geraniaceæ and Ficoïdæ, and other ornamental exotics, were first introduced from the Cape. The garden of Leyden was visited by Sir J. E. Smith in 1786 (*Tour*, &c., vol. i. p. 11.), who observes, that it had been much enlarged within the last forty years, and was then about as large as the Chelsea garden. In 1814 it appeared rather neglected; many blanks existed in the general collection of hardy plants, and the hot-houses were much out of repair. It contained, however, some curious old specimens of exotics, as Clusius's palm (*Chamaerops humilis*), twenty feet high, and upwards of 225 years old; and a curious ash, and various other trees and shrubs, planted by the same botanist. A new garden, in addition to the old one, and a menagerie were in progress. In this new garden, the walks are laid with a mixture of peat-moss and tanners' bark reduced to powder. A tourist, speaking of this garden as he found it in 1830, says, "It does credit to all who belong to it, being kept in the highest possible order. The walks are beautiful, and without a pebble; they are covered with a mixture of peat earth and the spent dust of tanners' oak bark. The garden is tastefully laid out in clumps of shrubbery in various forms, round which, on borders, are the various plants, named and numbered according to the system of Jussieu. The whole extent is seven acres; four of which have been added only a few years ago, and laid out in good taste by the late professor Brugmans, as a garden for the reception of medicinal plants, and for the use of the medical students. Among the hot-house plants we saw a date palm with fruit upon it, which tree the gardener said had been there 300 years. It may be questioned whether the botanical garden of Leyden and its museum are not superior to the Jardin des Plantes and its museum in Paris. Taken altogether, we were of opinion that they had a decided preference, though they wanted the attraction of living animals." (*Tour through South Holland*, &c., p. 75.) Strangers are shown two palm trees said to be planted by Boerhaave's own hands. Leyden, Deleuze informs us, was, for more than fifty years, the only city in Holland where there was a botanic garden; but before the middle of the seventeenth century, they were established in all the provinces.

274. The botanic gardens of Amsterdam and Gröningen merit particular notice. The former was under the direction of the two Commelyns, John and Gaspar; and was the first garden in Europe that procured a specimen of the coffee tree, about 1690. A seedling of this tree was sent from Amsterdam to Paris in 1714. Two seedlings from this plant were sent to Martinique in 1726, and these the Abbé Raynal observes (*Hist. de Commerce*, tom. xvi. ch. 90.) produced all the coffee trees now cultivated in the French colonies. This garden still contains many remarkable specimens of Cape and Japan plants. (*Neill's Hort. Tour*, p. 218.)

275. The garden of Gröningen was begun by Henry Munting, a zealous botanist and

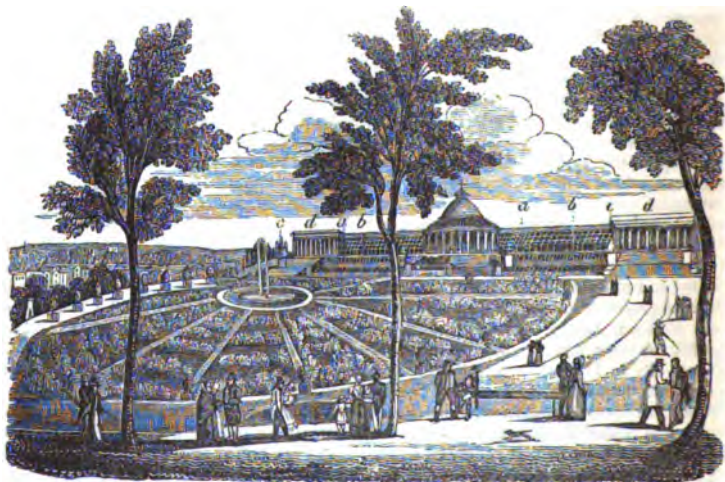
learned man, who had spent eight years travelling in the different countries of Europe, establishing correspondences between botanists and cultivators. He spent the greater part of his fortune upon his garden; but, in 1641, the states of Gröningen, thinking so useful an establishment ought to be under the protection of the republic, purchased it, and appointed him professor. The catalogue of this garden, published in 1646, contains about 1500 plants, without comprehending more than 600 varieties; 100 of these were pinks, and 150 tulips. Henry Munting was succeeded by his son, Abraham, esteemed for his posthumous work, *Phytographia Curiosa*, folio, 1702. The gardens of Amsterdam and Gröningen are still kept up, but without that enthusiastic ardour which distinguished the citizens of Holland when under more auspicious political circumstances than they are at the present time.

276. *The Antwerp Garden* was formerly one of considerable repute in the Low Countries. In 1579, a catalogue of this garden was given by Dodoens (*Florum et Coronariarum odoratarumque nonnullarum Herbarum Historia*. Antwerpæ, 8vo, 1568) which contained a considerable number of plants, including a great variety of tulips and hyacinths. The private botanic gardens of Van Schenen and Dr. Daaler, at Antwerp, are mentioned with approbation in *Neill's Horticultural Tour*, p. 121.

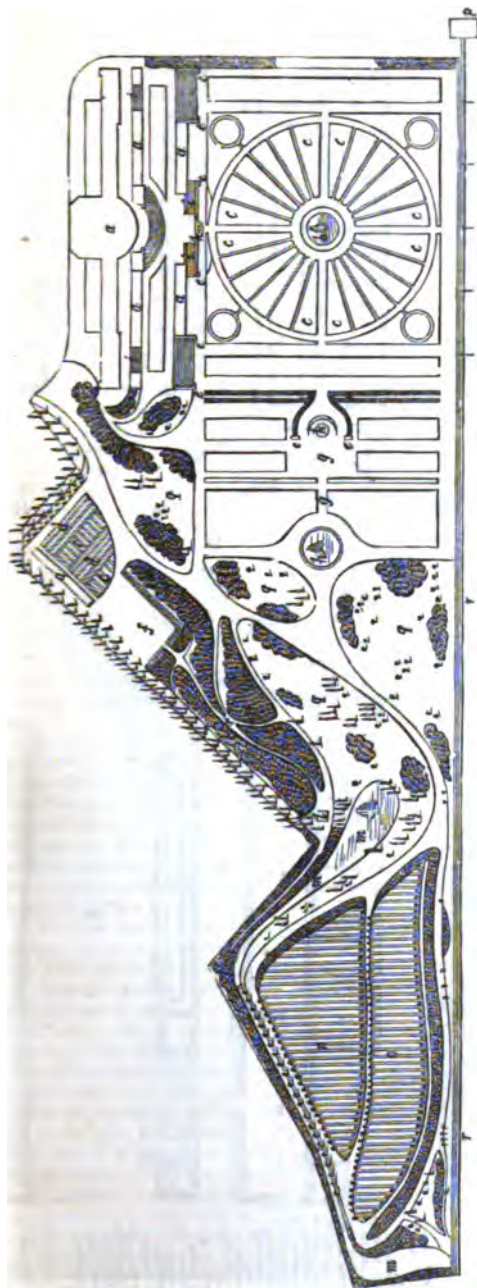
277. *The gardens of Clifford*, near Haarlem, of which Linneus published the history, was the most celebrated in 1737. Clifford got all the new plants from England, and corresponded with the botanists of every country. Boerhaave gave him the plants of the Leyden garden; Siegesbeck sent him those of Russia; Haller, those of the Alps; and Burman, Roell, Gronovius, and Miller sent him portions of the seeds which they received from different parts of the world. This garden had four magnificent hot-houses; one for the plants of the Levant and the south of Europe, one for Africa, one for India, and one for America.

278. *The botanic garden of Utrecht* was founded in 1630, and contains several palms and other exotics, brought there at that time. Henricus Regius was appointed the professor, and published *Hortus Academicus Ultrajectinus*, 8vo, 1650. The garden is still kept in tolerable order, but displays no kind of scientific arrangement. (*Neill's Hort. Tour*, p. 244.)

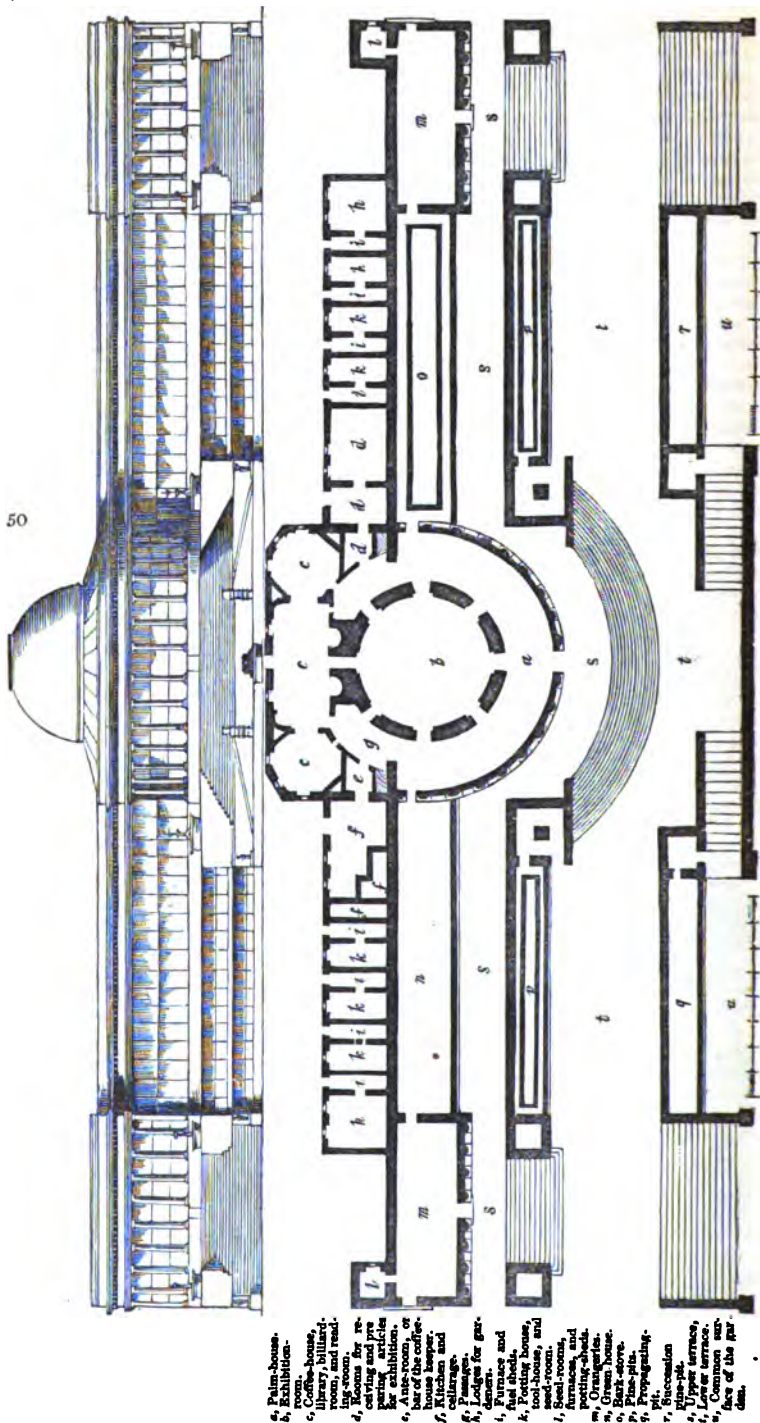
279. *The botanic garden at Brussels* occupied a small space, and contained very few plants, till 1826, when it was removed to a new site on the north of the city. It is now (1832) of considerable extent, and contains a magnificent range of green and hot-houses 400 feet long, ornamented with a rotunda and porticoes, with columns of the Ionic order (fig. 48.); pits, frames, and fountains. One striking feature of this botanic garden is, that, from the circumstance of its running parallel, for upwards of one third of a mile, with the boulevard, or rampart walk of the town, which overlooks it, the hot-houses, and the whole garden may be completely seen by the public without their entering it.



Besides the magnificent range of hot-houses, there are low frames with curvilinear roofs (a); low frames with straight sashes (b); six fountains (c); handsome flight of steps (d) from the boulevard (e, e). (*Gard. Mag.*, vol. ii. p. 87., and vol. v. p. 327.) A plan of this garden (fig. 49.) exhibits the following details (see p. 71.):—



- a*, Hot-house.
b, Hot-house, or herbaceous arrangement.
c, Botanic garden.
d, Hot-beds and pits for forcing culinary vegetables;
e, Hot-beds and pits for forcing culinary vegetables;
f, Experimental garden, from which the public is excluded.
g, Area for placing the plants of the orange-tree and green-houses during summer.
h, Basins and fountains.
i, Basins and fountains.
j, Large basin, or lake.
k, Gate of the city.
l, House for steam-engine, for supplying the fountains *l* and *m*.
m, Arrangement of culinary vegetables.
n, Small basins and fountains.
o, Nursery for fruit-trees.
p, Nursery for trees and shrubs.
q, English garden.
r, Boulevards overlooking the garden.
s, Statues.



- a. Palm-house.
 b. Exhibition-room.
 c. Green-house, library, billiard-rooms, and reading-room.
 d. Log-room, for drying and preserving articles for exhibition.
 e. Bar of the coffee-house keeper.
 f. Collection and collection.
 g. Passages.
 h. Lodge for gas.
 i. Pump.
 j. House and fuel shade.
 k. Potting house, seed-house, and seed-house.
 l. Seed-rooms, furnaces, and water-wheel.
 m. Ornamental.
 n. Green-house.
 o. Bank above.
 p. Propagating-pit.
 q. Succession.
 r. Upper terrace.
 s. Lower terrace.
 t. Common surface of the garden.

280. *The range of hot-houses at the botanic garden at Brussels* including the pits, and architectural appendages in front of them, forms a very splendid elevation (fig. 50.). The arrangement, as far as can be judged from the plan, is eligible.

281. *The botanic garden of Ghent*, established by Bonaparte in 1797, was in his day the richest and best garden of the Netherlands. The area is about three acres: it had, in 1819, a considerable collection of hardy herbaceous plants, arranged after the Linnæan method; a pleasure-ground, in which the trees and shrubs were distributed in natural families; and so as to combine science with picturesque effect; an excellent rosarium, chiefly standards; and a range of hot-houses, in part with glass roofs. In the pleasure-ground the busts of eminent botanists were distributed with good effect; and on the large boxes of palms, and other exotics, were marked the name of the donor, or the year in which the plant or tree was originated, or introduced to the garden. Mr. Rivers, in 1829, found the collection in this garden meagre, the herbaceous borders very bare, and many of the labels without any plants belonging to them. He found, however, some fine specimens of hardy trees, such as *Celtis cordata*, *Magnolia auriculata*, *Quercus Phellos*, *Gymnocladus canadensis*, *Larix pendula*, *Robinia viscosa*. "Several of the finest exotics in boxes, placed in different parts of the gardens, were dedicated to botanists of eminence. Some venerable bays, from eight to nine feet high, in boxes and pots, were so old that their stems were hollow; there were also some old myrtles and oranges, all shorn into ball-like heads and naked stems."

282. *The botanic garden of M. Parmentier*, mayor of Enghien, is one of the richest in the Low Countries. In 1817, Neill and his companions considered it as only exceeded in exotics by the collection at Kew or at Messrs. Loddiges'. It occupies little more than an acre, but it is crowded with hot-houses and plants in pots.

283. *Festivals of Flora* are held twice a year, at midsummer and midwinter, by the Horticultural Society of Ghent, and by other societies in different parts of Holland and the Netherlands. The plants are exhibited for three days. "By a pleasing fiction, the plants alone are said to be competitors, and the successful plant is said to be crowned." The reward is an honorary medal. (*Neill's Hort. Tour*, p. 521.)

284. *A public exhibition of the finest and rarest plants* in full bloom takes place every year in Ghent, under the auspices of the Royal Botanical and Horticultural Society. The first of these is on the 6th of February; the second on the 29th of June. These meetings are styled the festivals of Flora, or the *Salon d'Hiver* and the *Salon d'Été*. Amateurs as well as gardeners send the rarest and most novel plants, as the representatives of their gardens and parterres. The *réunions* to which these exhibitions give rise are most splendid. National as well as foreign amateurs, on such occasions, flock to Ghent, the *ville privilégiée de Flore*, as it has been called, and from distant parts, to witness a display of the gayest and richest productions of Flora, not only the most beautiful of the kind, but perfectly unique in Europe. The festivals generally last three days, and are countenanced by the presence of the highest public authorities. At the conclusion of the period, a reward, medal, or other token of approbation, is bestowed on the *plant* which has been judged to be the finest or the most rare; and the names of all such plants, with that of the owners, are inserted in the public papers. These public exhibitions have tended to extend, improve, and give a stimulus to the cultivation of ornamental plants, which are to be met with in and about Ghent in the greatest perfection. (*Granville's Travels*, &c., vol. i. p. 40., 1828.)

285. *Florists' flowers* began to be objects of commerce in Holland about the beginning of the seventeenth century. Double flowers were then first noticed, or brought into repute, which may be said to have created a new era in gardening, and certainly laid the foundation in Holland of a considerable commerce; the more valuable, as it is totally independent of political or civil changes, and founded on the peculiar qualities of the soil and climate for growing bulbous roots. The *florimania*, as it is termed by the French, existed in the highest degree among the Dutch, from the beginning to the middle of the seventeenth century. Many noted instances are on record, of the extravagant sums given for flowers possessing certain qualities agreed on by florists as desiderata, and established about this time as canons of beauty. Hirschfeld states, that in the register of the city of Alkmaar, in the year 1637, they sold publicly, for the benefit of the Orphan Hospital, 190 tulips, with their offsets, for 9000 florins; and that one of those flowers, named the Viceroy, was sold for 4203 florins. When we consider the value of money at this remote period, these sums appear enormous; a florin at that time in Holland (*Anderdon's Hist. of Com.*) being the representative of nearly an English bushel of wheat.

286. *The commercial flower-gardens or bloomeries of Haarlem* have long been the most celebrated for bulbous-rooted flowers. The name of Van Eden has been noted for upwards of a century; and there are now four gardens occupied by different members of that family, celebrated florists. That of Voorhelm is of equal antiquity and celebrity. Of the gardens of both families, accounts will be found in Neill's *Horticultural Tour*. The most extensive and best managed is said to be that of Schneervooght, late a partner

with Voorhelm. The establishment of Krelage is also very extensive; and here 300 new hyacinths have been raised from 1818 to 1826. (*Gard. Mag.* vol. vi. p. 592.)

287. *The practice of the commercial bulb growers at Haarlem* has been thus given by Mr. Knight, of the Exotic Nursery, King's Road, London:—Mr. Knight spent a fortnight in the bulb district, in April, 1830. He saw, he supposes, upwards of 100 acres covered with hyacinths in bloom, commencing on the road from Leyden to Haarlem, five or six miles from the latter place. It seems the soil in Haarlem is now worn out, and is no longer fit to grow hyacinths in sufficient vigour; and the growers, therefore, send their bulbs to be grown by contract, on lands in the neighbourhood of Overveen, and other places, in the same manner as the London seedsmen send seeds to be grown by country seed-growers, in Essex and Kent. Wherever the bulbs do well, he observed the soil to be of the lightest description of sand, such as can be blown away by the wind; with the water standing under it, not nearer the surface than 15 inches, nor farther below it than 2 feet 6 inches. This it seems is the level of the water in the adjoining canals and ditches; and it is owing mainly to the points of the fibres going down to this water, that the plants are so fresh and vigorous, while the dry sand above prevents their bulbs from being rotted. As a proof of the exceeding lightness of the soil, immediately after putting in a crop in the spring season, the surface is raked, and generally thrown into beds; cow dung mixed with water is then thrown from barrels wheeled along the alleys, over the whole surface with a scoop, so as to cover it all with a thin crust, through which the finest seeds vegetate, and without which the entire surface would be blown away. The cow dung is taken fresh from the cow house. (*Gard. Mag.*, vol. vi. p. 318.)

288. *The florimaniacs*, Boac observes, were much more numerous towards the middle of the last century than in 1809. "One does not now hear," he says, "of 30,000 francs being given for a tulip; of a florist depriving himself of his food, in order to increase the number and variety of his anemones, or passing entire days in admiring the colours of a ranunculus, the grandeur of a hyacinth, or trembling lest the breath of an over-curious admirer should hurt the bloom of an auricula." The general price of choice bulbs, it is observed in Neill's *Horticultural Tour*, varies from three to ten guilders (a guilder is about 1s. 8d.); a few kinds are valued at from ten to twenty guilders; and the most select, new, and consequently rare, varieties, seldom fetch more than from twenty to fifty guilders. Among the most precious tulips in 1817, were the Universal Conqueror, Pompe Funèbre, and Charbonnier Noir, with yellow grounds; Louis XVI. and Toilette Supérieure, with white grounds; and the price of them was one hundred guilders (8s. 2s. 6d.) a bulb. (*Neill's Hort. Tour*, p. 195.)

289. *Tulipomania*. Beckmann, in his *History of Inventions* (vol. i. p. 36.), has a chapter on this subject, entitled *Tulips*. C. Gesner tells us that he saw the first tulip, in the beginning of April, 1559, at Augsburg, in the garden of the learned and ingenious counsellor, John Henry Herwart. In 1611 they first appeared in Provence in France, in the garden of the celebrated Peiresc. The Dutch merchants, who were fond of flowers, sent to Constantinople for tulips as soon as they became known; and the first that were planted in England were sent from Vienna about the end of the sixteenth century, according to Hakluyt, who says "they were procured thither a little before, from Constantinople, by an excellent man, Carolus Clusius." John Barclay, the author of the Latin romance *Argenis*, &c., employed his vacant hours in the cultivating of a flower garden near Rome. Rossi (or Erythraeus) relates, that he cared not for those bulbous roots which produce flowers of a fine scent; and that he cultivated such as produced flowers void of smell, but having a variety of colours. Hence we may infer that he was one of the first of those who were infected with the tulipomania. Barclay had it to that excess, that he placed two mastiffs as sentinels on his garden, and, rather than abandon his favourite flowers, chose to continue his residence in an ill-sired and unwholesome habitation. (*Erythraei Pinacotheca*, vol. iii. 17. p. 623.) "The gaudy tulip," says a modern tourist, "was an object which at one time drove the grave, the prudent, and the cautious Dutchman as wild as ever did the South Sea bubble, or the senseless speculations that took possession of our countrymen a few years ago, the gullible John Bull. The enormous prices that were actually given for real tulip bulbs of particular kinds, formed but a small fraction of the extent to which the mercantile transactions of this flower were carried. If we may give credit to Beckmann, who states it on Dutch authorities, four hundred *perits* in weight (something less than a grain), of the bulb of a tulip, named Admiral Leifken, cost four thousand four hundred florins; and two hundred of another, named Semper Augustus, two thousand florins. Of this last, he tells us, it once happened there were only two roots to be had, the one at Amsterdam, the other at Haarlem; and that for one of these were offered four thousand six hundred florins, a new carriage, two grey horses, and a complete set of harness; and that another person offered for it twelve acres of land. It is almost impossible to give credence to such madness. The real truth of the story is, that these tulip roots were never bought or sold, but they became the me-

drum of a systematic species of gambling. The bulbs, and their divisions into *peris*, became, like the different stocks in our public funds, the objects of the 'bulls' and 'bears'; and were bought and sold at different prices from day to day, the parties settling their accounts at fixed periods; the innocent tulips, all the while, never once appearing in the transactions, nor being even thought of. 'Before the tulip season was over,' says Beckmann, 'more roots were sold and purchased, bespoke and promised to be delivered, than in all probability were to be found in the gardens of Holland; and when *Semper Augustus* was not to be had any where, which happened twice, no species, perhaps, was oftener purchased and sold.' This kind of sheer gambling reached at length to such a height, that the government found it necessary to put a stop to it." (*Tour in South Holland*, p. 86.)

290. *The Dutch and Flemish gardeners have many curious practices; such as training fruit trees in particular shapes, clipping shrubs, disguising flowers and fruits, &c. A London nurseryman, who visited Holland in 1880, found the dwarf fruit trees, in some gardens, trained in the shape of saucers, not more than three feet high, but ten feet in diameter; others in the form of a bowl or a vase; some with a stem only one foot high, with two branches proceeding from it, horizontally, in opposite directions, "with shoots covered with spurs, rising perpendicularly from these two horizontal branches, at equal distances; those in the centre of the plant three feet high, gradually diminishing to one foot at the extremities, and having altogether a strangely artificial appearance."* (*Gard. Mag.*, vol. vi. p. 318.) Another writer in the same work mentions flower-pots resembling miniature ruins, or stumps of trees, in which succulent plants are placed; and gourds half green, half yellow, or in green and yellow stripes, the pale stripes produced by arranging narrow pieces of tape on the fruit while growing, in order to exclude the light. The curious sometimes leads to the useful; and a genuine love of plants may be often first excited in some breasts by the wonderment caused by a grotesque flower-pot of succulents, a hedgehog of crocuses, or by the production of a cucumber bearing the initials of the grower. (*Gard. Mag.*, vol. ii. p. 227.) Henry Van Oosten, in giving directions for "breaking tulips, and bringing them to perfection," thus communicates what he calls the sublime mystery of the art:—"If you increase the strength of your mother by feeding her with the ashes of her bones, and the substance of her father, then you will possess the land of promise, wherein udders of milk shall be, and rivers of wine, and other liquors of several colours shall flow across. Many rocks of gold shall be dispersed therein, and the ground shall be filled up with oysters, that shall discharge their red *cromoties* on the ground, and bring their purple to light; and if you follow this fashion, the milk of the udders shall be turned into liquor of saffron, which shall give you golden flowers." (*Dutch Gard.*, p. 185.) Roses grafted on young shoots of oaks, are mentioned among other anomalies sometimes exhibited, to excite surprise, and puzzle the physiologist. It is said the roses sometimes last a few months, and flower. (*Gard. Mag.*, vol. i. p. 83.)

291. *Many new varieties of Aulæa have lately been raised by the Belgians, and all the best of them have been imported into England. The Belgians, also, occasionally become possessed of other new varieties or species of showy plants or shrubs, which soon find their way into other countries. Orange trees, roses, and Robinia inermis, the two latter budded standard high, are common importations by the London nurserymen; as are also some other shrubs and bulbs, and various kinds of flower seeds.*

SUMMARY. 3. Dutch Gardening, in respect to the Culture of Fruits and Culinary Vegetables.

292. *The Dutch and Flemings are eminent as fruit gardeners; but, as Harte observes, they are better operators than writers; and having at the same time a good deal of the spirit of gens de métier, we have scarcely any thing to offer in the way of historical information. Those gardens which Gesner and Stephanus inform us were so richly stocked with flowers early in the sixteenth century, would, no doubt, be equally so with fruits and legumes. One of the earliest books on the horticulture of the Low Countries is Henry Van Oosten's Der Niederländische Garten, 8vo, Hannau, &c., 1706. They appear at that time to have had all the fruits now in common cultivation, in considerable variety, excepting the pine-apple. This fruit, Miller informs us, was introduced about that time, by De la Court, of Leyden, from the West Indies, although not mentioned either by Van Oosten or by Commelyn. It is generally said that about the same period all the courts in Europe were supplied with early fruits from Holland. Bénard admits (quoted in Repertory of Arts, 1802) that this was the case with the court of France so late as the reign of Louis the Fourteenth. Miller informs us that De la Court paid great attention to gardening, and especially to the culture of wall-fruits; and that he tried the effects of different kinds of walls, and different modes of training. Speechly, early in the eighteenth century, made a tour in that country, chiefly to observe the Dutch mode of cultivating the pine and the grape: they forced, he informs us (Tr. on the Vine), chiefly in pits and low houses, and produced ripe grapes of the sweetwater kind (the pareil-druyf) in March and April. The Low Countries are celebrated for good varieties of the apple and pear. The supplies of these articles sent to the markets of Brussels, Antwerp,*

and Amsterdam are equal if not beyond any thing of the kind to be met with elsewhere in Europe. The climate of Flanders suits these fruits; that of Holland is rather adverse to flavour, from its moisture; but peaches, pines, and melons attain a larger size than in France. Tournay is so much celebrated for its pears, that the Ghent Society, in 1816, offered a prize for "the best explanation of the causes of the superiority in size, beauty, and flavour, of the pears grown at Tournay." (*Neill's Hort. Tour*, p. 333.) Forcing in pits and frames is carried to great perfection in Holland; and melons, grapes, and pines are, at the present time (1832), sent to the London and Paris markets, and sold at prices for which they cannot be grown in England. The vine has lately been cultivated in South Brabant, on land said not to be fit for any other produce, and excellent wine produced. (*Gard. Mag.*, vol. ii. p. 87.) There are now vineyards between Namur and Liege, near the lofty castle of Huy, where the vine was never cultivated before. (*Ibid.*, vol. vi. p. 596.) Vineyards are common towards the Rhine. The level pieces of ground next to that river are exceedingly well and neatly cultivated with grain and vegetables, interspersed with orchards of fruit trees, apples, pears, cherries, and walnuts: the sloping sides of the hills are covered with vineyards; and above these the higher parts are clothed with forest trees or coppice wood to their very summits. (*Tour in South Holland*, 1830.)

293. A great many new and excellent varieties of pears have been raised from seed in the Netherlands, by Dr. Van Mons of Brussels, Count Coloma of Malines, M. Louis Stoffels, also of Malines, and others. Dr. Van Mons informed the late Mr. Braddick that he had raised 80,000 new pears, of which not many scores were worth growing. Mr. Braddick asked him, "if his own taste were called upon to decide the question, to which of all his new pears he would give the preference." He immediately replied, with much vivacity, "the Beurré Spence;" and added, "This fruit, to my taste, is inestimable, and it has no competitor." (*Gard. Mag.*, vol. i. p. 145.) Mr. Braddick has the merit of having been one of the first to introduce the best new Flemish pears into England; and, through his efforts and those of the London Horticultural Society, they are now common in all the British nurseries.

294. The art of improving the quality of fruits is said to have originated in Belgium; and while the Academy of Munich were doubting the possibility of this description of improvement, and even giving a prize to an essay which maintained the negative side of the question, the art had already made immense progress in the Netherlands. It is not meant that new fruits were never raised from seeds before; but that the business of raising new sorts of fruits from seeds was never before undertaken on scientific principles. Chance has at all times, and in all countries, discovered new sorts of fruits from seeds that have sprung up accidentally; but it was only in Belgium, towards the latter end of the eighteenth century, that seedlings were raised scientifically. Professor Van Mons made the first attempt, and obtained four exquisite pears, viz. the Passe Colmar, the Beurré Rance, the Beurré Spence (named in honour of the celebrated entomologist), and the Beurré d'Hiver. Les Délices d'Hardenpont was raised in the garden of Counsellor Hardenpont. Other amateurs have devoted themselves to the same subject, and obtained several pears of excellent quality; the Bonne de Mons, the Doyenné de Mons, and many more. M. Scart procured Le Napoléon; and that learned pomologist the Abbé Duquesne raised, among others, the excellent Marie Louise. M. Petit pursued those researches which M. Duquesne was obliged to abandon from ill health, and from other causes. In Flanders, they discovered the incomparable Fondante du Bois; the capuchins of Louvaine obtained their Pastorale; and the Comte de Coloma, of Malines, l'Urbaniste. During these times, thousands of plants were originated annually at Brussels, with a view of studying the quality of their fruits. The result of the whole has been published by Professor Van Mons, in a catalogue dated Louvaine, 1823. (*Messenger des Sciences et des Arts*, 1826, p. 77.)



295. Standard fruit trees in Holland and the Netherlands are very generally trained in what is called the *en quenouille* or distaff manner; and the advantages of this mode, as respects the saving of room, and the avoiding injurious shade to the vegetables near, are obvious. It is not, however, equally clear that this form is favourable to the production of fruit. A horticulturist (*Gard. Mag.*, vol. ii. p. 226.) who has resided for some time in Belgium, says a fair crop is very seldom seen on trees so trained. The same observation will apply to standard pear trees trained *en pyramide* (fig. 54.); which mode of training differs from the *en quenouille* mode only in not having the points of the young shoots tied down by cords attached to their extremities

and fastened to the stem of the tree. Pear trees trained *en pyramide*, however, when grafted on quince stocks, generally bear well.

296. *The culinary vegetables of Holland* are brought to great perfection. All the plants of culture, and especially the cabbage tribe, turnip, onion, carrot, &c., are grown to a large size, and are very succulent. Of plants edible in their natural state, as the parsley and other herbs, and the fungi, they have excellent varieties. For leguminous crops the climate is sometimes too moist in the early part of the season; nevertheless they grow in great perfection the Dutch runner, kidneybean, and the scarlet runner. Brussels is noted for the greens or sprouts, which bear the name of that town; and Van Mons informs us (*Hort. Trans.*, vol. iii. p. 197.) that they are mentioned in the market regulations of that city so early as 1213. Mr. Neill and his companions, in 1817, found the markets of Ghent and Amsterdam better supplied with culinary vegetables than any others in the Low Countries. The cauliflower was excellent. The Dutch also excel in asparagus, carrots, and purslane.

297. *Forcing-houses have been long in use in Holland*; but the date of their introduction we have not been able to learn. It is singular that they are not once mentioned in the early editions of Van Oosten, published from 1689 to 1750; but Adanson (*Familles des Plantes*, preface), writing about the latter period, speaks of the hot-houses of the Dutch in terms which evidently refer to forcing-houses. Orangeries, and botanic houses, we have seen (§ 277.) were in use so early as 1599. It is questioned by some whether the Dutch had any forcing-houses, or hot-houses, properly so called, as distinguished from pits and frames, previously to the introduction of the pine-apple. Before that period tanners' bark was employed by them for making forcing-beds. Miller says, the idea of employing tan for hot-beds was brought over from Holland, and that it was first used for raising orange trees in the beginning of King William's reign. It then fell into disuse, and afterwards was again applied to raising the pine-apple. The Dutch manner of forcing is practised in some places in England, and especially at Hylands, the seat of P. C. Labouchere, Esq., near Chelmsford. (*Gard. Mag.* vol. iii. p. 385; see also vol. iv. pp. 318. and 593.)

SUBJECT. 4. Dutch Gardening, in respect to the planting of Timber Trees and Hedges.

298. *Planting is not very general in Holland.* In a country so thickly peopled, and so conveniently situated in respect to marine commerce, it is not likely that much ground would be devoted to merely useful plantations. In the more inland parts of Flanders, there are natural forests and extensive copses; these have been, and continue to be, kept up, and have been in some cases increased in extent by planting land too poor for cultivation. In Radcliff's *Report on the Agriculture of Eastern Holstein, Flanders, &c.*, p. 8., 1819, some account will be found of their management. We observed, in 1819, some belts and clumps near Cambray, and that the Duke of Wellington was planting on his estate at Waterloo. Between Aranagoen and Rhenen, a tract of land several miles in extent, and no better in quality than Bagshot-heath, is planted with Scotch pines, Weymouth pines, beech, and birch; and many hundred acres adjoining have been sown with acorns for copse, and enclosed with thorn hedges.

299. *Avenues, hedgerows, and osier-holts* are the principal plantations of the Dutch. In these they excel; and the country, in consequence, resembles a series of gardens. Avenue trees, chiefly elms and oaks, are trained for eight or ten years in the nursery; repeatedly removed, so as to become furnished with numerous fibrous roots; and pruned, so as to have clean smooth stems from ten to fifteen feet high. Avenues, being public property, are under the care of proper officers. Judging from the vigorous growth of the trees, and the manner in which they are pruned, these officers seem to understand their business, and to do their duty. In Rotterdam, on the quays, are perhaps the finest trees in Holland; they are narrow-leaved elms, upwards of fifty feet high, with clear stems of twenty-five feet, and upwards of a century old. At the Hague are remarkably fine limes in the Mall, on the road to Scheveling; and oaks, elms, and beeches, round the palace called the House in the Wood. A tourist who visited the palace in 1830 says, "It is pretended that in this wood there are oak trees of 500 years' growth; but we saw none that in England would not attain the size of the largest at most in 120 years. Some of these, however, and the beeches and lindens, are of respectable size and healthy foliage." (*Tour in South Holland, &c.*, p. 73.) The hornbeam is a very common plant for the garden hedges. Every plant in the row or hedge is trained with an upright stem, and the side shoots are shorn so closely, that we often find hedges of six or eight feet high, not more than eighteen inches wide at base, contracted to six inches wide at top. These hedges receive their summer shearing in July, by which time scarlet runners are ready to shoot up from the garden side of their base; and these, in the course of two months, cover the hedge with their fresh verdure and brilliant blossoms, presenting a good crop in October and the beginning of Novem-

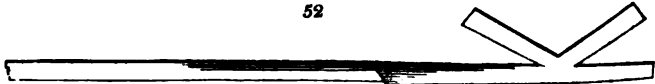
ber. The Dutch have also very excellent field-hedges of birch and willow, as well as of all the usual hedge plants; and the gardeners are particularly dexterous at cutting, training, and shearing them. The deep moist grounds on the banks of their estuaries are particularly favourable for the growth of the willow; and hoops of two years' growth from the Dutch willow (a variety of *Salix álba*, with a brownish bark) are in great esteem in commerce. Their common basket willows (*S. viminalis* and *triándra*) are also excellent.

300. *The plantations of trees for public walks*, whether elms or limes, are admirably managed by the Belgians and the Dutch. A judicious writer in the *Gardener's Magazine* states, from his own observation, during a residence for some time at Brussels, that "these trees are always planted of a considerable size, from eight to ten feet high, and two or three inches in diameter; having been so ordered by previous transplanting, or digging round them in the nursery, as to have an abundant mass of roots. When planted out, the gardeners cut off the head, leaving either bare poles, or only a few twigs; thus at once insuring the future vigorous growth of the tree, and dispensing with all need of stakes. After suffering the trees to grow untouched two or three years, all the branches are cut off below the strongest leading shoot, which is left to form the head of the future tree; and this in a few years becomes as straight and handsome as one not headed, and far more vigorous. In cases where it is impracticable to plant trees in their intended site at the proper season, they are transplanted in autumn in hampers of earth (as is sometimes practised in England with fruit trees); and these hampers are then sunk in trenches in the nursery, the tops of the trees being cut off, as in ordinary planting. When it is wished, in the ensuing summer, to transfer the trees thus treated to the place where they are intended to remain, each is transplanted along with its hamper into its destined hole, and can thus be safely removed, however hot the weather may be, without experiencing any check. In this way about 100 lime trees, from six to eight feet high, and about two inches in diameter, were planted on some ground adjoining the new stables of the Prince of Orange at Brussels, the latter end of June, 1826; and these trees, though not watered, never flagged during the subsequent period of hot weather. At the time of transplanting, their tops had made several strong shoots, and the points of the roots of many of them protruded through the interstices of the sides of the hampers. Nothing further was done than making each hole about twice the size of the hamper, and filling the space surrounding it with good loamy soil. (*Gard. Mag.*, vol. ii. p. 296.)

301. *In planting public walks*, the Belgians do not, as is but too often done in England, think it enough to squeeze the trees into holes cut out of hard and sterile soil, and barely large enough to contain the roots, and then to leave them to their fate. During much of the winter of 1826-7, many workmen were employed in digging out the sandy soil round scores of the trees in the boulevards of Brussels, which, though fifteen or twenty feet high, and three or four inches in diameter, were not so luxuriant as the rest, and replacing it with rich black surface mould, of which, as the holes were ten feet square and above two feet deep, each tree had subsequently, allowing for the mass of earth left round the roots, at least 150 cubic feet to strike its roots into. Equal attention is paid in pruning their trees. All the branches too crowded, or crossing each other, are cut off close to the stem, as well as several of the lateral twigs from each branch; the whole head of the tree, both branches and spray, being kept thin and well balanced, and particular attention being given to preserve one central leading shoot, by cutting off the one least upright, when the tree has parted into two." (*Gard. Mag.*, vol. ii. p. 461.)

302. *The caterpillars of different insects* are found very injurious to trees of every kind in the Netherlands; and an edict is therefore published annually by government, ordering all the proprietors of lands to clear off the caterpillars from their trees twice a year; viz., before the 25th of March and before the 25th of April, under pain of the infliction of a certain penalty fixed by law. (*Gard. Mag.*, vol. ii. p. 349.) This operation is effected by cutting off the spray in March, and in April both the spray and the young leaves, with what they call the *echénilloir*. (*Ibid.* vol. i. p. 335.) This instrument is very correctly

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figured in Vander Groen's *Jardinier des Pays Bas* (fig. 52.), and is there described as being well adapted both for cutting off the nests of caterpillars and for gathering pearls.

SUSSEX. 5. Dutch Gardening, as empirically practised.

303. *Happily the use of gardens is universal in the Netherlands*; and of the Dutch and Flemings it may be truly said, in the words of Sir William Temple, "that gardening has been the common favourite of public and private men; a pleasure of the greatest and a care of the meanest, and indeed an employment and a profes-

sion, for which no man there is too high nor too low." A modern tourist informs us that many of the artisans, and poorer classes of Amsterdam reside constantly on the water, in comfortable apartments, built on the upper decks of their trading vessels, where they not only keep hogs, ducks, and other domestic animals, but have little gardens of tulips, hyacinths, anemones, and various other flowers. The gardens of the cottagers in these countries are undoubtedly better managed, and more productive, than those of any other country: no man who has a cottage is without a garden attached; often small, but rendered useful to a poor family by the high degree of culture given to it. Every available particle of matter capable of acting as manure is assiduously collected, and thrown into a neat ridge, cone, or bed, which is turned over frequently; and, when sufficiently fermented and ameliorated, applied to the soil. Liquid manure is put into tanks, and preserved there till it undergoes fermentation, in which state it is found far more efficacious than when new. The plants in general cultivation in the cottage-gardens are the cabbage tribe, including Brussels sprouts, the white beet for the leaves and leaf-stalks, the parsnep, carrot, yellow and white turnip, potato, the pea, bean, and kidney-bean; the apple, pear, and currant, and in some places, the vine trained over the cottage, are the fruits; and bulbs, double stocks, rockets, wall-flowers, pinks, violets, roses, and honeysuckles are the leading flowers and plants of ornament. It is almost unnecessary to add, that the gardens of the tradesmen, farmers, citizens, private gentlemen, and princes, rise in gradation, in extent, riches, and high keeping.

304. *The principal nurseries, florists' gardens, and market gardens are in the neighbourhood of Amsterdam, Haarlem, Antwerp, and Ghent.* These gardens formerly supplied trained trees, vines, and all the most valuable plants, to Britain and other parts of Europe; and the florists still continue to monopolise the commerce of bulbous roots. Justice (*Brit. Gard. Direct.*) gives credit to the Dutch nurserymen for accuracy and punctuality; he mentions Voorhelms and Van Zompel as tradesmen whom he could recommend; and it is remarkable that the same establishment (Voorhelm and Schneevoght, who now, however, hold separate businesses,) is the most eminent at this day. Garden-seeds, for which Holland has long been celebrated, are chiefly grown by the market-gardeners and small farmers round Haarlem. Roses are extensively grown at Noordwyck, between Leyden and Haarlem, for the apothecaries, and the dried leaves are sent to Amsterdam and Constantinople. The sorts are, the Dutch 100-leaved and the common cabbage rose. A striking characteristic of Dutch fruit and forest tree nurseries, is the length of time the trees are trained in the nursery. They are so often removed there, as to have a large fasciculus of fibrous roots, and the fruit trees commonly bear for a year or two before they are sold, at least for local planting. Ready-grown hedges and shrubs, of various sizes and shapes, may be purchased; and as they have been transplanted every third year, like the trees, there is little risk of their not succeeding. At Brussels, Professor Van Mons has established a fruit-tree nursery, which he calls *Pépinière de la Fidélité*, in which are grown upwards of 1000 new varieties of pear, raised by himself, and by M. Duquesne, of Mons, since 1803, besides new varieties of the other hardy fruit trees. Krelage, already mentioned (§ 292.) is an extensive hyacinth grower; and Perck, near Vilvorde, and Treloux, near Liège, are celebrated for their fruit trees. At Ghent, Mr. Rivers visited twenty nurseries, all of them containing "good things."

305. *The operative gardeners in Holland are for the most part apprenticed, and serve as journeymen, before they are employed to undertake the care of gardens where several hands are employed; but so general is horticultural knowledge, that every labourer is considered as capable of cropping and dressing an ordinary tradesman's or farmer's garden.*

306. *There are few or no artist gardeners in Holland.* Eminent practical gardeners are employed to lay out walled kitchen-gardens; and artists from Paris are generally called in to lay out parks or pleasure-grounds of more than ordinary extent.

SUBJECT. 6. *Dutch Gardening, as a Science, and in respect to the Authors it has produced.*

307. *Horticulture, as a science, has been less cultivated in the Netherlands than in Italy or France.* The botanists of the country were not among the first to advance the study of physiology, nor have any of their practical men appeared with the science of a Quintinie or a Miller. "The patience and riches," Boer observes, "which produced so high a degree of florimania in Holland, might have been usefully employed in advancing vegetable physiology; but science owes nothing to the Dutch in this branch." At the present time, however, when science is so rapidly and so universally spread, the learned in the Netherlands are unquestionably on a footing with those of other countries.

308. *The nursery and seedmen of Holland and the Netherlands supply those of Britain, and indeed the whole world, with bulbous flowers.* We import from them also various culinary and some flower seeds, clover and other agricultural seeds, orange trees,

azaleas, standard roses, and some other shrubs; occasionally Doucin stocks for fruit trees, and generally whatever is new and rare.

309. *One of the most scientific gardeners in Europe* is Professor Van Mons, at Brussels. This gentleman has given to the world more new and excellent pears than ever were before raised from seed by any individual. He has also written on the subject of raising fruits from seeds, in the *Journal d'Agriculture des Pays Bas* and some other public journals, and it is much to be regretted that he has not yet been able to publish his long promised *Dictionnaire des Arbres Fruitières*. Prof. Van Mons was the first to show the advantage of raising successive generations of the same seedling. (*Jour. d'Agr. des Pays Bas*, &c., Sept. 1829, p. 180.)

310. *The Dutch and Flemings have few works on gardening*, and the reason may be the universality of practical knowledge in that country. Vander Groen, Commelyn, and Van Oosten are their principal authors. *Le Jardinier des Pays Bas*, par J. Vander Groen, gardener to the Prince of Orange, 4to, Brussels, was published in 1672. Commelyn published the *Hortus Amstelodamus*, in 2 vols. folio, in 1697; and *Nederlantse Hesperides*, &c., folio, 1676, which was translated into English under the title of the *Belgic or Netherlandish Hesperides*, made English by G. V. N. 8vo, Lond. 1683. Van Oosten, who was gardener at Leyden, published *Der Nederlândische Garten*, 8vo, Hannov, 1706; which was translated into English under the title of *The Dutch Gardener*, in 1710, and into French, under that of *Le Jardin de Leide*, in 1714. Various French works on gardening have been printed at the Hague and other parts of Holland. The *Annales de la Société Royale d'Horticulture des Pays Bas*, which appears monthly, is one of the most recent works exclusively devoted to horticulture and garden botany. (*Gard. Mag.*, vol. ii. p. 88.)

SECT. III. *Of the Rise, Progress, and present State of Gardening in France.*

311. *Three eras mark the gardening of France*: that of Charlemagne, in the eighth; of Louis XIV., in the middle of the seventeenth; and that of the Revolution, at the end of the eighteenth, centuries. The first introduced the best fruits, and spread the use of vineyards and orchards; the second was marked by splendour in design; and the third by increased botanical and scientific knowledge, and by the diffusion of garden comforts throughout the whole mass of society.

SUBSECT. 1. *French Gardening, as an Art of Design and Taste.*

312. *Some remains of Roman villas still exist in France.* "The valley of the Rhone was, at an early period of the empire, a favourite retreat of the Roman nobility; as much for the fine climate, unalloyed by malaria, as for its distance from the suspicion and wanton cruelty of the many tyrants, successors of Augustus. Nowhere else out of Italy have such splendid remains of villas been discovered as in the Provincia Narbonensis." A writer referred to by G. L. Meason has left "a description of the country life of the Roman or Gallic nobility in the neighbourhood of Nismes. The mornings were spent in the tennis court, or in a library furnished with Latin authors; the profane for the men, the religious for the ladies. Between dinner and supper they slept, took the air on horseback, and used the warm bath. It was only in the reign of Louis XIV. that royal palaces and pleasure-houses in the country were erected free from towers, donjons, and drawbridges. Terraces and parterres, pleasure-grounds and parks, succeeded, which were enclosed with low walls, and entered by gates of open ironwork, indicating rather the boundary than the defence of the property." (*Land. Arch. of Italy*, 1830.)

313. *Though the gardening of Charlemagne, in the eighth century, was chiefly of the useful kind*, yet he is said (see *Nigellius*) to have had a noble palace at Nieder Ingelheim, on the Rhine, supported by a hundred columns of Italian marble. This could hardly be erected without an accompanying and decorative garden, though the frugal habits of the prince might prevent an extravagant display of design. Williams informs us that some fragments of the marble pillars which once adorned Charlemagne's palace are still shown in the church. (*Travels*, &c. p. 27.) From the *Hortulus* of Walafrid, published in the beginning of the ninth century, it appears that gardens were in those times made only within the walls of castles and monasteries. (*Walafridus Strabus, Hortulus*, 4to, Norimbergæ, 1512.) He wrote in the ninth century, about 842.

314. *Previously to the sixteenth century*, any notices of gardening in France chiefly relate to other branches than that under consideration. At the end of this century, Francis I. built the palace of Fontainebleau, and introduced there some traits of the gardening of Italy. Stephens and Liebault published their *Maison Rustique* about this time: the early editions contain little on the subject of design, farther than directions for forming avenues, arbours, and flower-gardens. (*L'Agriculture à la Maison Rustique*, 4to, Paris, 1567.)

315. *In the beginning of the seventeenth century*, Hirschfeld observes, the gardens of France consisted only of a few trees and flowers, some plots of turf and pieces of water; the whole, he adds, according to their own accounts, "are totally devoid of taste, and completely wild and neglected."

316. *About the middle of the seventeenth century*, and in the second year of Louis XIV.'s reign, France was visited by Evelyn, who makes the following remarks on the gardens in and near Paris:—

317. *The garden of the Tuileries* "is rarely contrived for privacy, shade, or company, by groves, plantations of tall trees, especially that in the middle being of elms, and another of mulberries. There is a labyrinth of cypress, noble hedges of pomegranates, fountains, fish-ponds, and an aviary. There is an artificial echo, redoubling the words distinctly, and it is never without some fair nymph singing to it. Standing at one of the focuses, which is under a tree, or little cabinet of hedges, the voice seems to descend from the clouds; at another, as if it were under ground. This being at the bottom of the garden, we were let into another, which, being kept with all imaginable accuracy as to the orangery, precious shrubs, and rare fruits, seemed a paradise."

318. *St. Germain en Laye*. "By the way I alighted at St. Cloes [St. Cloud], where, on an eminence near the river, the archbishop of Paris has a garden, for the house is not very considerable, newly watered, and furnished with statues, fountains, and groves: the walks are very fine; the fountain of Laocoon is in a large square pool, throwing the water near forty feet high, and having about it a multitude of statues and basins, and is a surprising object; but nothing is more esteemed than the cascade, falling from the great steps into the lowest and longest walk from the Mount Parnassus, which consists of a grotto, or shell-house, on the summit of the hill, wherein are divers waterworks, and contrivances to wet the spectators."

319. *Cardinal Richelieu's villa at Ruelle*. "The house is small, but fairly built, in form of a castle, and moated round. The offices are towards the road, and over-against them are large vineyards walled in. Though the house is not of the greatest size, the gardens about it are so magnificent, that I doubt whether Italy has any exceeding them for varieties of pleasure. The garden nearest the pavilion is a parterre, having in the midst divers brass statues, perpetually spouting water into an ample basin, with other figures of the same metal; but what is most admirable is the vast enclosure, and a variety of ground in the large garden, containing vineyards, cornfields, meadows, groves (whereof one is of perennial greens), and walks of vast lengths, so accurately kept and cultivated, that nothing can be more agreeable. On one of these walks, within a square of tall trees, is a basiliak of copper, which, managed by the fountaineer, casts water near sixty feet high, and will, of itself, move round so swiftly, that one can hardly escape wetting. This leads to the *citronnière*, where is a noble conserve of all those rarities; and at the end of it is the arch of Constantine, painted on a wall in oil, as large as the real one at Rome, so well done, that even a man skilled in painting may mistake it for stone and sculpture. The sky and hills, which seem to be between the arches, are so natural, that swallows and other birds, thinking to fly through, have dashed themselves against the wall. At the farther part of this walk is that plentiful, though artificial, cascade, which rolls down a very steep declivity, and over the marble steps and basins, with an astonishing noise and fury; each basin hath a jette in it, flowing like sheets of transparent glass; especially that which rises over the great shell of lead, from whence it glides silently down a channel, through the middle of a spacious gravel-walk, terminating in a grotto. Here are also fountains that cast water to a great height, and large ponds, two of which have islands for harbour of fowls, of which there is store. One of these islands has a receptacle for them, built of vast pieces of rock, near fifty feet high, grown over with moss, ivy, &c., shaded, at a competent distance, with tall trees: in this the fowls lay eggs and breed. We then saw a large and very rare grotto of shell-work, in the shape of satyrs, and other wild fancies; in the middle stands a marble table, on which a fountain plays in forms of glasses, cups, crosses, fans, crowns, &c. Then the fountaineers represent a shower of rain, from the top, met by small jets from below. At going out, two extravagant musketeers shot us with a stream of water from their musket-barrels. Before this grotto is a long pool, into which ran divers spouts of water from leaden escallop basins. The viewing this paradise made us late at St. Germain."

320. *St. Germain*. "The first building of this palace is of Charles V., called the Sage; but Francis I. (that true virtuoso) made it complete. Speaking as to the style of magnificence then in fashion, it has too great a mixture of the Gothic, as may be seen of what there is remaining of his in the old castle, which was an irregular piece built on the old foundation, and having a moat about it. It has yet some spacious and handsome rooms of state, and a chapel neatly painted. The new castle is at some distance, divided from this by a court, of a lower but more modern design, built by Henry IV. To this belong six terraces, built of brick and stone, descending in cas-

acades, towards the river, cut out of the natural hill, having under them grandly vaulted galleries; of these, four have subterraneous grottoes and rocks, where are represented several objects, in the manner of scenes, and other motions by force of water, shown by the light of torches only; amongst these is Orpheus, with his music, and the animals which dance after his harp; in the second is the king and dolphin (dauphin); in the third is Neptune sounding his trumpet, his chariot drawn by sea-horses; in the fourth, Perseus and Andromeda; mills, hermitages, men fishing, birds chirping, and many other devices. There is also a dry grotto to refresh in, all having a fine prospect towards the river, and the goodly country about it, especially the forest. At the bottom is a parterre; the upper terrace near half a mile in length, with double declivities, arched and balustrated with stone of vast and royal cost. In the pavilion of the new castle are many fair rooms well painted, and leading into a very noble garden and park, where there is a pall-mall, in the midst of which, on one of the sides, is a chapel with a stone cupola, though small, yet of a handsome order of architecture. Out of the park you go into the forest, which, being very large, is stored with deer, wild boars, wolves, and other wild game. The tennis-court, and cavalierizo for the maneged horses, are also very observable."

321. *The Count de Liancourt's palace*, in the *Rue de la Seine*, "is well-built. Towards his study and bedchamber joins a little garden, which, though very narrow, by the addition of a well-painted perspective, is to appearance greatly enlarged; to this there is another part, supported by arches, in which runs a stream of water, rising in the aviary, out of a statue, and seeming to flow for some miles, by being artificially continued in the painting, where it sinks down at the wall. It is a very agreeable deception. At the end of this garden is a little theatre, made to change with divers pretty scenes; and the stage so ordered, that figures of men and women, painted on light boards, and cut out, are, by a person who stands underneath, made to act as if they were speaking, by guiding them, and reciting words, in different tones, as the parts require," &c.

322. *The gardens of the Luxembourg* are near an English mile in circumference. "The parterre is, indeed, of box, but so rarely designed and accurately kept cut, that the embroidery makes a wonderful effect to the lodgings which front it. The walks are exactly fair, long, and variously descending; and so justly planted with limes, elms, and other trees, that nothing can be more delicious, especially that of the hornbeam hedge; which being high and stately, butts full on the fountain." (*Memoirs*, vol. i. p. 40—52.)

323. *President Maison's palace and gardens*, "between St. Germain and Paris. The palace is environed by a dry moat; the offices under ground; the gardens are very excellent, with extraordinary long walks, set with elms, and a noble prospect towards the forest, and on the Seine towards Paris. Take it altogether, the meadows, walks, river, forests, corn-ground, and vineyards, I hardly saw any thing in Italy to exceed it. The iron gates are very magnificent." (*Memoirs*, p. 239.)

324. *The French taste in laying out gardens* may be considered as having been settled and confirmed by Le Nôtre during the reign of Louis XIV. Le Nôtre's taste and style, Daines Barrington observes, continued in full repute for upwards of a century; and appears to have been in general vogue so late as 1771, fifty years after the introduction of the modern style in England. However remarkable this may appear, it is a fact which does not admit of a doubt; for Millin, the editor of the *Journal Encyclopédique*, in a critique on the translation of Whately's *Observations on Modern Gardening*, published that year, after the most liberal encomiums on the work, expresses his doubts as to how the modern style would be received in France; where he adds, "Le Nôtre's school is still followed; and every rich proprietor is anxious that his garden, if it does not resemble, shall at least recall to his mind, those of the court, at Versailles, Trianon, Meudon, Sceaux, or Clugny."

325. *André le Nôtre* was the most celebrated gardener that probably ever existed. If Le Nôtre, observes Hirschfeld, had been born under any other monarch than Louis XIV., his taste would, in all probability, never have spread, or his name been known to posterity. But that age, in which a feeling for the fine arts had begun to awake in men's minds, together with the personal character of this monarch, was favourable to pomp and brilliancy. The nation and the court wished to be dazzled and enchanted by novelty and singularity; and though there certainly was nothing in Le Nôtre's manner that had not before been displayed in France and Italy, and, with the exception of parterres, even by the Romans; yet the grand scale and sumptuous expense of his plans surpassed every thing before seen in France, and produced precisely the desired end. His long clipped alleys, triumphal arches, richly decorated and highly wrought parterres; his fountains and cascades, with their grotesque and strange ornaments; his groves, full of architecture and gilt trellises; his profusion of statues and therns: all these wonders springing up in a desert-looking open country, dazzled and enchanted every class of observers. Le Nôtre was educated an architect; and had attained his fortieth year before he finished his first work in the rural department of his profession, the garden of Vaux le Vicomte

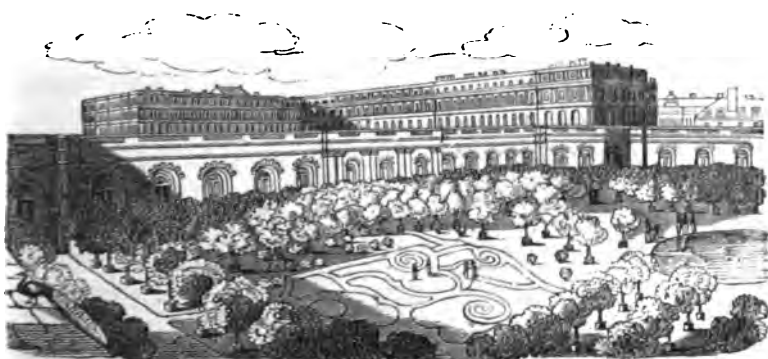
afterwards Vaux le Villon, and now (1832) Vaux Pralin. The king, enchanted with this decoration, made Le Nôtre his controller-general of buildings and director of gardens, loaded him with presents, gave him a patent of nobility, and made him knight of the order of St. Michael. His principal works are Versailles, which cost nearly 200 millions of francs; Trianon, Meudon, Saint Cloud, Sceaux, Chantilly, and the celebrated terrace of St. Germain. The gardens of the Tuileries, the Champs Elysées, and many others, were either formed by him, or improved from his designs. In 1678 he went to Italy, where he furnished the plans of several gardens, particularly those of the villas Panfilii and Ludovisi. England, Sweden, and all Europe, adopted his manner. He died in 1700. (*Hirschfeld*, tom. v. p. 298.)

326. *The gardens of Versailles*, the grand effort of Le Nôtre, and the model of excellence in the geometric school, have been so frequently described, and are so generally known, that we shall only quote one or two opinions concerning them. The Duc de Crequi called his master's darling residence "a favourite without merit." Hirschfeld considers them not as models of taste, but as models of a particular class or character of gardens. Gray the poet was struck with their splendour when filled with company, and when the waterworks were in full action. Lord Kames says they would tempt one to believe that nature was below the notice of a great monarch, and therefore monsters must be created for him, as being more astonishing productions. Bradley calls Versailles the "sum of every thing that has been done in gardening." George Andreas Agricola, a German physician at Ratisbon, says, "When I reflect on Versailles only, and what I have seen there, I cannot but think I had a foretaste of paradise: all my senses were struck with astonishment; and though I have the whole represented in fine prints, it is only a shadow of what was so naturally figured there. Therefore I think it absolutely necessary that gardeners should traverse foreign countries." (*Phil. Treat. on Agr.*, trans. by Bradley, 4to, 1726, p. 60.) Our opinion coincides with Gray's. "Such symmetry," as Lord Byron observes, "is not for solitude."

327. *The menageries in the gardens of Versailles*, during the reign of Louis XIV., contained every description of foreign animal then known, or to be procured; it is said also to have contained every aquatic animal that would live in the ponds and basins. Indeed, from the earliest times the gardens of king's palaces seem to have contained menageries, more or less extensive.

328. *The waterworks at Versailles*, Neill was informed, in 1816, were played off only eight or ten times a year, and cost at the rate of 200*l.* per hour. A writer in *Fraser's Magazine* (vol. iv. p. 708.), who gives a very lively description of these works, says, "that when the whole are played off, which is only once a year, on the fête day of the king, the cost for the half hour during which the main part of the exhibition lasts, is 3000*l.*" Wood says that "it requires three months to fill the reservoir with sufficient water to keep the jets going for this half hour." (*Letters*, &c., vol. i. p. 75.)

329. *The orangery at Versailles* has rather the air of a place intended for coolness than for warmth and light. "There are two magnificent flights of steps; but, not being directed towards the palace, they are rather deformities than beauties, as they have the appearance of leading to nothing." (*Wood's Letters*, &c., vol. i. p. 75.) The orange trees are not intended to be seen by the public when in their cellars; but when set out



(*Fig. 53.*), they have an imposing and characteristic effect. Neill mentions (*Hort. Tour*, p. 409.) that in 1816 he saw an orange tree at Versailles "semé en 1421," and thirty feet high.

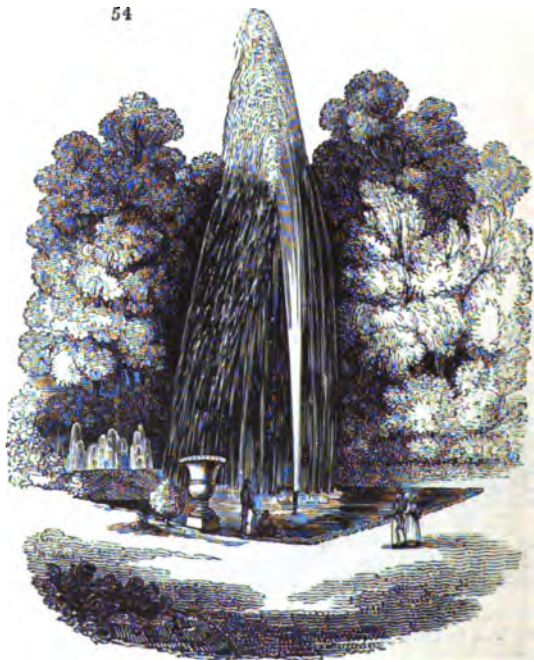
330. *A fête given in the gardens of Versailles*, by Louis XIV., on the 7th May, 1664, will give some idea of the use to which these gardens were applied by that monarch. This fête was continued for several succeeding days, and supplied materials for an illuminated folio, officially published soon afterwards by the court printer, under the royal license. All the gardens, throughout their whole extent, were illuminated from sunset to sunrise, by lights emitted from transparent vases; the branches of the trees were clipped so as to represent different orders of architecture, and musicians in the garb of shepherds were perched every where among the boughs, playing sylvan pipes, and flutes; and violins innumerable; tables were loaded with the most sumptuous banquets, disposed with an elegance which almost inspired reluctance to disarrange them; Chinese fireworks detained a splendid twilight in the firmament; the atmosphere was odoriferous with the perpetual splash of scented fountains; masks and dances alternately ministered to the amusement of the court, among whom the sovereign himself was conspicuous by his silver armour *à la Grecque*, studded with a profusion of diamonds, and the fire-coloured plumes that nodded in his helmet. (*Fraser's Mag.*, vol. iv. p. 708.)

331. *The palace at Versailles* was erected by Louis XIV. in the midst of a tedious and expensive war, and cost the nation many millions sterling. In one week alone 22,000 men and 6000 horses were employed daily, at an expense of 250,000 francs; and for a considerable length of time the labourers actually composed an army of not less than 36,000. The lead alone cost 32,000,000 livres. When Louis XIV. was shown the tremendous account of the cost incurred by the château and gardens, his majesty was "graciously pleased," after having glanced at the sum total, — to throw the paper behind the fire. (*Fraser's Magazine*, vol. iv. p. 705.)

332. *The palace and gardens of Versailles, during the Revolution*, were proposed to be sold as national property; but M. Le Roy, the architect, greatly to his honour, stepped forward, and represented that the palace might be usefully employed for public purposes, and the garden rendered productive of food for the people. "This satisfied the citizens: a military school was established in the palace; and by planting some of the parterres with apple trees, and others with potatoes, the garden was saved." (*Neill's Hort. Tour.*)

333. *The gardens of St. Cloud*, also by Le Nôtre, are less celebrated than those of Versailles; but, from their natural advantages, they are, in the present age, considered more beautiful. At St. Cloud, nature and art are struggling for the mastery; whereas, at Versailles, art is every thing. For this reason the garden at Versailles is by far the

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more perfect production ; that is, it more fully answers the end proposed by the artist. Speaking of the gardens of St. Cloud, with a view to the taste of his own time, an intelligent writer observes, " that they are beautifully situated, and by nature not less beautifully diversified ; but nature is here every where subdued, and made subservient to art. Insuperb and affected marble nymphs, and trimmed orange trees in tubs with corresponding regularity, conduct the eye to fountains which seldom flow, and, when they do, make art ridiculous, by showing how nature may be lost in childish puerilities. Here is a little channel, about two feet wide, and a hundred and fifty feet long, with small pipes at given distances from each other, which spirt up water like so many syringes ; and on each side a favourite gravel walk. The French are lively and gay, and fond of the country ; but the country must be trimmed, and made fashionable, before it can be truly delightful." (*Duppa's Observations, &c.*, p. 14.) " The fountain at St. Cloud, which is called the Grand Jet, from its amazing elevation, is," Batty observes, " from its delightfully retired situation, one of the most beautiful of the kind in Europe (fig. 54.). It is formed of a single jet, which shoots up from the centre of a quadrangular reservoir, to the height of one hundred feet. The best time for viewing this fountain is a little before sunset, when the glowing rays of the setting sun gleam through the spray of the fountain in its fall, and give a sparkling lustre to the surrounding foliage. The gardens of St. Cloud abound in fountains ; but this simple jet cannot fail to be preferred before all the fantastical designs of the grand cascade." (*Batty's French Scenery.*)

334. *The park of Chantilly* is of great extent, but of little beauty. The surface is nearly flat, the soil light and sandy, and the whole naturally a scattered forest of beech, hornbeam, birch, poplar, and other secondary deciduous trees. The house is a huge pile, which, however, has been diminished in size by the dilapidations of the Revolution. Near it is a large piece of artificial water, and a piece of ground laid out in the English manner. One of the extraordinary things shown to strangers is the stables. These, Duppa observes, " are magnificent, and in the highest degree unfit for their purpose. They are at least forty feet high, and six hundred feet long, without accommodation for a bushel of corn, or a single truss of hay ; in the centre is an octagonal room, sixty feet in diameter, and ninety feet in height. Here the prince used to dine once in the course of the hunting season, with a large party of his friends of the chase. The old garden has not been restored, but here is a modern garden, laid out like an English gentleman's pleasure-ground." (*Duppa's Observations, &c.*, p. 3.)

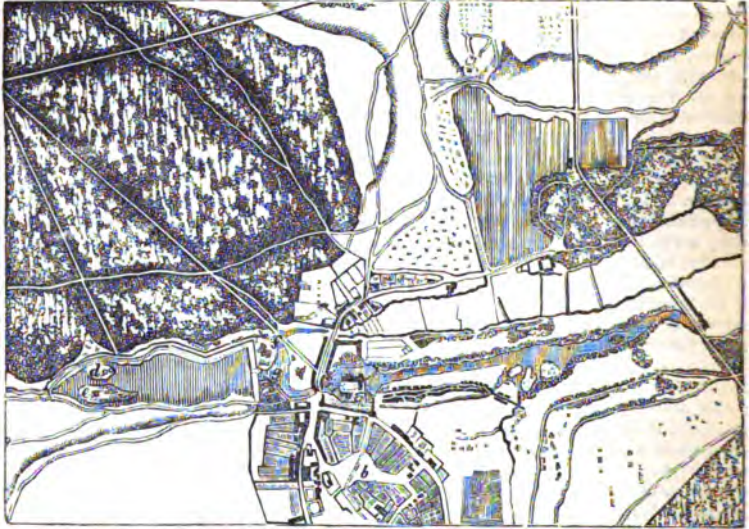
335. *Le Nôtre's successor* was Dufresnoy, controller of buildings ; his taste differed considerably from that of his predecessor, and he is said to have determined on inventing a style different and more picturesque. He preferred unequal surfaces, and sometimes attempted these by art. His style had something of the modern English manner, but his projects were rarely carried into execution. He was accused of being too expensive ; but it is more probable that the chief objection to his taste was the continued prevalence of that of his predecessor. However, he constructed, in a style superior to that of Le Nôtre, the gardens of the Abbé Pajot, near Vincennes, and in the Faubourg Saint Antoine two other gardens of his own, now known under the names of Moulin and of Chemincreux. Marly has been erroneously attributed to Dufresnoy, but it was constructed from the plans of the architect Drusé, controller of the works at St. Germain. The garden of Bagnolet is the principal work of Desgodets, a relation of Le Nôtre. Chapelle d'Isle, and the brothers Mansard, and other architects, at that time constructed several gardens in France, but on the general plan of that of Le Nôtre. Millin considers Dufresnoy as an artist of much greater genius than Le Nôtre, and more attached to natural beauties, though less known by his talent for designing gardens, than by his comedies.

336. *The English style of gardening* began to pass into France after the peace of 1763, and was soon afterwards pursued with the utmost enthusiasm. Hirschfeld affirms that they set about destroying the ancient gardens, and replanting them in the English manner, with a warmth more common to the mania of imitation than the genius of invention. Even a part of the gardens of Versailles were removed, as Delille laments (*Les Jardins*, 4th edit., p. 40.), to make way for a young plantation à l'Angloise. Dufresnoy, as we have already stated, had been bold enough to depart from the former style ; and Gabriel Thouin, in the preface to his *Plans Raisonnés des Jardins, &c.* (1818), says, this artist gave the model of natural gardens on a piece of ground which belonged to him in the Faubourg Saint Antoine, already alluded to, and thus fixed the principles of natural (that is, English) gardening in France about the middle of the last century. Laugier is the first French author who espoused the English style of gardening, in his *Essai sur l'Architecture*, published in 1753 ; and next in order Prevôt, in his *Homme du Gût*, published in 1770. About the same time, the first notable example was preparing at Ermenouville, the seat of Vicomte Girardin, about ten leagues from Paris. An account of this place was written by Girardin himself, in 1775, and published in 1777. It was soon after translated into English, and is well known for its

eloquent descriptions of romantic and picturesque scenes. Morel observes, in his *Théorie des Jardins*, published in 1766, that very little had been done previously to 1766: he mentions that he had been consulted as to Ermenonville, and states that the Duc d'Aumont's park at Guiscard, and a seat near Château Thierry, were chiefly laid out by him. Soon after Morel's work, Delille's celebrated poem (*Les Jardins*) made its appearance, and is perhaps a more unexceptionable performance than *The English Garden of Mason*. The French, indeed, have written much better on gardening and agriculture than they have practised; a circumstance which may be accounted for from the general concentration of wealth and talent in the capital, where books are more frequent than examples; and of professional reputation in that country depending more on what a man has written than on what he has done. It does not appear English gardening was ever at all noticed by the court of France.

337. *Ermenonville* (fig. 55.), still (1832) in the Girardin family, but now, we believe, neglected, appears to have been laid out in a chaste and picturesque style, and in this

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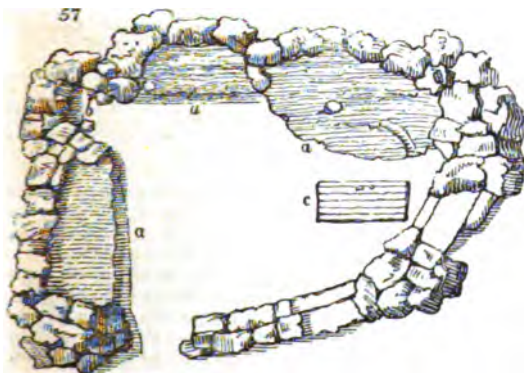
respect to have been somewhat different and superior to contemporary English places. The château (a) was placed on an island in the lake, near the village (b). Among other objects in the grounds were Rousseau's cottage (c); his tomb in the Island of Poplars (d); that of the landscape-painter G. F. Meyer, who had assisted Girardin in designing the improvements, in an adjoining island (e); a garden in ruins (f), and the grand cascade (g). Useless buildings were in a great degree avoided, and the picturesque effect of every object carefully considered, not in exclusion of, but in connection with, their utility. There is hardly an exceptionable principle, or even direction, referring to landscape-gardening laid down in the course of Girardin's Essay; and in all that relates to the picturesque, it is remarkable how exactly it corresponds with the ideas of Price. Girardin, high in military rank, had previously visited every part of Europe, and paid particular attention to England; and before publishing his work he had the advantage of consulting those of Whately, Shenstone, G. Mason, and Chambers, from the first of which he has occasionally borrowed. He professes, however, that his object is neither to create English gardens nor Chinese gardens, and less to divide his grounds into pleasure-grounds, parks, or ridings, than to produce interesting landscapes, "*payssages intéressans*," &c. He received the professional aid of J. M. Morel, the Kent of France, who afterwards published *Théorie des Jardins*, and probably that of his guest Rousseau, who seems to have composed the preface to his book. Magellan, in the *Gazette Littéraire de l'Europe* for 1778, in giving some account of the last days of Rousseau, who died at Ermenonville, and was buried in the Island of Poplars (d) there, informs us, that Girardin kept a band of musicians, who constantly perambulated the grounds, making concerts sometimes in the woods, and at other times on the waters, and in scenes calculated for particular seasons, so as to draw the attention of visitors to them at the proper time. At night they returned to the house, and performed in a room adjoining

the hall of company. Madame Girardin and her daughters were clothed in common brown stuff, *en amazones*, with black hats, while the young men wore "habillemens le plus simples et le plus propres à les faire confondre avec les enfans des campagnards," &c.

338. *Ermenonville in October, 1828.* The property was then to be sold, and was let in the mean time to the Prince de Condé, who made no other use of it than as a preserve for game. The tower of the fair Gabrielle was roofless, and going fast to decay; some of the other garden structures were wanting; all were more or less dilapidated, with the exception of Rousseau's tomb in the Island of Poplars, and what is called "*La maison du Philosophe*" (figs. 56. and 57.), which is still pointed out to strangers as a place where



Rousseau used to spend whole days, reposing on its beath benches (fig. 57. a, a), having a fire of logs in the rude fireplace (b), and supplying himself with water from an adjoining spring. Bread and wine, we were told, the benevolent proprietor placed every morning in the cellar below, which Rousseau entered by a trap-door in the floor (c). The house in the village in which Rousseau lived, and the room in which he died, used to be shown to strangers: the room, we were told (in 1828), was become the sleeping room of one of the Prince de Condé's gamekeepers. Ermenonville having little or no natural beauty, and being now neglected



by art, has ceased to be interesting otherwise than by historical associations. (See *Trois Jours en Voyage à Chantilly, Mortefontaine, et Ermenonville, &c.*, 1828.)

339. *Watelet's garden, the Moulin Joli*, the next example of the English style in France, is of a very different description from Ermenonville. Watelet is the author of an *Essai sur les Jardins*, which appeared in 1774. His garden was situated in the suburbs of Paris, on the Seine, and contained about four acres, varied by buildings, grottoes, temples, and inscriptions; and was, on the whole, more in the Chinese style than in that of Kent or Shenstone. The author, who professes to take utility for the basis of his art, seems to have felt something wanting, in this particular, to his temples and altars, and is ridiculed by Hirschfeld (*Théorie des Jardins*, tom. i. p. 168.) for proposing occasionally "de faire paroître auprès les temples et les autels, les arcs de triomphe, &c., une troupe de pantomimes, vêtues suivant le costume nécessaire, imitant des cérémonies, faisant des sacrifices, allant porter des offrandes," &c. The Prince de Ligne admired Watelet's garden almost as much as that of Girardin, though in so different a style. After describing it, he says, "Allez-y, incroyables. . . Méditez sur les inscriptions que le

goût y a dictées. Méditez avec le sage, soupirez avec l'amant, et bénissez Watelet." (*Mémoires et Lettres*, &c. p. 230.) The object of such as attempt English gardening in France on a small scale is too often more to imitate the sentimental garden of Watelet, than the "paysages intéressans" of Girardin.

340. *A number of gardens in the English style* were laid out, just before the first French revolution, by Mr. Blaikie, a British landscape gardener. Mr. Blaikie was born in the neighbourhood of Edinburgh, and is still the proprietor of a house and large market garden, which belonged to his father, in the parish of Corstorphine. He went to France first as a botanical collector; and walked in that capacity through great part of Switzerland. He was one of the first Englishmen who ascended to the summit of Mont Blanc; and he sent to England most of the plants mentioned in the *Hortus Kewensis* as having been introduced by Dr. Fothergill. Mr. Blaikie entered upon the profession of a landscape gardener at Paris in 1776; and when we saw him there, in 1828, he gave us a list, from recollection, of all the places at which he had been employed, from which we subjoin an extract. Though advanced in years, Mr. Blaikie is still in vigorous health, and is actively employed in his profession. He is also a frequent contributor to the *Gardener's Magazine*.

341. *Gardens planned and made by Thomas Blaikie, in France, from 1776 to the first revolution:—*

1776. Made and planted a garden for the Count de Lauraguais, at Moncourt, near Orléans, opposite the village of Hevre de Grace. This place is agreeably situated upon an eminence near the sea, with a navigable river bordering the grounds on the other side. This estate was afterwards sold.

1777. Laid out another place for the same nobleman at Manicamp, near Chauny, in Picardy. This was likewise sold.

1778. Began an English garden at Malen for the Count d'Artois. Went to England and bought the trees, &c. at that time, few trees or shrubs could be found in any nursery near Paris.

1779. Began the garden of Bagatelle for the Count d'Artois. The little garden round the pavilion was designed and made by M. Boissier, the architect of the pavilion. The rest of the ground was taken from the Bois de Boulogne. The lawns and glades were cut out of the natural wood, and the remaining trees (though rather stunted, from the gravelly nature of the soil) were reserved, till the newly planted trees and shrubs had grown high enough to replace them. This was a great advantage to the place.

1780. Made the plan, and began the gardens of St. Lea, for the Duke of Orleans. St. Lea was sold in the Revolution, and afterwards became the property of the Princess Hortense, wife of Louis Bonaparte. In 1828, it belonged to the Duc de Bourbon, Prince de Condé. Laid out the garden de Ginevillier, which belonged to the Count de Vandredil, but was afterwards purchased by the Duke of Orleans. During this period I altered some of the gardens de Guiseard, belonging to the Duke d'Angoulême. These gardens were reckoned the finest of any at Paris. In 1828 they were the property of M. Oberkampf.

1783. Began making some alterations in the gardens at Moncourt, then belonging to the Duke de Choiseul, Panbourg de Roule, afterwards the Duke of Orleans. These gardens were laid out by Carmentelle, but without taste. They were originally small, but were afterwards augmented to their present size, and planted. After the Revolution, these gardens

were turned first into a nursery, and afterwards into public gardens; many of the plantations were destroyed, and the vistas blocked up.

1785. Made the plan, and began the park of Balency for the Duke of Orleans. These plantations and works continued till the Revolution, when they were stopped, and the château was destroyed. Laid out a garden at Maupertuis for the Marquis de Montcaupin: this garden and the château belonging to it were both destroyed during the Revolution. At Autueil, I laid out a garden for Madame la Comtesse de Boufflers, adjoining the Bois de Boulogne, also one for Madame Helvetius, and another for M. d'Arville. All these have been since destroyed for building on. Planned part of a garden for the Count d'Artois at St. Germain, where he proposed to build a château. This place was sold during the Revolution. Planned and planted a garden at St. Mandé, for the Duchess de Rohan Chabot.

These are nearly all the works, besides those which I conducted in the different parks belonging to the Count d'Artois, and the Duke of Orleans, which I began previous to the Revolution. At that time all were stopped.

1789. Laid out a garden at St. Firmin, opposite L'Isle d'Amour at Chantilly, for M. de la Haye, who was soon afterwards guillotined; about the same time my house was plundered of every thing by the Revolutionaries.

1792. When all my property was confiscated, I fled with my wife into Picardy, where we cultivated a farm for the Duke de Brancas. About this time I was named commissioner for the department of the Seine and the Oise, to form a botanical collection of plants at Versailles, but I refused, although I was appointed by the National Assembly of France.

1794. While a prisoner, under the protection of the mayor of Chauny, I laid out his garden, and those of some of the other inhabitants of that town. This year the garden of the Tuileries was planted with potatoes, and I furnished the sets, but was never paid for them.

Mr. Blaikie subjoined a list of fifty-two gardens, which he laid out for different princes and other noblemen, from the period of the first French revolution to 1828; but the catalogue does not contain any name of interest, save that of Labédoyère; whose château, near Marne, Mr. Blaikie describes as well wooded, and commanding fine views.

342. *The garden of Monceau*, again become the property of the Orleans family, was in excellent order, as an English garden, in 1829. A young and talented English lady, who visited it in the June of that year, says, "It certainly does full justice to our national taste. The groups of trees and walks are prettier than any thing I have seen for a long time. They were making hay, and I could almost fancy myself in England. I did not admire the Petit Trianon nearly so much." (*Gard. Mag.*, vol. v. p. 457.)

343. *The grounds of the Petit Trianon* are not without some features of natural beauty; and, like those of Bagatelle and Monceau, are still in good preservation. It was here that the queen of Louis XVI. used to entertain her guests, habited as a shepherdess; that the citizens used to hold *fêtes champêtres* during the Revolution; and that Napoleon made the residence, first of Josephine, and afterwards of Maria Louisa.

344. *The grounds of Bagatelle*, as laid out by Mr. Blaikie, are maintained nearly in their original state, and they form one of the most agreeable and successful imitations of the English manner in the neighbourhood of Paris. Through the kindness of M. La Pie, the geographer, at Paris, we obtained, in 1828, a correct plan (*fig. 59.*), which will give the reader a very good idea of the disposition of the principal masses. The only view beyond the boundary is obtained from the house and the other buildings; and this view is chiefly the Seine, and beyond it the hill Mount Valerian. The most un-English parts of Bagatelle are the house and offices; and, indeed, it may be observed, generally, that, with the exception of some recent buildings erected by the very first French architects, such as Durand and Percier, a French house is almost as easily dis-

tinguished from an English house, as a French garden is from an English one. In general, the faults of Bagatelle are those of most other English parks or gardens in France; viz. too much bustle and display, too many walks, too few trees and shrubs, and too many statues and seats, for the extent of surface. The result of all this is a want of shade, quiet, and repose. There is scarcely such a thing as a solitary, umbrageous garden walk in all France. The following are the details of the plan of Bagatelle:—

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- | | | |
|--|---|--|
| <p>1, Main entrance from the Bois de Boulogne.
 2, Outer entrance to the courts of the château.
 3, Avenue court (second court).
 4, Court of honour.
 5, Main entrance to the château.
 6, Bowling-green, surrounded by geometric garden.</p> | <p>7, Isle of the Tomb.
 8, Elevated rock, on which is placed La Maison de Philosophie (philosopher's hut).
 9, Rockwork, whence issues the water that supplies the lake.
 10, Ice-house, over which is La Tour des Paladins (the tower of the Paladins).</p> | <p>11, Porter's lodge and garden.
 12, Hot-houses, green-houses, and gardens.
 13, Picturesque scenery in the park, which extends southwards to some distance.</p> |
|--|---|--|

345. *Mercville*, the seat of M. Laborde, was one of the most considerable in France, and was laid out immediately before the Revolution, under the guidance of Robert, a famous landscape painter. The château stood on a terrace, and commanded a distant prospect, over a marsh originally of little interest. But the wall of this terrace was covered with artificial rockwork, a river formed in a marsh, with a bridge and cascade. The general surface was raised by earth, and on the right and left of the view from the house were raised considerable hills of earth, the one surmounted by a column 120 feet high, serving as a prospect-tower, and the other by a Doric temple of seventeen columns. At the base of one hill was a magnificent grotto and rocks; and near the other, stables, in the character of Gothic ruins. Various buildings were erected in other parts of the grounds; one to the memory of Captain Cook, and another to that of M. Laborde's two sons, who perished in the voyage of La Peyrouse. Every hardy exotic tree was planted; and many of them, as the tulip tree, *Ailántus*, *Sophora*, &c. grew with great vigour, and flowered luxuriantly. Many millions of francs were expended on this place, which for some years past has been falling into decay, and has been lately sold in lots.

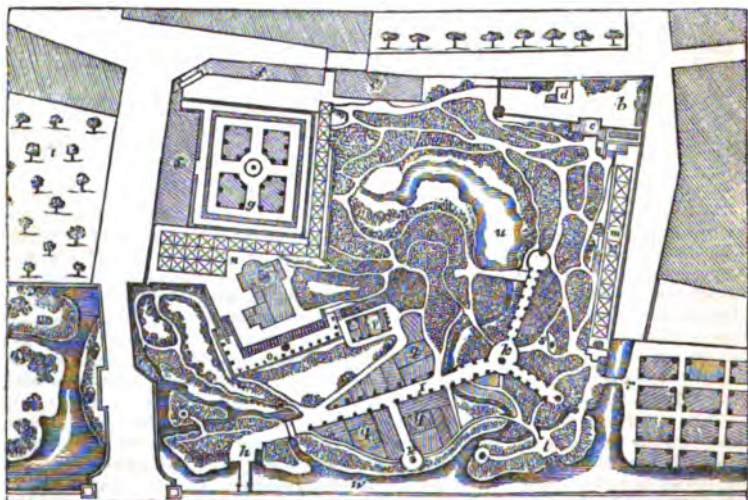
346. Among other English gardens in France, which existed previously to the Revolution, may be mentioned the *Jardin de Marbois*, planted by the Chevalier Jansen, an Englishman (*Ed. Encyc.*, vol. xii. p. 543.); the gardens of Belœil, the château of the Prince de Ligne; Montreuil, a garden of the Princess Gremené; Maupertuis, a garden of the Marquis de Montesquieu, with a beautifully varied surface, abundance of wood and water, and a desert after the manner of *Mercville*.

347. The French Revolution, however favourable to the progress of society, by the emancipation of energies and intellects, and by the general subdivision and distribution of property, has, as was to be expected, been injurious to gardening as an art of design on a large scale: but magnitude is not essential to taste in any art; and if the French have not now deserts of 1000 acres in extent, "after the manner of *Mercville*," they have such pleasure-grounds as those of Radepond (§ 360.); parks like that of Epinal (§ 357.); suburban villas, like that of Fromont and St. Ouen (§ 365. and § 355.); and town gardens like that of M. Boursault (§ 376.). The parks which existed before the Revolution can no more be put in competition with these residences and their gardens, than the constitution of Russia can be compared with that of France or of North America.

348. *English gardening during the consulate* was little attended to. The garden of Malmaison was formed by the empress Josephine in three years. It was laid out in the English style by Berthoud, assisted by the English gardener Hudson. Bonpland formed the botanical collection, which was chiefly obtained from the Hammersmith Nursery, and directed its culture; and Redouté lent his pencil to aid in its description. All has disappeared, says Soulange Bodin; and to the pomp of exotic vegetation has succeeded the pomp of funerals; and of that which Racine would have called the reign of a moment, there remains no more than an obscure monument in a village church. [Alluding to Josephine's monument in the church of Ruelle, to which commune or parish Malmaison belongs.] (*Gard. Mag.*, vol. ii. p. 223.) We saw Malmaison in 1815, and again in September, 1828, a few days before it was exposed for sale. The large hot-house which we saw on our first visit had disappeared before our second; and on its site stood a labourer's cottage. The cedar trees, and the large hippophaes, the tulip trees, the catalpas, the jujubes, and the Judas trees, still remained; but it would have been difficult to find any feature that could tell that it had once been laid out as an English garden. In this respect the difference between the natural and the geometrical style is worthy of notice. The most finished place in the natural style, when neglected, soon ceases to be recognised as a work of art; trees remain, but they may have been planted there by nature, and undulating lawns may very well pass for the original surface; but while a row of trees or a terrace remains, it bears the stamp of art, and proclaims itself to be the work of man.

349. *The plan of the residence of General Lomet at Agen* (fig. 59.) is given by Kraft. (*Plans des plus beaux Jardins*, &c., pl. 17.) It is situated on a hilly spot bordering the

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river, and contains in a very small space a dwelling-house (a), poultry-yard (b), in the pavilions of which (c, d) are the coach-houses, stables, rooms above for the coachman and stable-boys, and the gardener. There is a green-house (e), cart-shed and warehouse,



let off to townsmen (f), a flower-garden (g), principal entrance and avenue (h, i), temple of Flora (k), Roman temple and bath (l), terrace covered with an arbour (m), a vine plantation trained on an arcade trellis in the Italian manner (n), a terrace for orange trees with a green-house underneath (o), parterre (p), miniature fields of barley, wheat, beans, &c. (q), kitchen-garden (r), numerous monuments and statues (s, s), an orchard (t), and a lake (u). There are numerous seats and rustic buildings (fig. 63.). Kraft says that this garden contains the greatest variety of picturesque views, but has rather too many winding walks. It was laid out by the architect Kleber, who afterwards became the celebrated general of that name, and

was murdered during the campaign in Egypt. Kleber seems to have been fond of rustic buildings, with which this garden abounds in the greatest variety of form and dimensions, from the gardener's house, to that of the bees, and the shelter for peacocks.

350. *The garden of the postmaster at Allkirch (fig. 61.), in Alsacia, is described by Kraft as a singularly beautiful spot.* Beyond the basin of water is an amphitheatre of

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shrubs and trees, which is intersected by shady walks leading to a mount containing the grandest prospects of the Rhine and the Alps.

351. *At a post-house a short distance from Als, "we went," says Mrs. Carey, "into the garden to see a curious weeping willow. We were placed on a seat round the trunk, while a fountain was made to play from the centre, which ran down its large umbrella-like branches like a shower of rain. This curious effect is produced by a pipe being carried up close by the side of the trunk to the top of the tree. The gardens round the town are well irrigated, and consequently very productive."* (*Tour in France, &c., p. 104.*)

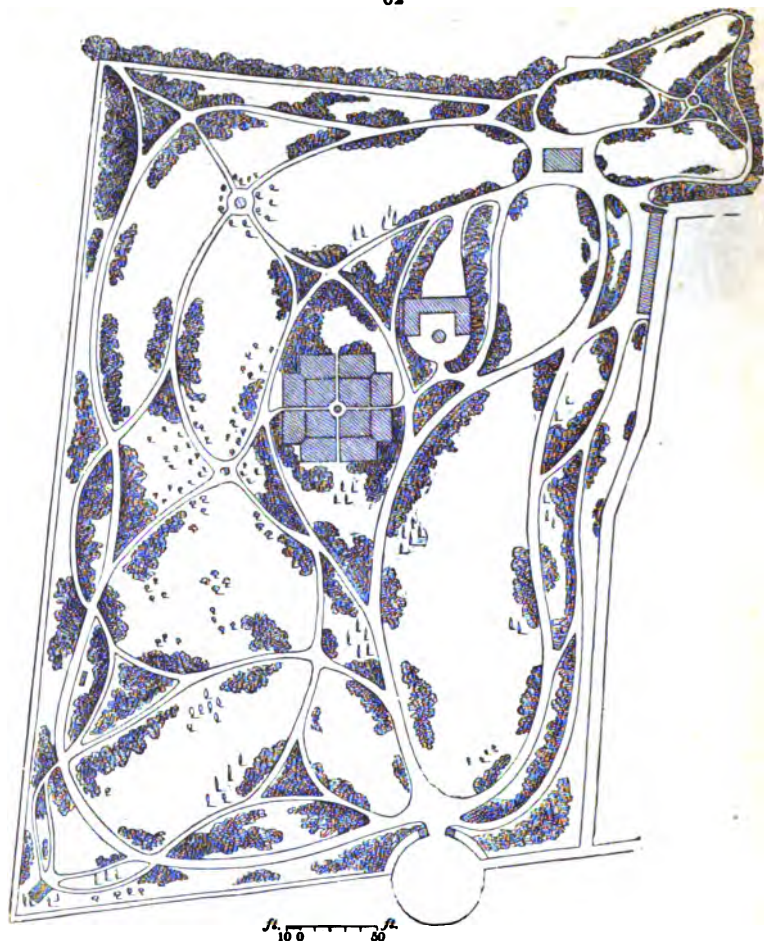
352. *The garden of the Minimes, in Tours, a conventual house, now become private property, is laid out with taste, and abounds with early flowering shrubs; among which, in May 1831, when the height of the bloom of the almond tree was past, the laburnum, the Judas tree, and the cornelian cherry shone conspicuous in the midst of a profusion of roses in beds, and in the front of the*

borders. In the garden of the Minimes there is also a considerable portion of lawn; but, though mown, it is never rolled, and looked more like a field than what it is called; but it was green. (*Mogridge in Gard. Mag., vol. vii. p. 488.*)

353. *During the empire, landscape gardening made little progress. Napoleon formed a winding road, or drive, in the park of Fontainebleau, for the purpose of taking exercise; and the scenery on each side of it was opened up a little, so as to resemble the free or natural manner. It is also said (*Lit. Gaz., Jan. 19. 1830*) that he had formed a plan for roofing over with glass the garden of the Tuilleries, so as to make it a winter promenade. Nothing was done at St. Cloud, the principal imperial residence, and but very little at either of the Trianons. Versailles was never occupied; and the theatre of the palace there, when we saw it in 1814, was said to be exactly in the same state in which it was left after a masquerade, which was given by Marie Antoinette before the Revolution. The emperor's generals were too frequently in the field to have leisure to attend to their gardens.*

354. *Landscape gardening in France made some progress after the Restoration. Sixteen years of peace gave leisure to those who had made fortunes during the war, to apply themselves to the means of domestic enjoyment. Louis XVIII. had the park of St. Ouen formed in the English style for his mistress, Madame Cayla; Compeigne was also laid out or altered in the English style; and a small garden, in imitation of Hartwell, was formed in a secluded part of the park of Versailles. Besides these, the Duchesse d'Angoulême obtained possession of Villeneuve d'Etang, and made some improvements there; and Rosin underwent alterations while in possession of the Duchesse de Berri. All the men of wealth in France began now to direct their attention to the improving of their estates; and more or less to practise or encourage gardening. The names of the individuals most conspicuous during this period for making improvements in landscape gardening, were M. Doublat of Epinal; M. d'Argenson of Vienne; M. de Radepont, near Rouen; Admiral Tchitchagoff, at Scéaux; M. Ternaux, at St. Ouen; M. Berthoud, at Chantilly; M. Soulange Bodin, at Fromont; and M. Boursault, in Paris. The two last gentlemen rank among the most ardent and devoted amateur gardeners of any age or country. We shall give short notices of some of these gardens, and of a few others, as we found them in 1828.*

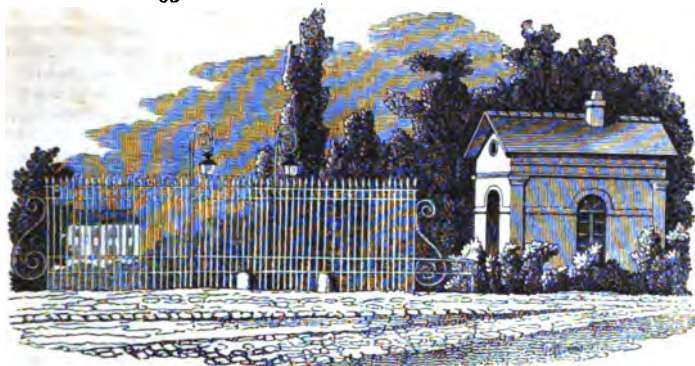
355. *The park of St. Ouen (fig. 62.) was laid out by Gabriel Thouin for Madame de Cayla, soon after the restoration of Louis XVIII. The surface is flat; and very little is gained from the distant prospect; but by great diversity of disposition in the trees and walks, a continual change of verdant scenery is presented to the spectator. The fault, to an English taste, is, that the wood is not in sufficiently large masses, and that*



there are too many walks. The result of these defects is a want of grandeur and repose. There are, however, two points in the laying out of this garden, well deserving the attention of British landscape-gardeners: the first is, that the situation and turnings of every walk are accounted for, by trees or shrubbery, in the axils, so to speak, of their intersections; and the second, that great depth of interior view is given from all the principal points, by studiously avoiding to intercept the views by trees. In short, nothing in this plan of the park of St. Ouen seems as if it could be otherwise than as it is; and this is always a good test. M. G. Thouin, though he has never been in England; and therefore cannot have a clear idea of what an English park is; yet lays out such parks, in France, on strictly scientific principles. The entrance lodge and iron gates to the park of St. Ouen (*fig. 63.*) have a very elegant appearance, and a glimpse of the house is obtained from them, though it is at quite the other extremity of the park: a proof of how much the depth of perspective has been studied.

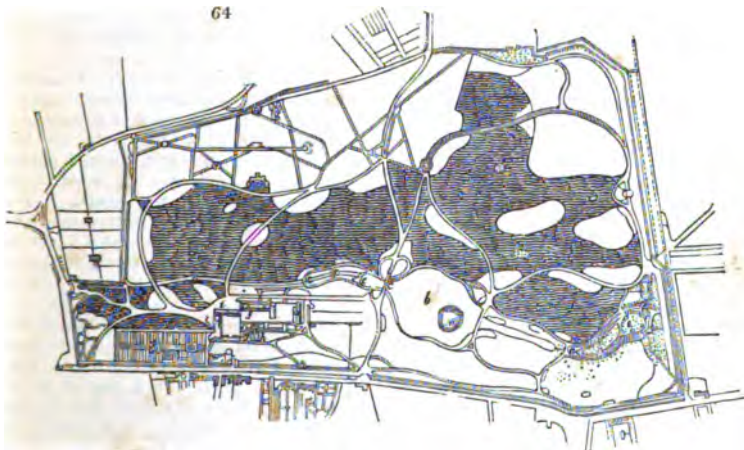
356. *Villeneuve l'Etang, near Marne*, was occupied before the Restoration by Marshal Soult, who is said to have been very much attached to it, and to have derived much pleasure from planting and altering the grounds. The park may contain upwards of 300 acres, which occupy two sides of a valley, through which runs a small stream. The house, which is small, but with very extensive offices, is placed on the margin of the park, and in the lowest part of the grounds. A worse situation could hardly have been fixed upon in the whole 300 acres. The planting in the park has been done in what is considered the English style; but the formal clumps, which are conspicuous in the plan

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(fig. 64.), shows that the designer has considered that style any thing but an imitation of nature. The small stream of water (a) is made to spread out into a pond (b), and it is crossed by numerous bridges, under which are cascades (c c c). The only parts of the

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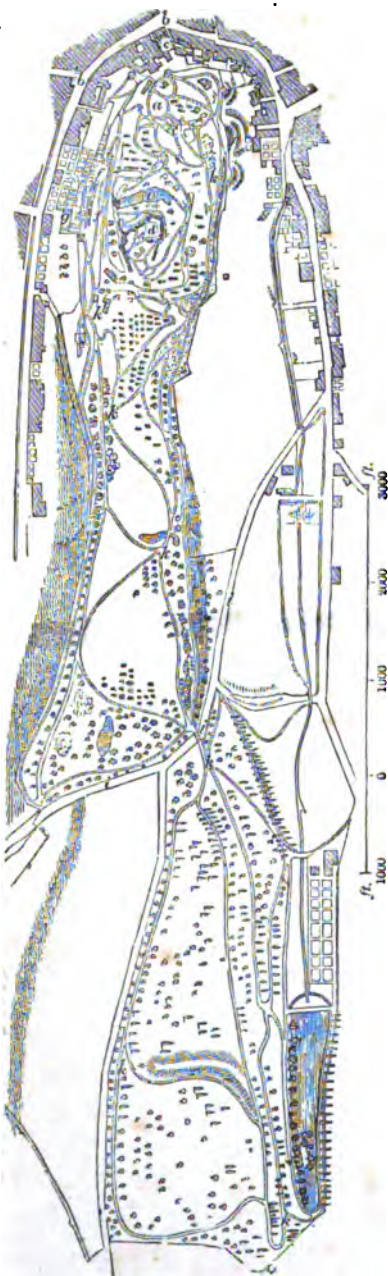


grounds which are tolerable, and which create in the mind any allusion to natural scenery, are a flat bottom, varied by spruce firs (d); and a somewhat irregular piece of ground (e), said to have been laid out under the direction of Soult himself. This last scene displays some apparently natural rocks and stones on the margin of the stream, and contains some groups of American shrubs. The Duchess d'Angoulême, having coveted this place, obtained it with some difficulty from Soult; and she has the merit of having added to the house (i) a large conservatory and an aviary (f), and also a dairy establishment (g) and a poultry yard (h). Notwithstanding the duchess's desire for the place, we were (in 1828) informed that she passed only one night at it, during the whole time it was in her possession. The kitchen-garden here (k) is on an elevated platform, and when we saw it, the walks were beautifully bordered with *Iberis sempervirens*, which makes a large, but very handsome edging. In some of the pits were a few very finely grown pine-apples. Taken altogether, Villeneuve l'Etang affords an example of a situation highly favourable for the natural style, but mangled by a description of art, without either the expression of purpose, or the expression of style.

357. *The gardens and pleasure-grounds of M. Doublat, at Epinal*, have the reputation of being the finest specimen of English gardening in France. Their merits are great, though they depend more on the natural beauties of the situation, and on the surrounding scenery, than on the exercise of any style of art. M. Doublat's grounds consist of a rocky hill (fig. 65. a), rising abruptly from the town of Epinal, to the height of 300 or

400 feet, and stretching away to the east in the form of a narrow ridge, of a mile in length, gradually declining till it terminates in the vale of the Moselle. This hill and its continuous ridge bear a remarkable resemblance to those on which Edinburgh Castle and the Old Town are built. The town of Epinal (*b b*) embraces the hill on three sides; the Moselle passes through the town, and forms the northern boundary to the ridge; and a public road, accompanied by a small tributary stream, constitutes the western boundary. M. Doublat, the proprietor, a banker in Epinal, and the receiver-general for the department des Vosges, assisted by M. Grillo and his son, architects of Nancy and Epinal, began to plant and improve this domain about 1793, and have continued doing so ever since. The great merit of the place, so far as art is concerned, is, that the planting is done in groups and masses, in which one species always prevails in one place; and in which the trees are disposed in a free, natural-like manner; and not in heavy, lumpish, formal shapes, as in some of M. Sckell's works in the English garden at Munich.

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358. *As leading features of the grounds at Epinal*, we may direct attention to the mansion (*c*); to the ruins of the castle of Epinal, on the highest part of the rock (*d*); to a large piece of water, formed adjoining what was formerly the moat of the castle, and including the moat (*e*): (this water, brought by pipes from a spring on a mountain some miles distant, can be rendered available to M. Doublat's house, and to the whole of the town of Epinal, at a moment's notice, in case of fire.); to a succession of terraced walls planted with fruit trees and vines (*f*); to the terraced kitchen garden (*g*); to the dairy, cow-houses and poultry yard, placed in the ravine, formerly a dry ditch for the defence of the castle (*h*); and finally, to the general variety in the direction of the walks and roads. In one part of the grounds, it will be observed that they are intersected by a public road (*i*); but the grand drive, which displays all the main features of the place (*k*), passes over this road on a bridge (*l*). On tracing this drive in the figure, it will be found very ingeniously contrived for going and returning over the same bridges; and also for combining the greatest length with the greatest variety of line.

359. *The most striking feature*, however, of the grounds at Epinal, is the rock on which is scattered the remains of the ancient castle. The castle of Epinal was a place of great strength, till it underwent a siege, in the time of Louis XIV., when it was taken, blown up, and has since remained in ruins. Some of these masses are very large and entire, while others are shattered by perpendicular rents;

and, leaning to one side, remain monuments of the tremendous force of gunpowder. It appears that the cannon balls made use of in the siege were partly formed of granite; as numbers of these, as well as of iron balls, are constantly dug up by the gardeners. The great inequality of the surface, and the various forms of the masses of rock round these ruins, with the distant amphitheatre of wooded hills and mountains on three sides, and the valley of the Moselle on the east, seen from them, constitute by far the finest part of the scenery. In our notes made on the spot in October, 1828, we find noticed two stupendous piers of the drawbridge, one rent from top to bottom, a height of nearly 100 feet, and leaning towards the other; immense masses of rock, beautifully varied with creepers, and more especially with the *Ampelopsis hederacea*; birch trees, larch, fir, and Scotch pines, protruding from crevices of the ruin and of the rock; a cleft or ravine with steep rocky sides, planted with larches, and having a Swiss air; a tunnel through the rock, of several yards in length, forming part of the road, and displaying a very striking view of the Moselle and its vale, from one end, and of one of the highest of the mountains of the Vosges on the other; and the imitation of natural woods, by planting very young trees among the older ones, always of the same sort in one place, so as very successfully to imitate the spruce fir forests of Prussia, the pine and birch forests of Sweden, and the larch and silver-fir scenery of the Alps. The grand and savage character of the mountain scenery, on the one hand, as contrasted with the buildings and bustle of the town, and the vale of the Moselle, with its meadows and vineyards, on the other, add greatly to the charm of M. Doublat's grounds in our eyes; though, if the domain belonged to an aristocratic Briton, the town would be deemed a nuisance, and the great object of all his efforts would be to plant it out from the view. So far is M. Doublat from entertaining any opinion of this kind, that his grounds are thrown open every Sunday to the whole town of Epinal; and at all times they are open to strangers.

360. *The château de Radepont, M. de Radepont*, presents no grand or striking feature; but the grounds are varied, well planted, very well laid out, and exceedingly well kept. The extent of the demesne may be thirty or forty acres, partly on the side, and partly along the bottom, of a valley. The house, a plain modern building, is situated in the middle of a low, flat surface, and is unaided by any external feature. The interesting part of the grounds is the irregular acclivity which rises from the level ground on which the house stands; and the leading feature of this acclivity is formed by the ruins of an ancient castle or fortress, and its various outworks. These are exceedingly well managed, and made the most of, by walks leading to different points of view; and by a chapel, hermitage, mausoleum, and armoury. Another feature is a conservatory, with some good orange trees, and perhaps thirty or forty species of the common green-house plants. There is a temple of Fame, with a statue in it of some prince, or other person belonging to the court, who had honoured Radepont by a visit; and there are also various seats, covered and open (the former with rush mats, or cushions, both for sitting on, and to place beneath the feet); an American ground; a hanging wood, with a dark walk; a bridge over the stream which drives the cotton mills, and passes through a part of the low grounds; a cascade; an aviary and a menagerie, with a lemur, turtle-doves, pheasants, &c.; English cottages; a dairy, and very neat cow-house; with some similar objects of amusement and interest. The walks are, for the most part, ornamented with groups of showy annuals of the commoner sorts; asters, marigolds, poppies, mallows, &c. The views from the rising grounds are over the house and the low grounds, to the naked chalk-hills on the other side of the valley; and those from the low grounds are, in most places, limited by a boundary of wood, and are chiefly from one object to another within this boundary. The kitchen-garden may contain three acres, surrounded by a mud wall, trellised: it has a very good gardener's house, a fruit-room, a hot-house, pits, and frames. The hot-house contains some good old plants of general interest, such as the sugar-cane, date palm, *Ficus elastica*, &c. The frames were shaded with straw mats, and contained, if we recollect right, a few fine plants, some Cantaloupe melons, and several pots of cuttings. The walks, like all the others about this residence, were laid with fine river gravel; which, as it does not bind, is kept soft and even by frequent raking. The edgings in the kitchen-garden were of strawberries, or of sorrel, and other culinary plants. The borders were planted with fruit trees, some dwarfs, and others trained *en pyramide*; in the compartments were some standards. The whole, even to the melon-ground, was in the most perfect order; the walks newly raked, and scarcely a weed to be seen. With the exception of the house, this place may be considered as a very successful imitation of the English manner. (*Gard. Mag.*, vol. v. p. 647.)

361. *The villa at Chantilly, of the late M. Berthoud*, architect to the government in the time of the consulship, contains upwards of one hundred acres, and has been laid out in the natural manner with extraordinary care. The surface consists of a hill or bank, in great part covered with natural wood; and of a hollow, with a small stream of water. The house is placed at one end of this hollow, close to Chantilly; and there is one short

approach from the town, and another long one through the bank of natural wood, from a cross country road. This may be described as a double approach, there being one road for entering and advancing to the house, and another for returning: both are admirably adapted for showing all the beauties of the place to the best advantage; a circumstance exceedingly favourable for the stranger, who, in order to see the place completely, requires to do nothing more than drive up to the house and drive back again. After passing through the gates at the lodge, and advancing about one hundred yards, the stranger meets two roads, beside one of which is a post, with the words, *chemin du hameau*: on returning from the house, at about the same, or perhaps rather a greater distance from it, the road divides in a similar manner, and close to one branch of it is a post, exhibiting the words *chemin du départ*.

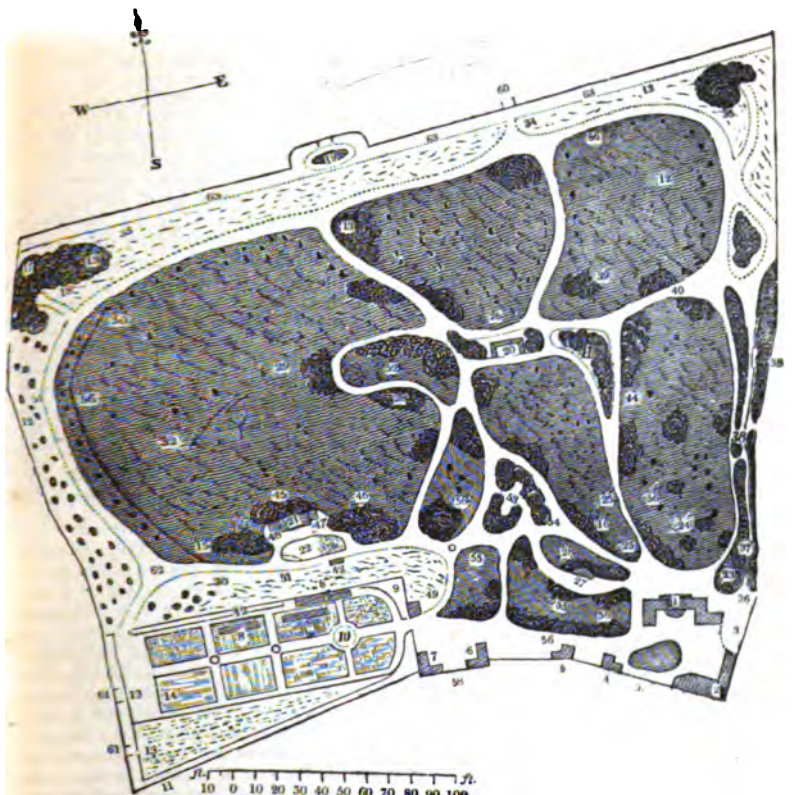
362. *The house of M. Berthoud* is in the Italian style; small, but richly ornamented. The principal view from it is along a valley, in which the eye catches, in succession, glimpses of water, and buildings among trees and grass. In walking through this valley, the buildings, seats, urns, statues, and rockwork are found to be very numerous. Near the house is a rustic grotto, over which is a highly finished and richly furnished bedroom. A concealed door in the grotto leads to a small kitchen and other conveniences; so that this detached building seems to have been intended either to serve as an addition to the house, or as a lodging for a friend. Not far from this grotto, and also near the house, is a larger building, with the external character of a chapel: on entering we found that the ground floor assumes this character, that the sunk story is a wine-cellar, and the room over a billiard-room. Hard by is an ice-house, disguised so as to appear a mass of rock, but partially covered with trees and bushes. A conspicuous object from the house, is an obelisk, covered with hieroglyphics, and dedicated *aux arts*. The Chinese buildings, ornamental cottages, rustic bridges, and fanciful cattle-sheds and sheepcots, are too numerous to be recollected. The stables, the Chinese buildings, and also part of the exterior of the house, are painted in fresco externally; but, to an eye not accustomed to this style of ornament, this conveys the idea of superficial construction, and temporary duration. The only building about the place which we could thoroughly approve of, was the entrance lodge. The usual defects of too great a width of gravel or sand in front of the house, and of rounding off too much of the angles of junction in the walks and roads, was less obvious at this place than in most others which we have seen in the neighbourhood of Paris; for example, *Madame de Cayla's* (see fig. 65.). When we saw this villa in 1828, the whole was in a state of dilapidation; but we have no doubt that, when it was in complete repair, it displayed much natural beauty, though with a greater mixture of architectural objects, and with less repose of effect, than harmonises with the British taste in landscape gardening.

363. *The villa of Fromont*, on the Seine. M. Soulange Bodin combines, at Fromont, an elegant villa residence with an exotic nursery, and an institution for young horticulturists. M. Soulange Bodin, like M. Vilmorin, is at once a skilful cultivator, a marchand grenetier (seedsmen), a scholar, and an accomplished gentleman. As connected with the army, he has been all over Europe; and having been long, to use the Prince de Ligne's phrase, under the influence of the *jardinomanie*, wherever he went, the gardens were the main objects of his attention. At one time he had the principal management of the gardens of the Empress Josephine at Malmaison. On M. Bodin's retirement to Fromont, in 1814, he commenced laying it out in the English manner, and so as to combine the picturesque scenery of the park with the profitable culture of the nursery. The grounds exceed a hundred acres of a surface gently varied, and sloping to the Seine. They are surrounded by a walk or drive, which displays varied views of the interior, the main feature of which is the château; and of the Seine, with some rising grounds, beyond the boundary. In various spaces among the groups of trees are formed beds of peat earth, in which seedlings of American shrubs are raised; the more rare kinds being propagated by artificial methods. In the walled garden near the house are numerous pits and frames, in which the more popular exotics, such as the orange, *Camellia*, *Azalea indica*, and numerous other green-house and hot-house plants, are increased by hundreds. In effecting this, one of the principal modes employed is herbaceous grafting, or grafting on the young wood. The plants thus raised are sent to all countries. In the larger green-houses and hot-houses there is a collection of fine specimens, intended principally for ornament. The object of the institution for the instruction of young gardeners is, to supply French country gentlemen with young men well acquainted with both the practice and the theory of their art in all its branches. For this purpose there are professors, a library, a museum of implements and models, and a monthly journal, entitled *Annales Horticoles de Fromont*. There is not a more striking example in all France of the gentleman and the man of science being united with the tradesman, than in M. Soulange Bodin; nor a villa in which more industry and activity goes hand in hand with picturesque beauty. There is nothing of the kind that we know of in England; nor can there be in the present state of things. It is

perhaps one of the finest moral features in France, that most gentlemen are either manufacturers, tradesmen, or farmers; and that most of the persons practising these professions are, in their manners, gentlemen.

364. *The villa of Admiral Tchitchagoff, at Sceaux (fig. 66.), contains fifteen or twenty acres, on a nearly flat surface; but it has been laid out with extraordinary care by the proprietor, aided by the constant advice of Mr. Blaikie. The object is to compress as many as possible of those beauties, of which a pleasure-ground is susceptible, into a small space. The following references to the plan will show how this has been done:—*

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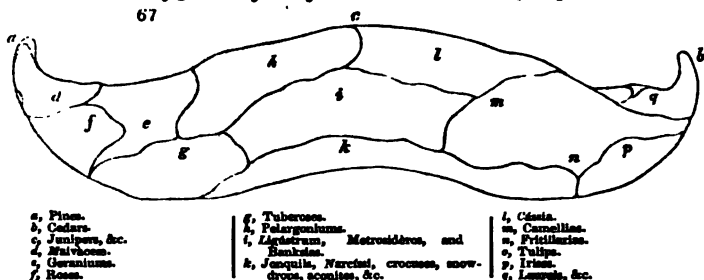


1. The house.
2. Stabling, cow-house, coach-house, dog-house, &c.
3. Poultry run, place for rabbits, Guinea pigs, &c. and dooghill, with hot-bed frames.
4. Porter's lodge, and dairy.
5. Pump and reservoir, from which leaden pipes conduct the water all over the grounds, in order to water the lawns, &c. in dry weather.
6. Gardener's house and office, pigeon-house, seed-room, &c.
7. Granaries, wash-house, and tool-house.
8. Flinery, and hot-houses for forcing culinary vegetables.
9. Pig-house.
10. Great basin surrounded by a flower garden for *Barbets* flowers.
11. Collections of biennials.
12. Foreign exotical vegetables.
13. Orchards for vines and peach-trees.
14. Frames for forcing asparagus.
15. Asparagus.
16. Rock-work.
17. Run-ribs.
18. Battery.
19. Flower borders, and a herbage de base (a flower clock). See index.
20. Orangery.

21. Green-house.
22. Garden of variegated plants.
23. American garden.
24. Pelouse du nord (north lawn).
25. Magnolias.
26. Mount Lebanon, a collection of cedars, pines, and evergreens.
27. Conservatory of orange trees planted in the ground, with a roof removable in summer.
28. Cabinet de verdure (a bower).
29. Mount Echo. (Here there is an echo.)
30. Borders for duplicates; botanic grounds.
31. Herbaceous plants, and nursery.
32. Druidical ruin, containing two lives.
33. Vines trained à la Fontainebleau.
34. Vines trained in the Italian manner.
35. Embroidered parterre, laurels, experimental garden, and nursery.
36. Banc des pareaux (seat for idlers).
37. Banc tête à tête (seat for two).
38. Banc des solitaires (hermits' seat).
39. Banc des philosophes (philosophers' seat).
40. Banc des pleureurs (mourners' seat).
41. Banc Américain (American seat).

42. Banc de la Vérité (seat dedicated to Truth).
43. Banc des amateurs (amateurs' seat).
44. Baskets of *Salvia splendens*.
- 45 and 46. Groups of magnolias and other trees, surrounded by flowers.
- 47 and 48. Reading and breakfasting pavilions.
49. Banc bâti (alcove of masonry).
50. Grotto.
51. Banc des amis (seat dedicated to Friendship).
52. Choice fruit trees and esculent vegetables.
53. Salle de jeux (billiard-room, &c.).
54. Salle de danse (ball-room).
55. Pelouse de l'ouest (west lawn).
56. Shrubs and forest trees; pomegranate trees in the open ground.
57. Grande porte (principal gate).
58. Porte de charretier (gate for carts, &c.).
59. Petite porte, surnommée de la vache (small gate, called the cow-gate).
60. Porte du nord (north gate).
61. Porte de l'ouest (west gate).
62. Carrefour des six ifs (square of six yew trees).
63. A slip of outside ground, planted with oaks.

365. The mass in fig. 66. in front of the house is thus arranged (fig. 67.) : —



366. The park of Neuilly is in a dull, flat situation on the Seine. There is a small spot near the house, which bears considerable resemblance to an English pleasure-ground; but the rest of the place is very deficient in picturesque interest. There is, however, an arboretum, containing a considerable collection of rare trees and shrubs; and some hot-houses, into which the industry of the very skilful gardener has collected a number of stove plants.

367. The park of Marshal Massena, at Ruelle, formerly the Duc de Richelieu's, is said to remain pretty much in the state in which it was when occupied by that minister. It presents a tolerably complete specimen of the ancient style, but is much neglected.

368. The park of M. Morel Vindé is delightfully situated on the side of a hill, and the château looks across a narrow, park-like valley, to a well-wooded hill, on which is seen a part of the aqueduct of Marly. Looking from the house to the left, the winding of the valley conceals its termination; looking to the right, the valley opens into a level country richly cultivated, with hills and the château of St. Germain in the extreme distance. With every desirable feature for the exercise of the natural style, this place was laid out, many years ago, in the geometric manner; and the natural lines of an undulating surface, to a considerable extent from the house, are changed into levels and regular slopes, or counteracted by avenues, hedges, and straight canals. We do not know a finer subject to work on in the English manner in the neighbourhood of Paris. M. de Morel Vindé is an excellent agriculturist, and the author of by far the best work on rural architecture which has appeared in France.

369. The château du Mailleval is built close on the margin of the river, on a bank somewhat higher than that opposite, but not so much so as to give the situation any decided advantage in point of character or effect. Behind, and on one side, lies the park scenery, consisting chiefly of avenues and woods in the ancient style; and on the other side are the stables, offices, kitchen-garden, church, and village. The park, we were told, contains above one hundred acres; about three fourths of which consist of a flat or very slightly varied surface, planted with herbaceous avenues, and close woods, pierced by numerous clipped alleys, diverging from centres in the usual manner, of which the only one that has left any impression on our mind is a triple vista, from a *patte d'oie* to the river. The remaining fourth part consists of a surface, a good deal varied, and is laid out with numerous buildings in imitation of the English manner; of which, upon the whole, it is rather a successful imitation. The kitchen-garden is close to the house, and, in former times, must have been its chief ornament in the way of pleasure-ground; at present it is in a state of ruin and desolation, such as no British gardener can form the slightest idea of. The walls, terraces, slopes, and platforms, on the different levels; basins no longer fit to hold water; ruined fountains, broken statues and urns; the remains of an old conservatory and some pavilions; neglected wall trees; and old shrubs, show what it has been, and the luxuriance of the weeds what it will very soon become. (*Gard. Mag.*, vol. v. p. 643.)

370. The mansion of Madame de Malartie, at Tôtes, between Dieppe and Rouen, is a stately modern building of red brick, faced with grey limestone. The grounds around it were, in 1828, in a sad state of disorder. They displayed some woods, some walks and alleys in the ancient style, and a field, with a serpentine walk along two sides of it, bordered by some stunted shrubs. This was called the *partie Anglaise*. The kitchen-garden contained two or three acres, and was surrounded by a high, substantial, ancient brick wall. Against the wall stood the cankered stumps of three pear trees, an old fig tree not nailed, a vine, a peach, and two apricots, ruined by age, moss, and gum; and, what we were rather surprised at, a young apple tree. There were also some young forest trees, self-sown willows, and birch trees, growing out of the coping of the wall. The walks were without edgings, and not gravelled. A few fruit trees, chiefly pears, *en quenouille*, without fruit, and with the bark covered with moss, stood in the quarters; and in the borders were some currants, with stems three or four feet high, and matted

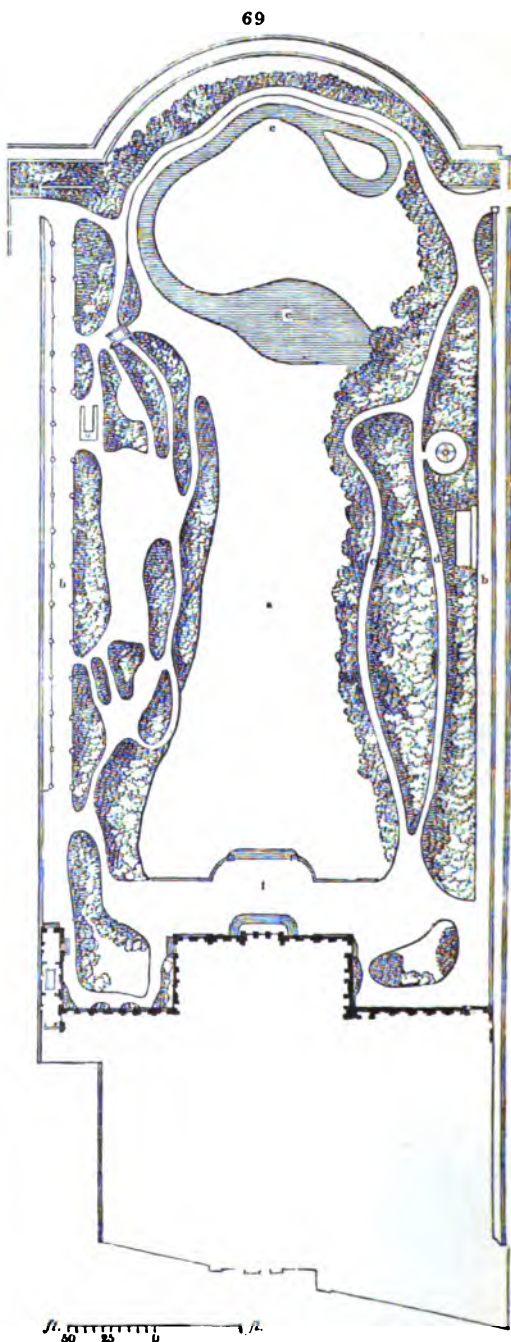
(which the gardener said preserved the fruit till Christmas); one or two gooseberries also on tall stems, and a few raspberries and wood strawberries. The compartments were cropped with artichokes, field cabbage, celery (scarcely, if at all, earthed up), kidney beans, spinach (lately sown for winter and spring use), red beet, leeks, sorrel (in a considerable quantity), and scorzonera. In the borders were *Calliopsis tricolor*, double perennial sunflowers, mallows, and a few other things. What is remarkable, there was a small pine pit, the plants shaded with straw mats; and a small green-house with *Cereus speciosissimus*, *Crassula obliqua*, and other succulents; *Ficus indica*, *Solanum Pseudo-Capsicum*, *Brugmansia suaveolens*, *Alophia citriodora*, one or two pomegranates, orange trees, and myrtles. The walks had lately been hoed and raked; and the gardener told us that the broad walks and carriage roads, on both fronts of the house, were cleaned by harrows drawn by horses or oxen, and afterwards raked smooth by men. (*Gard. Mag.*, vol. v. p. 248.)

371. *The château de Queville*, the seat of the Prince de Montmorency, near Rouen, is a large, plain, modern edifice, approached through a broad avenue of lime trees, descending rather than ascending; the effect of the whole, to an English eye, is the reverse of grandeur, dignity, order, neatness, and habitableness. It put us in mind of some of the wretched châteaux which we have seen in Poland and Russia; and, with every desire to be pleased and to commend, we could really find nothing either in the house or grounds on which we could bestow our approbation. The house is surrounded by a very broad sandy area, on which are placed a profusion of old orange trees and pomegranates, and a number of the commoner green-house plants of the last century; few of them well grown, or, in our idea, at all ornamental. On what may be called the garden front of the house, was an open avenue of grass, perhaps 150 feet wide; and on each side was a wood, in some places open like a grove, and in others thicker, like an artificial plantation. In the thick parts, the Pin de Bordeaux (*Pinus maritima*), which the gardener informed us was greatly to be preferred to the Pin d'Ecosse (*P. sylvestris*), or the sapin épicier (*Abies commūnis*); because shrubs and grass grew much better under it, and the cones, which are thick, and from six to eight inches long, made an excellent fuel for the poor, being picked up by them as they fell from the trees, so that the proprietor of the wood sustained no injury. There are various walks, straight, and winding, both in the woods and in the grove. In the latter, near the house, are several swings of different kinds, very completely equipped, for ladies and gentlemen; and roundabouts, which the gardener informed us were much used by the younger part of the family. There was also a skittle-ground, a place for playing at bowls, and a sort of rustic house, containing a table nearly as large as a billiard-table, but fitted up like a bagatelle-board, for playing at *trou madame*. These contrivances for amusement seemed to be very judiciously placed under the shade of the trees, which were at the same time so lofty, so naked-stemmed, and so far apart, as to create or admit a gentle cooling breeze. Directly in front of the house, on the centre of the grass avenue just mentioned, is a *méridien d'étonation*, the cannon three feet long. Beyond the wood there is a small meadow with winding walks *à l'Anglaise*, which we looked at over the turf fence, but did not enter. (*Gard. Mag.*, vol. v. p. 641.)

372. *As an example of the exterior appearance of a magnificent old château, of the time of Louis XIV.*, we shall refer to the château de Neuville, on a commanding situation in the valley of the Moselle, between Nancy and Roville (*fig. 68.*). This château



stands on an eminence, which protrudes boldly from the range of hills which skirt the north side of the valley. The summit of this eminence has been levelled, so as to form a platform of nearly two acres. About half an acre is occupied with the château and its different courts and offices, the remainder is laid out as a geometrical garden. The entrance is through a short avenue from behind; the carriage of the visiter passes under an archway to the court of honour, and the stranger entering the saloon is struck with astonishment and delight at the magnificence of the prospect, which comprises the fertile valley of the Moselle, with its numerous villages, farm-houses, cornfields, and vineyards, bounded by undulating hills covered with wood. The remains of terraced gardens, orchards, avenues, canals, and of all the component parts of a highly enriched geometric garden, still exist, though they have been utterly neglected for upwards of thirty years, and though the house was pillaged during the first excesses of the revolution. At the base, and on the sides of the knoll on which the château stands, are the cottages, which compose the village of Neuville, and the public road; and we were told that it was the unjust acts perpetrated by the proprietor, in endeavouring to remove this village and road to a distance, which cost him his château, and ultimately his domain. On looking over the



numerous apartments, of spacious dimensions, on the ground-floor, we found that a number of them had never been finished; and that very few of the bed-rooms were what in England would be considered habitable.

373. *As specimens of town gardens in Paris*, we shall give the plan of the Elysée Bourbon, that of M. Boursault, and that of Bel Respiro.

374. *The garden of the Elysée Bourbon* (fig. 69.) belongs to a palace of that name, and is situated in the Rue du Faubourg St. Honoré. It was laid out by the architect Bélanger, and contains a long glade of lawn (a); a straight covered walk (b); open winding walks (c); shady winding walks (d); a piece of water with an island (e); and a handsome terrace in front of the palace (f). As far as design is concerned, the ground is made the most of; but it was planted at a time when little regard was had, and as little opportunity afforded, for the introduction of American shrubs. In 1828, we found this garden in excellent order.

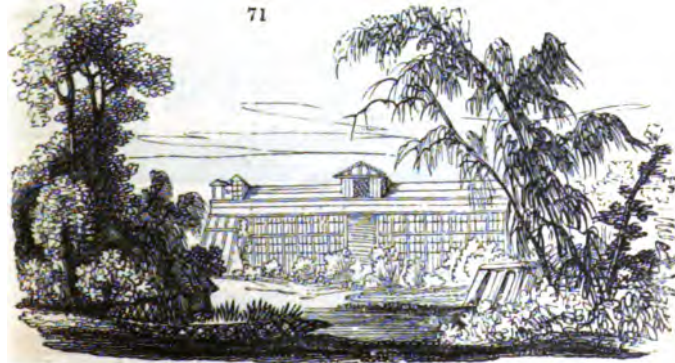
375. *The garden of M. Boursault* is situated in the Rue Blanche; and, for its size and situation, is one of the richest, not only in France, but in Europe. It contains less than two acres, and is surrounded on every side by high houses. The winter garden comprises a range of architectural conservatories, ornamented with columns of marble in the Corinthian order; another range of upright glass at an angle of nineteen degrees, as in Holland, and with opaque roofs containing rooms used for various garden purposes. At a time when gardening pursuits in France were confined to few, and when rare plants were only to be procured at an enormous expense, M. Boursault collected the most costly exotics to be found in Europe, notwithstanding all intercourse with Britain was prohibited. There are indeed here many fine specimens of plants, which, though they have been for some years familiar to British gardening, were, before the peace of 1815, not to be found in France beyond the precincts of M. Boursault's garden.

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We saw this garden in 1815, again in 1819, and again in 1828; and always found it in the very highest order and keeping. Through the kindness of the proprietor, we have been favoured with the ground plan of this garden, and we employed an artist in 1828, to take the two views (figs. 70. and 71.). The first of these views shows a large plant of *Araucária excelsa*, then thirty feet high; and the second, the style of the largest of

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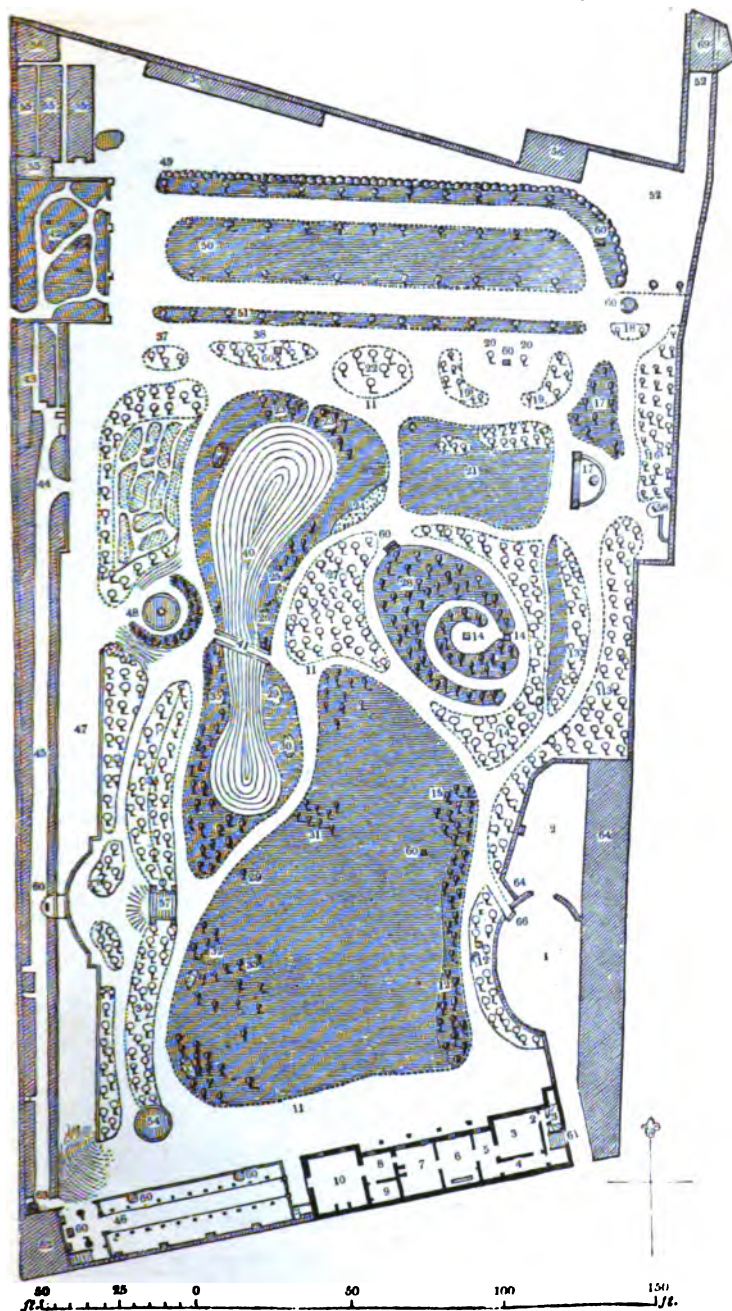
the hot-houses. The ground plan (fig. 73.) was made for us by M. David, M. Bour-sault's very intelligent gardener, who also supplied us with a list of the principal trees. The following are the details of the plan.

1. Principal court of the mansion.
2. Court of the stables and coach-houses.
3. Attic-chamber.
4. Corridor.
5. Waiting-room.
6. Small drawing-room.
7. Large drawing-room.
8. Vestibule for entering from the garden.
9. Bath-room.
10. Gallery of paintings, statues, and antiquities.
11. Open garden. The walks are of gravel, and the turf is kept short by mowing, and carefully watered during summer.
- 12, 13. Masses of *Magnolia grandiflora*, conspicuous, and purple-flowered. *Kalmia latifolia* and other species, *Asplenium* several species.
13. *Asplenium* *Montana*, edulis, and other species.
15. Avenue chiefly of *Magnolia grandiflora*, but with all the other species mixed, and numerous *rhododendrons*, *saxatiles*, and other American plants.
- 14, 14. Vase of white marble on the summit of a mound; on the side of which, surrounded by choice shrubs, is a group of georgines; near this is a handsome caryatides in marble.
15. *Robinia tortuosa*, *Æsculus cerasus*, and variegated hollies.
16. Place for camellias during the summer season.
- 17, 17. Semicircular marble bench, succeeded by steps, and containing a handsome marble antique vase in the centre. *Rhododendrons*, *andromedas*, tulip trees, *Calyculinus*, *Chamaecrista*, *Cydonia japonica*, and various American shrubs.
- 18, 18. Exotics from the stove and green-house during summer; comprehending the coffee-tree, *Myrtus Pimenta*, cinnamon, &c.
- 19, 19. Place for New Holland plants during the summer.
- 20, 20, and 21. *Magnolia grandiflora* as standards, with a collection of all the *rhododendrons* which can be purchased in Europe, as undergrowth; with select species of *Magnolia*, *Asplenium*, and other American plants, and *Asplenium* *Montana*, *Gordonia pubescens*, &c.
22. *Arceuthobium* *excelsa*, thirty feet high, protected by a cover of boards during winter, and surrounded by a walk bordered with orange trees in summer. The *Arceuthobium* (fig. 70.) is a very handsome tree, and the most conspicuous exotic in the garden.
23. Cedar of Lebanon, *Photinia serrulata*, *Nandina domestica*, *Eriobotrya*, *Japanea*, *Pinus palustris*, *Acer nipoense* (*olivifer de Bobbery*), *Eleagnus argentea*.
24. Bed of renunculus.
25. *Edwardsia macrophylla*, twenty feet high.
26. *Pomegranates*, and dwarf georgines.
27. *Magnolias* of various species, and of a large size; *Virgilia thymifolia*, *rhododendrons*, and various species and varieties of holly. *Cunninghamia lanceolata*, *Nallaburii edulis*, *Peonia Montana*, and many herbaceous sorts of peony. *Haleisia* *diptera*.
28. Hill or mound of cedars, pines, fir, *rhododendrons*, hollies, and various evergreens.
29. *Asplenium tuberosum*.
30. Bed of select tulips.
31. Purple beech, silver lime tree, and gold blotched alder.
32. *Asplenium*.
33. *Kalmia latifolia*, *Pyrus spectabilis*, and *Betula pendula*. Among these trees are beds filled with choice *brachanthus* in spring, and *polypodiums* and other showy green-house plants in summer.
- 34, 34. Collection of standard roses, remarkably complete.
35. Handsome cedars of Lebanon.
36. *Partia flantensis*, devoted to the culture of bulbous-rooted *feralia* *feralia*.
- 37 and 38. *Pomegranates* and georgines.
39. Choice collection of herbaceous plants.
40. Food supplied from the canal d'Ouro, by a perpetual fountain issuing through rock-work. Wave basin and other aquatic thrive here, and flower magnificently.
41. Iron bridge with handsome palisades.
42. Conservatory, from which the roof is removed in summer, containing camellias of all sorts, *Euphorbia*, *Rhododendron arboreum* var. *album* and var. *marginatum*, *Asplenium* *indica* and *indica pinnatifida*: the cinnamon tree, which has been ripened its seeds, and young plants, have stood the winter with very little protection. *Magnolia speciosa*, *Wisteria* *Consequens*, and a number of other conservatory plants.
43. Stove containing *Gerardia Mangostina*, *Lobelia hortensis* and *rubra*, a number of palms, the only *Dumora* in France in 1828, *Telfairia americana*, *Combretum purpureum* (Fouquieria *coccinea*) and *Combretum* (*Pavane comina*); *Thunbergia*, five species; *Myrtus*, several species; and numerous bulbs.
44. Green-house.
45. Stove containing *Caryota mitis*, *C. brevis*, *Cycas circinalis*, *Corypha umbraculifera*, *Elæa sylvestris*, *Pothos macropbylla*, *drum montana*, *Urania speciosa* (*Ravensia madagascariensis*), *Theophrasta americana*, *T. integrifolia*, *Streptia regina*, *S. lanceolata*, *S. juncos*, *S. augusta*, *Dillenia speciosa*, *Ficus ferruginea*, *F. cerasiformis*, *F. speciosa*, and *Myrtus Pimenta* var. *longifolia*, *Aristolochia labialis*.
46. Green-house, with a row of marble statues on pedestals. Among the plants are, *Beaufortia decussata*, *Wisteria Consequens*, *Liparis spheerica*, *Mimosa stricta*, *Wisteria*, *scutellaria*, &c. *Diosma suaveolens rubra*, *Wisteria corymbosa minor*, *Euphorbia pinnata alba*, *E. rubra*, *Bursera spinosa*, *Erythrina herbacea*, *E. Crista galli*, *Doryanthes excelsa*, *Fimbristylis*, *Olea cordata*, *Yucca filamentosa variegata*, *Fuchsia gracilis*, *Daphne Dauphina* (*hybrida*), *Acacia lunata*, *Camellia altissima*, *Rhododendron arboreum ferrugineum*.
47. Terrace walk, supported by a parapet wall, so as to be on a level with the glass.
48. Basin of water, with a statue of bronze in the centre, and surrounded by rock-work.
49. Lines of trees on turf.
50. Turf shaded by trees.
51. A row of trees on turf.
- 52 and 53. Back way for the gardeners and garden materials.
54. Basin of water, the bottom and sides of sand.
- 55, 55, 55. Stoves for pines, and for propagation (*cuisse de jardinier*, as M. Bour-sault calls it).
- 56, 56. House and sheds for tools, garden materials, and in-door labours.
57. Stair leading towards the terrace.
58. *Pothos* *variegata*.
59. Basin of water.
60. Pedestals for statues.
61. Main entrance.
62. Billiard-room.
63. Staircase to a small garden library.
64. Coach-houses and stables.
65. Lodgings for the gardeners.
66. Private entrance from the kitchen-court to the garden.

876. The house of *Bel Respiro* (fig. 72.) is situated close to the Barrière de l'Etoile, which forms the entrance to the grand avenue of the Champs Elysées, and is one of the handsomest of its kind in Paris; but the formation of a conspicuous wooden bridge



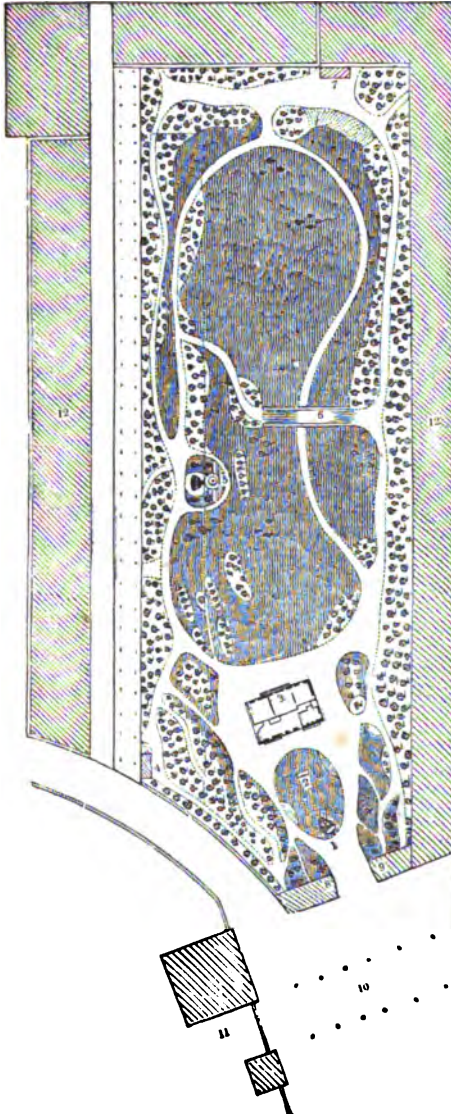
(fig. 74.) in a situation without water greatly injures the expression of the whole garden. The object is a very laudable one, that of joining two high banks by a walk; but that ought to have been done by an inconspicuous rustic stone arch, concealed by creepers and wood. The groups of trees shown in this landscape are entirely artificial; and though the individuals are large, they were all planted in the spring of 1828. The building on the left of the picture is over the well and its machinery; the windmill, on the right, is beyond the boundary of the garden. This property was purchased, the house built, and the grounds laid out, entirely as a mercantile speculation, by a Parisian attorney.



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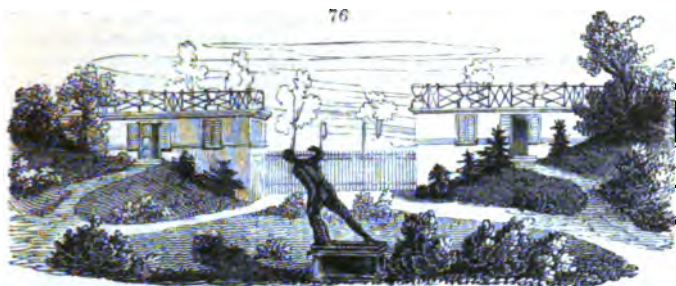


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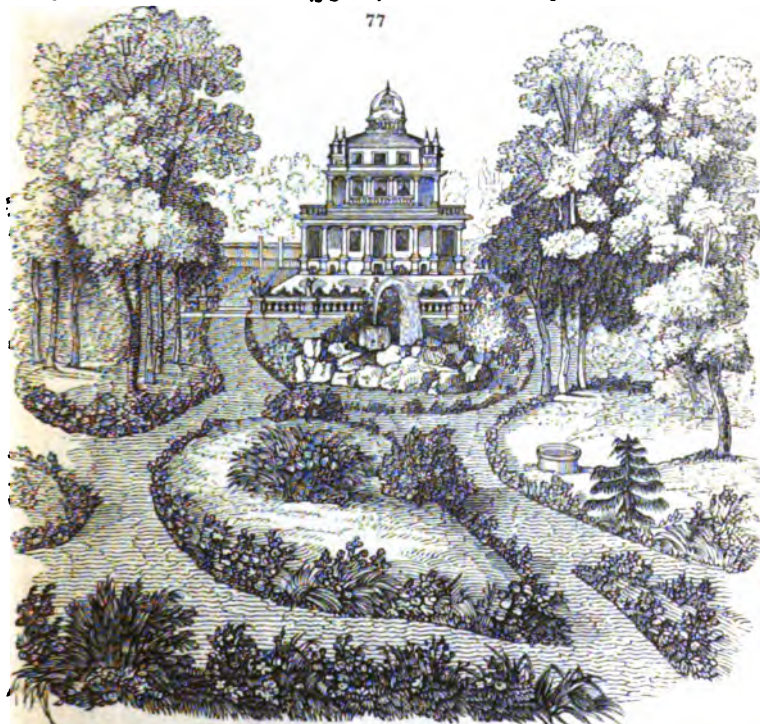


377. *The garden of Bel Spiro (fig. 75.), like other town gardens, is surrounded by buildings. The surface is flat, and of no great extent; but the grounds have been laid out, from the proprietor's designs, with very great care, and at a very great expense. The following are the details: —*

- 1, Rock with a cascade of water; the water brought by tubes from a reservoir, and falling from the rock into a circular basin.
- 2, Bronze figure, in the centre of the grass plot, in the entrance front: it has a good effect looking through the iron gates from the street, and also looking from the house towards the iron gates, serving both to measure or increase the distance, and to enhance the interest of the scene (fig. 75.).
- 3, House.
- 4, Volière (aviary).
- 5, Draw-well, with machinery for raising the water by a horse.
- 6, Wooden bridge.
- 7, Hot-house.
- 8 and 9, Lodge of the keeper, the roof of which forms a terrace, which is ascended from walks conducted on the high banks which surround the garden. These banks are planted so as completely to shut out the surrounding houses.
- 10, Avenue of the Champs Elysées.
- 11, Barrière de l'Étoile.
- 12, Street houses.



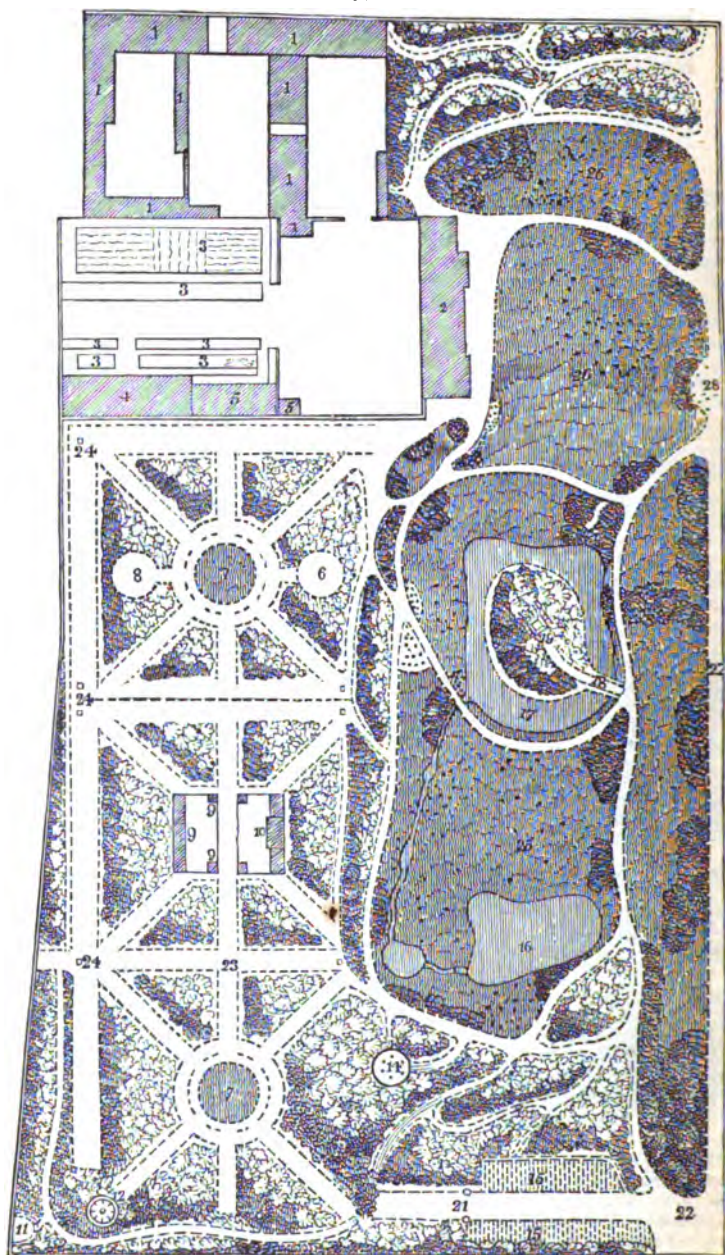
378. *There are numerous small town gardens in Paris, and many houses have gardens of pots on their roofs. In a work entitled *Le Jardinier des Fenêtres*, the author directs how a considerable collection of plants may be grown on the roofs of houses. Not only botany, he says, but many of the operations of gardening, such as planting, sowing, grafting, striking by cuttings, pruning, training, &c., may be thus taught, so as to give persons who pass their youth in towns in acquiring an independency, such a knowledge of country matters as may lead them to retire there, when the objects of their industry have been obtained. There are also town gardens entirely of an architectural character. One of the handsomest of these which we happened to see in 1828, was that of a young architect, who unfortunately spent his whole fortune in creating it. The garden was in a dilapidated state; but the house (fig. 77.) was in tolerable repair.*



379. *One of the most beautiful villas in the neighbourhood of Paris, as far as regards general scenery, and views beyond the boundary, is the park of M. Ternaux, at St. Ouen (fig. 78.). The proprietor is well known as a manufacturer, an agriculturist, and an enlightened and philanthropic man. He is highly esteemed by us, not only as a man of taste, but as one of the warmest advocates for universal education in France. His park is not large, and contains little variety of surface; but it is situated on the high bank of*

the Seine, where that river makes one of its most beautiful bends; and this, with the great extent of varied scenery beyond, are seen to admirable advantage from M. Ternaux's house and grounds. The chief merit of the place consists in the adaptation of the scenery within the boundary, to the most beautiful parts of that which lies beyond

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it; and more especially to the finest parts of the river. For the latter purpose, M. Ternaux has formed two pieces of water (16 and 17) which harmonise with the river, in a manner so striking, as to make it difficult to convey by description a clear idea of the effect produced. This striking and harmonious effect was the more difficult to obtain, from the river being there upwards of fifty feet below the surface of the garden. M. Ternaux, however, fixed on a glimpse of the river caught in the distance, and by the two ponds before mentioned (16 and 17), between which, and the distant water, the eye does not meet with the slightest interruption, not even grass or gravel, the distant reach is in effect brought home to the drawing-room windows. To understand how this is done, it is necessary to know that the pond nearest the eye (17) is full to the brim, and from the house (2) carries on the eye to the farther pond (16), which, being higher than all the trees between it and the boundary, and at the same time brim-full, connects it in perspective with the distant reach of the river. The merit of this arrangement belongs entirely to M. Ternaux, who had no professional assistance whatever. The following are the details of the plan:—

1. Manufactory, storerooms, workshops, stables, and other offices and lodgings for the overseers.
2. Mansion.
3. Kitchen-garden.
4. Orangery.
5. Stable.
6. Place for the cheval de bois (roundabout).
- 7, 7, 7. Plantations of turf, surrounded by lime trees, clipped architecturally, forming airy shady walks.
8. Place for the balançoire (swing).
9. Bergerie (sheep-houses). M. Ternaux has a large flock of marshes, which are housed here every night throughout the year; and every day, when the ground is not covered with snow, as the rain is not excessive, they are taken out, to feed upon, and walk over an extensive tract of common field land, so as to imitate the treatment they receive in Spain. There is also a flock of Cachemire goats lodged with the sheep, and treated like them. M. Ternaux manufactured the finest cloth from the wool of the sheep, and cachemire shawls from the hair of the goats. The flock of goats and the shawl manufactory have, we believe, subsequently been given up.
10. Sheep-houses, with dovecot over.
11. Moon-house.
12. Rustic temple.
13. Rock, with an archway and walk underneath.
14. Chinese temple.
15. Parterre.
- 16 and 17. Ponds connected by a rivulet.
18. Bridge.
19. Rockwork and rustic seat.
20. Artificial spring and rocks. The water that enters by this spring comes from the manufactory (1) to which it is raised from the Seine for various useful purposes.
21. Two Doric columns, surmounted by marble statues.
22. Terrace walk supported by a lofty wall, near the base of which is the Seine. From this terrace magnificent views are obtained.
23. Avenues, chiefly of horse chestnuts, clipped, so as to form columns joined by arches. The soil being dry and gravelly, the trees are very prolific in nuts, which were eaten greedily by the goats, as well as the leaves of the chestnut and other trees, when properly dried, and stacked up for winter use.
24. Seats on pedestals.
25. Lawn sprinkled with shrubs in the natural manner, sloping from 17 to 16.
26. Elevated lawn, planted in the natural manner, and kept verdant and clear in summer by nightly watering.
27. Shady winding walks à l'Anglaise.
28. Point shaded by trees, from underneath which the master-views of the place are obtained.

380. *There are several small villas in the neighbourhood of Sceaux worthy of notice:* All these, as well as the public garden of that place, were formed out of the park of Penthièvres. Next in interest to the grounds of Admiral Tchitchagoff are those of M. Vandermarq: the former depends chiefly on art, the latter on nature. It consists of twenty or thirty acres, with considerable diversity of surface. It was laid out during the consulate, for Mademoiselle Mars, the celebrated actress, by the architect Berthoud, who laid out Malmaison. The place is not without considerable beauties, but it is deficient in small groups; and when we saw it, in 1828, it was, like most other French villas, very badly kept. The villa of the Countess de Bruce is chiefly remarkable for its green-houses and its exotics; that of M. Comte for the architectural remains of the palace of Penthièvres; and that of M. Sartoris is a good deal in the English manner.

381. *The suburban gardens at Rouen are kept in good order, and for the most part contain collections of orange trees;* that of Mr. Pugh, an Englishman, contains a hundred trees, which, in 1823, produced 1400 lbs. of blossoms; which sell, on an average of years, at three francs per pound. The sum produced is supposed to pay something more than the expense of keeping the trees; a circumstance which accounts for the number of orange trees in France. (*Gard. Mag.*, vol. v. p. 499.)

382. *The villa of the Abbé Gossier is in the Rue du Nord, at Rouen. The situation is one of the highest in the town; and from a pavilion on the top of the house are seen the whole of the town, and an extensive reach of the river. The garden contains above an acre, surrounded by a wall, and somewhat varied in surface by nature, but much more so by the art and taste of the abbé. Before the principal front of the house is a small lawn, bordered by groups of trees, which completely conceal the town, and form a varied outline to the sky and the distance. All except this lawn is in the artificial style suited to a walled garden, and consists of terraced slopes, espaliers, hedges, dwarf fruit trees, vines, shrubs, fanciful little railings, and a line of posts and chains. There is an orangery; and among a variety of curious contrivances about the house is a painting of a portière and a watch-dog, which is calculated to surprise a stranger on entering from the street.* (*Gard. Mag.*, vol. v. p. 500.)

383. *The public gardens and promenades of France are numerous and well arranged. Most of the towns, being fortified, have no suburbs; and the instant a rambler passes the barrière, he finds himself in the open and cultivated country. Except in Normandy and some parts of Touraine, there are no hedgerows, or shady fields intersected by paths; consequently very few towns have any country walks. The mildness of the climate makes the people enjoy passing much of their time in the open air, and their social disposition inclines them to congregate together. Public gardens and promenades thus become necessary appendages to every town in France; particularly as the growth*

and beauty of the plants and trees which they contain are not liable to be injured, as with us, by a dense atmosphere loaded with coal smoke: and what can be a greater luxury than to find in the centre of a large city a beautiful public garden, with its open scenes of gaiety and bustle; the distant hum of men heard in the stillness of its thick and shady groves; its lengthened perspectives of trees, vistas, statues, and fountains; its coffee and refreshments; its music and dancing on certain occasions; and, finally, the sprinkling of mind which is thrown over the whole by the scattered stations of those who hire out chairs and periodical literature! It would take too much space to mention even a small proportion of the public gardens in France; but as they all are nearly alike, a few will serve to give a clear idea of the rest.

384. *The principal promenade and public gardens of Paris* are those of the Tuileries and of the Luxembourg; but those of the Palais Royal, Tivoli, &c., may also be reckoned among the number of public gardens, as the Boulevards, the Champs Elysées, and the Bois de Boulogne, may among the promenades.

385. *The gardens of the Tuileries* are invaluable from their situation in the centre of Paris, and from their being open at all times to the public. They have open airy walks for winter, and shady walks and deep yet airy groves for summer; flower-borders, in which a constant succession of showy flowering plants is kept up; lawns, kept green by daily watering; fountains, which however do not play so frequently or so magnificently as they should; and a number of very beautiful statues. During the summer, the principal walks are bordered by lofty orange trees in tubs. (*Gard. Mag.*, vol. vi. p. 430.)

386. *The gardens of the Luxembourg* resemble, in general character, those of the Tuileries; but near the palace they are, perhaps, more ornamented with statues, and with basins of water. A defect which strikes a stranger, at first sight, is the ascent from the platform in front of the palace to the central avenue. This ascent is much too near for dignity of effect. Had it been considerably greater, it would have had a character of its own, and might have proved a feature of interest; as it is, it militates against the idea of freedom of choice as to situation, or of liberty to extend operations on every side; and, consequently, against general grandeur of expression. The avenue is long and flat, and its termination is bad; a commonplace observatory tower in the horizon, backed by the sky. Notwithstanding these disadvantages, the groves, or *bosquets*, as they are called, are good of their kind, and constitute great luxuries in the midst of a crowded city. (*Gard. Mag.*, vol. vi. p. 641.)

387. *The Garden of the Palais Royal*, once called the *Garden of the Revolution* (see the titlepage of *Les Frépugés détruits*, &c.), deserves to be mentioned for the beautiful verdure of its turf, which is maintained by nightly watering during the summer season. The garden itself somewhat resembles those in the squares of London. In the centre is a fountain, which in the time of the Bourbons threw up water in the form of a fleur de lis; but a writer in *Fraser's Magazine*, Jan. 1832, informs us that it is now changed to a plume of feathers. In the centre of the garden is a sundial (*méridien à détonation*), for indicating mid-day by the firing of a small cannon, the gunpowder being ignited by the concentration of the sun's rays.

388. *Tivoli* may be called the Parisian Vauxhall; it is, however very inferior to its London prototype, both in extent and variety. The principal attraction consists in sliding in a car with great velocity down inclined planes called the *Montagnes Russes*. The gardens of Beaujeu, and many others, are of a similar description.

389. *The Guinguettes* are public gardens for the lower orders, and are generally neatly kept gardens, with alcoves, &c., within thickets of young elms. These alcoves are usually complete bowers, cut in the trees, and have each a little table, on which the people take refreshment. The number of each alcove is suspended by a wire from the trees; and almost every garden has a saloon appropriated for dancing and music. (*Gard. Mag.*, vol. vi. p. 649.)

390. *The Boulevards* consist of two belts or zones which encircle Paris, one within the other. They were planted with fine trees of the small-leaved elm, but many of these were cut down during the Revolution of July, 1830. (*Ibid.*)

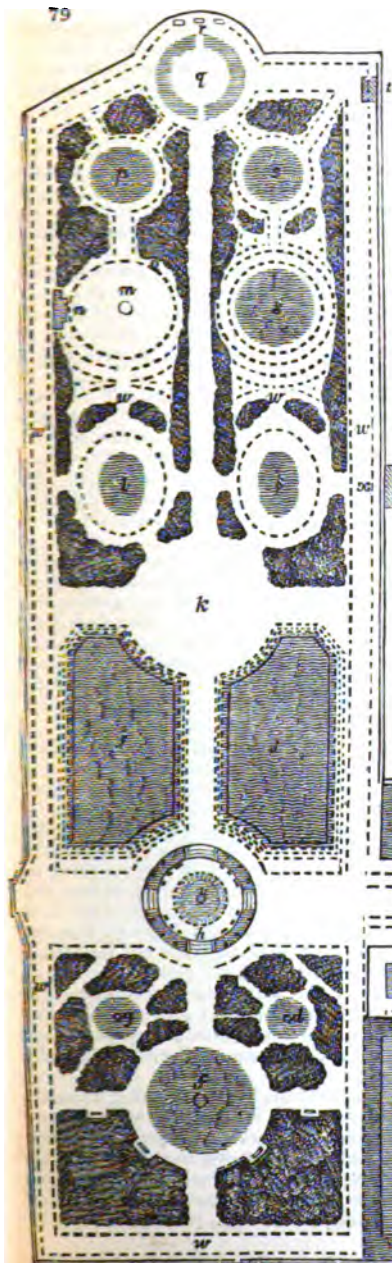
391. *The Champs Elysées* partake of the mingled characteristics of Hyde Park and Kensington Gardens. The ground is planted with trees which are cut into alleys, in various directions. The grand avenue is very fine; the view being terminated at one end by the palace and gardens of the Tuileries, and at the other by the triumphal arch at the Barrière de l'Etoile.

392. *The Bois de Boulogne* (also a kind of grove) is one of the most frequented promenades in the neighbourhood of Paris. It is situated on a flat sandy surface, intersected in all directions by straight roads bordered with trees. Even where the boundary of the wood had found by nature, or by accident, an irregular line, the surrounding trees have been reduced by engineers to lines recognised by their profession. The greater part of the trees composing this wood are of kinds indigenous to France, and are chiefly oak, birch, and hazel, though art has added some species of exotics in different places;

and among these are cedars, different species of pines, and American oaks. The indigenous wood is chiefly undergrowth; and in this there are a number of open glades which form the chief source of variety to the spectator, looking from the straight avenues. (*Gard. Mag.*, vol. vii. p. 5.)

393. *The Garden of Stéans* (a plan of which (*fig. 79.*) we had taken by a Parisian land-surveyor) is situated in the village of that name, about six miles from Paris; and is formed from part of the remains of the grounds belonging to the magnificent

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- a, Porter's lodge.
- b, Kitchen garden of the porter, bordered by flowers and shrubs.
- c, Range of baths.
- d, Circular platform of turf, raised about eighteen inches above the general surface, with a circle of columns supporting an ornamental entablature, and with a handsome antique vase in the centre, all of marble.
- e, Piece of water.
- f, Circular platform of turf, with a marble column in the centre, surrounded by an antique vase.
- g, Platform of turf, corresponding with that at d.
- h, Elevated platform, ascended to by seven steps, with a circular colonnade of clipped lime trees, and a handsome statue in the centre.
- i, Circle of turf, surrounded by a border of flowers.
- j, Parterres of flowers, with a lawn in the centre, the different compartments of flowers separated by walks two feet in width; the beds of flowers about three feet wide. The beds are planted chiefly with roses, pinks, margolds, and China asters, with some georginas and sunflowers.
- k, Circle of smooth sand. In this circle any party bringing their own music may dance in their own way, provided they do not disturb the public peace. Under a pavilion (m), to be hereafter described, the dance must go on according to certain rules agreed on, printed, and published with the approbation of the mayor of Stéans.
- l, Oval of turf, for the swings and roundabouts (*châteaux de bois*, &c.).
- m, Pavilion for dancing, or *grande salle de danse couverte*, 100 feet in diameter, with a column in the centre, on which rest the rafters of the roof, converging from the circumference. Around this pillar, at some height from the ground, are fixed seats for the orchestra.
- n, Coffee-house for refreshments of different sorts.
- o, Place for umbrellas and walking-sticks.
- p, Circle of turf.
- q, Circular area of sand, sunk below the general surface, and surrounded by a sloping bank of turf, with a border of flowers along the upper edge.
- r, Terminal arch, with a handsome statue under it.
- s, Grass-plots, surrounded by lime trees, cut so as to resemble arches, the trunks of the trees representing the columns, and their branches at the height of ten feet the impost, and superincumbent arches terminating in a projecting cornice.
- t, Watercloset (cabinet d'aisance).
- u, Lawn: the boundary wall is here covered with fruit-trees and roses; close under it, there is a border of flowers and another along the outer edge.
- v, Restaurateur.
- w, Rows of lime trees, clipped so as to form arcades in the direction of their length, the thickness of the arch or wall being about two feet, the opening or span of the arch two feet, and sometimes more. It is to be observed that these lime trees do not overarch the wall-like avenues, but merely produce a species of architectural shade.
- x, House, containing chairs and tables, which are set out under the trees during the fine season.
- y, Entrance from the street of Stéans.

château of the Duc de Penthievres, which was destroyed at the first revolution. It is principally resorted to as a place of dancing, on Sundays and other holidays, and is well calculated for that purpose, from the openness of its areas of turf in some places, and of smooth sand in others. There is besides an open pavilion, or *salle de danse*, for use during inclement weather or hot sunshine.

394. *The plan of this garden may be considered a very good representative of all others of the festive kind in France*; for the forms and dispositions of architectural art are but few, and they necessarily produce great sameness when compared with the unlimited forms of nature, or even with the imitations of those forms. But for a festive garden, the variety and intricacy of natural scenery is by no means so well adapted as the simple and determinate forms, and the ample space, of the geometric or architectural style. Hence it is that, by a species of instinct, the result of necessity, this style has been adopted, at least as far as we know, in all the gardens of this description in Europe. (*Gard. Mag.*, vol. vii. p. 1.)

395. *The principal public garden of Rouen contains only about two acres, but it is laid out with great care, and planted with the rarest trees, shrubs, and flowers which can be procured in that neighbourhood.* In 1828, we observed *Magnolia grandiflora*, *conspicua*, *glauca*, *tripetala*, and *acuminata*; *rhododendrons*, *asaleas*, *kalmias*, &c. There was a small green-house placed against the church, in which were kept *pelargoniums*, which are turned out in the borders, and in the groups, during summer, along with balsams and other articles raised in hot-beds. The whole of this garden, notwithstanding the fine plants and flowers which it contains, is open to the public every day. In the most ornamental part of the garden were a basin and fountain, with water-lilies, flowering rush, *sagittarias*, &c., and gold fish; around which was a collection of *chrysanthemums* in pots. Near this was a *parterre* of roses and other flowers, and a sundial (*méridien à détonation*). (*Gard. Mag.*, vol. v. p. 491.)

396. *Promenade and public gardens at Rheims.* "Just out of Rheims," observes Wood, "there is a fine public promenade, planted with several rows of good-sized trees, with many diverging paths; it leads from the highest gate of the town down to the water side, and is really a very pleasant place in itself, and particularly so in a country so generally bare as this is. Beyond the promenade is a public garden called Trianon; here a ball was given one evening, the price of admission to which was two sols: "une mise décente" was essential, but a person might be admitted in a jacket and trousers. (*Letters of an Architect*, vol. i. p. 63.)

397. *The public garden at Strasburg, called the Constadt, consists of three or four acres laid out in alleys, in the ancient style, and planted with catalpas, gleditachias, sophoras, robinias, tulip trees, planes, American oaks, and acers.* The catalpas and gleditachias flower beautifully; and when we saw them, in 1828, were conspicuous from their long seed-pods. The honour of projecting and planting this garden, or, as it may be called, public arboretum, belongs to Professor Hermann, a distinguished naturalist. Connected with the garden is an extensive public orangery, which is used as a coffee-room, and for public meetings, assemblies, and balls. In 1828, the orange trees were most luxuriant, and were finely covered with fruit.

398. *At Lyons there are public coffee-houses and gardens, on ascending terraces from the Rhone, which are much frequented.* They contain orangeries, summer-houses, and Chinese pavilions; and one of them has a saloon 150 feet long and forty feet broad, splendidly ornamented with looking-glasses, &c. (*Duppa's Obs.*, p. 134.)

399. *The public garden at Nismes may be termed an architectural one.* It includes the ruins of the temple of Diana; and a fountain, with a copious spring of delightful water, which supplies the town. "This garden," says Wood, "is the finest thing of the sort I have ever seen. The columns and balustrades which adorn the fountain, and the basins made for the reception of its waters, extend all through it; and there is an abundance of stone seats, vases, and statues. The character of art is nowhere lost, but it is a beautiful character of art, and the more so, because all the parts are consistent, and there is no appearance of pretence or affectation. Every thing is part of one design; whereas, in England, where we have such ornaments, they are too detached, and seem to have dropped from the clouds, rather than to belong to the scene. Even at the Tuileries the principle of distribution is by no means sufficiently apparent; they want more architecture to support them. The trees here are of a good size, and uncut, principally the linden. (*Wood's Letters*, &c., vol. i. p. 152.)

400. *The Place du Peyrou, at Montpellier, is a large square, in a commanding situation, planted with trees, and laid out with straight gravel walks.* In the centre was an equestrian statue of Louis XIV., which was destroyed, when the French hated kings with the same enthusiasm as they had once idolised them. Voltaire was so pleased with this place, that he suggested a plan to arrange the busts of all the illustrious men who had adorned France in the age of Louis XIV., around his equestrian statue, "pour inspirer aux siècles à venir, une émulation éternelle." (*Duppa's Obs.*, &c., p. 36.)

401. *There are several public promenades at Marseilles.* The *cours* is more than a mile in length in a straight line; it is very broad, and has handsome houses on each side, with double rows of large trees before them. Between each of these rows is a carriage road, and the centre forms the promenade. There are stalls among the trees, heaped with fruit and flowers, &c.; and abundance of fountains. (*Carey's Tour*, p. 108.)

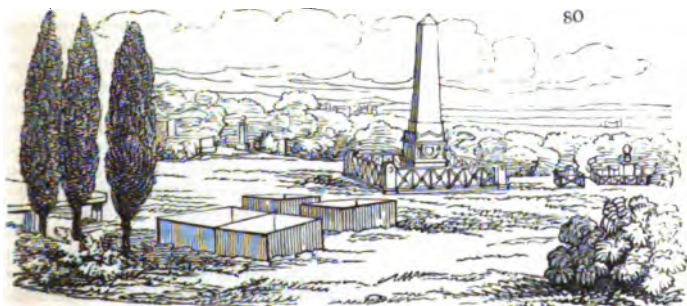
402. *Aix* is remarkable for the fine trees and fountains which adorn its streets. The trees are generally elms, but different from ours, the leaves being extremely narrow, and the branches so long and drooping, that they hang almost down to the ground from the top of the tree, which is of extraordinary height. (*Carey's Tour*, p. 104.)

403. *The public walk at Avignon* winds round the town: outside the town, between rows of trees, there is also a promenade on the bridge, which is very long, extending some distance beyond the bed of the river. (*Ibid.*, p. 94.)

404. *An original description of public gardens* has recently been formed in the neighbourhood of Paris. It is a park and warren for field-sports, supported by subscription, and containing above 6000 acres, partly arable, and partly forest ground. It belongs to a certain number of individuals, as shareholders, who maintain an ample stock of game, secured in preserves, and let out the privilege of shooting to subscribers from September to March. (*Gard. Mag.*, vol. vi. p. 316.)

405. *Garden cemeteries* are not uncommon in France; and if they are not always ornamented with sepulchral vases, monumental statues, and mausoleums, they are, at least, generally planted with trees and shrubs, and have the graves decorated with flowers. The most celebrated of those in Paris is called the Cemetery of Père la Chaise.

406. *The Cemetery of Père la Chaise.* The space walled in contains about seventy acres: the ground originally belonged to a Jesuit, named Père la Chaise, who was the confessor of Louis XIV., and from whom the cemetery takes its name. When an act was passed by the French legislature to prohibit burying within the precincts of towns, this tract of ground was set apart for its present purpose; and it was first used as a cemetery in the year 1804. Between that time and 1832, it is said that nearly 30,000 monuments have been erected in it. "This burial-ground," Haslitt observes, "is tricked out and overacted, as if there were nothing sacred from impertinence and affectation" (*Notes*, &c., p. 111.); and it is certain that the custom which prevails of decking many of the graves with artificial flowers and wreaths of everlasting (*Helichrysum*), dyed different colours, together with the fanciful conceits inscribed on some of the stones, give the whole an air of frippery, which appears very incongruous with the solemn destination of the place. Some of the graves are enclosed with iron palisades, within which grow roses, weeping willows, lilacs, honeysuckles, &c., with a variety of different kinds of flowers; and some of the larger monuments are very handsome (*fig. 80.*). The expense of burying in this cemetery is rather high: about 25*s.* English are paid for a common grave, and ten or twelve pounds required for permission to erect a permanent mausoleum.



407. *The natural or English style of landscape gardening* is neither generally understood nor duly appreciated in France; chiefly, we believe, because the whole kingdom, as far as we have either heard or observed, does not contain a single good example. There is no want of romantic scenery in various districts; but there is almost every where a want of close green turf, of evergreen shrubs, and of good adhesive gravel. These natural defects are aggravated, rather than concealed, by the excess of art; by too many walks; by too many seats and buildings; and by too meagre a distribution of trees and evergreen shrubs. The defects of nature can never be altogether overcome; more especially the want of dark green turf; but we do not object to sanded instead of gravel walks, provided they have not deep harsh edges, and are neither too numerous nor too perpetually serpentine, without real or apparent cause. In general the walks,

in continental imitations of the English manner of laying out grounds, are too close together, and so much alike in their lines of direction, that, in flat grounds more especially, the effect is monotonous. In the park of Madame Cayla (§ 355. fig. 62.), which is on an even surface, and sparingly though scientifically sprinkled with wood, the multiplicity of walks which every where meet the eye of the spectator destroy alike grandeur, richness, and repose. On hilly surfaces, like that of the park of M. Doublat (§ 357. fig. 65.), a greater number of walks in proportion to the actual extent of surface is admissible than on levels; because both the quantity of surface and of wood appear much greater than they really are. The cause of this appearance is, that a rising surface presents a larger angle to the eye than a level one. What aggravates the faults of English gardens in France, is the very slovenly manner in which they are generally kept; extent there, as in England, being more the object of ambition than excellence. There are, however, exceptions, both in regard to the knowledge of the principles of landscape-gardening and the want of order and keeping; and it gives us the greatest pleasure to be able to state our conviction that there are no men in any country more thoroughly imbued with the science and spirit of the art of laying out grounds in the natural or English style than M. Soulange Bodin and M. Gabriel Thouin; nor any places in England more neatly kept than Fromont, Radeput, M. Boursault's garden at Paris, M. Ternaux's at St. Ouen, and that of Admiral Tchitchagoff at Sceaux, were when we saw them in 1828.

408. *The improvement of landscape gardening in France* will proceed rapidly in connection with other improvements; and, above all things, when France and Britain shall be so far assimilated in the price of the necessities of life as to admit of the gardeners and amateurs of both countries visiting each other; not, as at present, for a few days or weeks, confined to the neighbourhood of London, or the neighbourhood of Paris; but for months or years, to be spent in visiting the finest gardens in the provinces. The turf of France might be very much improved by employing a proper selection of grasses, and by previously cultivating and manuring the soil; improved, indeed, to an extent that few could believe who have not seen the effect produced by the mixtures of grass seeds for lawns used by Mr. Sinclair in England, and by M. Vilmorin in France. If the two particulars we have mentioned were attended to, the lawns would be much thicker and closer, and they would by that means retain more moisture in the soil, so as to continue growing, and consequently green, during summer. The same selection of grasses, which we shall give in the proper place (see *Lawns*, Index), will insure a uniformity of growth in lawns and pastures, instead of that coarseness and tuftiness, which is now almost every where common in lawns on dry soils. The recent invention of a mowing machine, which operates better on dry grass than on a moist surface, will also contribute greatly to the improvement of the lawns in France, and in other countries with very dry warm summers; more especially when this machine shall be so much enlarged and improved, as to be worked by a horse. The sands and gravels of France are generally loose, and very disagreeable to walk on: by mixing the gravels with burnt clay pulverised, or the sands with tar, or any oily or greasy matter, they will become hard, so as not to require that continual hoeing and raking which, in their present state, renders them more like ground newly sown with seeds than paths for walking on. Evergreen shrubs do not thrive very well in France, from the great severity of the winters; it is surprising how few there are in the natural woods every where; and the gardens in the neighbourhood of Paris present a dreary appearance during several months every year, for want of what contributes so much to the beauty of those in the neighbourhood of London during the same season. This defect may be remedied by the more free use of the hardier evergreens, such as box, yew, holly, juniper, common and Portugal laurel, butcher's broom, ivy, &c.; of the rapid-growing evergreens, such as the *Ulex*, *Spartium*, &c. (which, if they are easily killed by frost, are easily renewed from seed), and by planting the more tender American evergreens, as rhododendrons, kalmias, vacciniums, &c. under the protection of deciduous trees, in the manner of undergrowths to them. In short, though we cannot altogether agree with the patriotic sentiment of our excellent friend Soulange Bodin (*Annales de Fromont*, tom. iii. p. 96.) in his assertion, that France is pre-eminently the country of landscape gardening, yet we are confident that there is no defect in that country, either natural or artificial, which may not be greatly mitigated, if not entirely removed, by the resources of art.

409. *The improvement which an English landscape gardener may derive from studying the state of his art in France*, is greater than might at first sight appear. By observing the exaggeration of either beauties or deformities, the causes of the pleasure or the dislike that they excite are more easily discovered; and consequently our resources for enlarging the one or diminishing the other increased. Moderation in the use of walks is a lesson taught by almost every French garden; and not less so the use of depth of perspective in most views, whether limited to the interior, or extending across the boundary. In general, all that leads an artist to recognise and appreciate the

minds of others in their works, has a tendency to lead him to infuse a superiority of mind into his own.

SUMMARY. 2. French Gardening, in respect to the Culture of Flowers and Plants of Ornament.

410. *A taste for flowers was introduced to France from Holland, after that country had established commercial relations with the Levant and the south of Europe. (Deleuze, Recherches, &c.)* Charlemagne loved gardens, and was most particular in giving directions to his gardeners. In his *Capitularium de Villis et Curtis*, which he must have written about the end of the eighth century, he enumerates the sorts of plants which he desires may be grown in all his gardens. This list, however, excepting the rose and the lily, is entirely culinary and medicinal.

411. It was in the *thirteenth century* that ornamental plants began to be introduced to France as such. The crusades had brought to notice the gardens of the infidels in Egypt and Syria; the Christian invaders, who could not avoid being struck with their beauty, imitated their plans, and imported their productions into Europe.

412. *The sixteenth century*, however, had arrived before the culture of flowers was attempted. Botany now began to be considered a science, independent of medicine. Gardens were constructed, destined for curious and beautiful plants; and the discovery of America and the passage to the Indies augmented their number. Travellers collected seeds, which they sent home to their respective countries; great care was bestowed on such as appeared the most ornamental; of some flowers double varieties were produced, and the colours and size of others varied by culture, till, advancing by degrees, they at length became an object of luxury; and trade and caprice, fashion and variety, gave incredible prices for some of these productions: for in what, observes Deleuze, will extravagance not intermingle? Henry IV. had a taste for flowers: his gardener, Jean Robin, published a catalogue of plants in 1610, in which the passion-flower and crown imperial are mentioned; the former as newly imported, and the latter as rare. In 1635, the varieties of tulips, ranunculuses, and anemones, in the *Jardin des Plantes*, exceeded that of the species in 1800. Evelyn mentions, in 1644 (*Memoirs*, vol. i. p. 52.), a M. Morine, who from an ordinary gardener had become one of the most skilful persons in France; who had a rare collection of shells and flowers, and above 10,000 sorts of tulips alone. This florimania seems to have declined, and given way to a taste for exotics, during the reigns of Louis XV. and Louis XVI.; and this taste has ever since continued to prevail.

413. *In the time of the directory and of the consulate*, preparations were commenced for establishing a general system of botanic gardens throughout France; but time did not permit the execution of the plan. Improvements, however, were made in the *Jardin des Plantes*, and in that of the *Petit Trianon*; and the garden of Malmaison was established.

414. *During the empire*, a number of botanic gardens were formed in the provinces; and something like a general system of correspondence was established between them and the Paris garden. The latter garden was, during this period, carried to a high degree of perfection, under the direction of Professor Thouin: it was liberally supported, and kept in admirable order. The constant wars in which the country was engaged during this period, almost prevented the introduction of new plants; and the culture of flowers and plants of ornament was very little attended to by any part of society throughout the country. With the exception of the gardens of M. Boursault and M. Fouchiron, and perhaps one or two others, none of those now eminent for botany, or floriculture, date from a period earlier than the Restoration.

415. *With the restoration of the Bourbons*, in 1814, commenced the introduction of immense quantities of rare and new plants from England; and a great stimulus was thus given to botany and floriculture throughout France. The flower market, which was established during the empire, now displayed in abundance plants formerly considered rare; and the number of commercial florists increased in proportion. The Paris garden, however, has declined since this period, from a diminution of the funds allowed for its maintenance. Private gardens, on the other hand, have rapidly improved both in botanical riches and floral beauty. We shall notice some of the principal gardens devoted to botany, or the culture of flowers; and commence with the public botanical establishments.

416. *The study of botany* began to be cultivated in France at an early period, and has since attained great consideration in that country from the labours of Tournefort, Vaillant, Adanson, the Jussieus, Richard, Mirbel, Kunth, and De Candolle. The first botanic garden was formed in 1597, at Montpellier, in Henry the Fourth's reign, through the representations of Bélon. In the following year it contained 1300 distinct species, the greater part gathered in the neighbourhood.

417. *France, in respect to botany*, and indeed natural history in general, may be truly called the cradle of science. She has long been celebrated for the number and import-

ance of her public botanical institutions; and for the deep interest which her government has taken in the prosecution of every department of natural history. From the days of Tournefort, there has scarcely been an expedition of discovery undertaken from France, to which a botanist has not been attached, with ample means of prosecuting his pursuit. Resident botanists and collectors have been placed in every colony belonging to the French government, whose foreign possessions have scarcely been less assiduously investigated than its provinces at home. The voyages of Commerson, of Michaux, of Olivier, of Labillardière, of Du Petit-Thouars, of Lechenault, of Bory de St. Vincent, and of a host of other scientific travellers, and the large collections formed by Dombey, Aublet, and others of less note, have supplied the French botanist with stores of knowledge more ample than have been possessed in almost any other country. The importance of these is shown by the extent of the advantage derived to the French botanists by the acquisition of them; by the multitude of new genera and species with which the publications of Jussieu, Lamarck, and their successor, Desfontaines, and more recently of Decandolle, are replete. Of private means applied to the prosecution of investigation in natural history, the expedition of Humboldt to South America is a splendid example. The various scientific publications in illustration of its results are a noble monument of the zeal and knowledge, and well applied resources, of the most illustrious traveller now existing. The public botanical gardens of France are numerous: but, with the exception of those of Paris and of Montpellier, have not much celebrity. That of Montpellier, which has successively been under the direction of Magnol, Gouan, De Candolle, and Delile, all botanists celebrated in their day, has acquired a high degree of reputation. The *Jardin des Plantes*, at Paris, is also an establishment of great celebrity, and numbers of the rarest plants have been reared within its walls. (*Gard. Mag.*, vol. i. p. 48.)

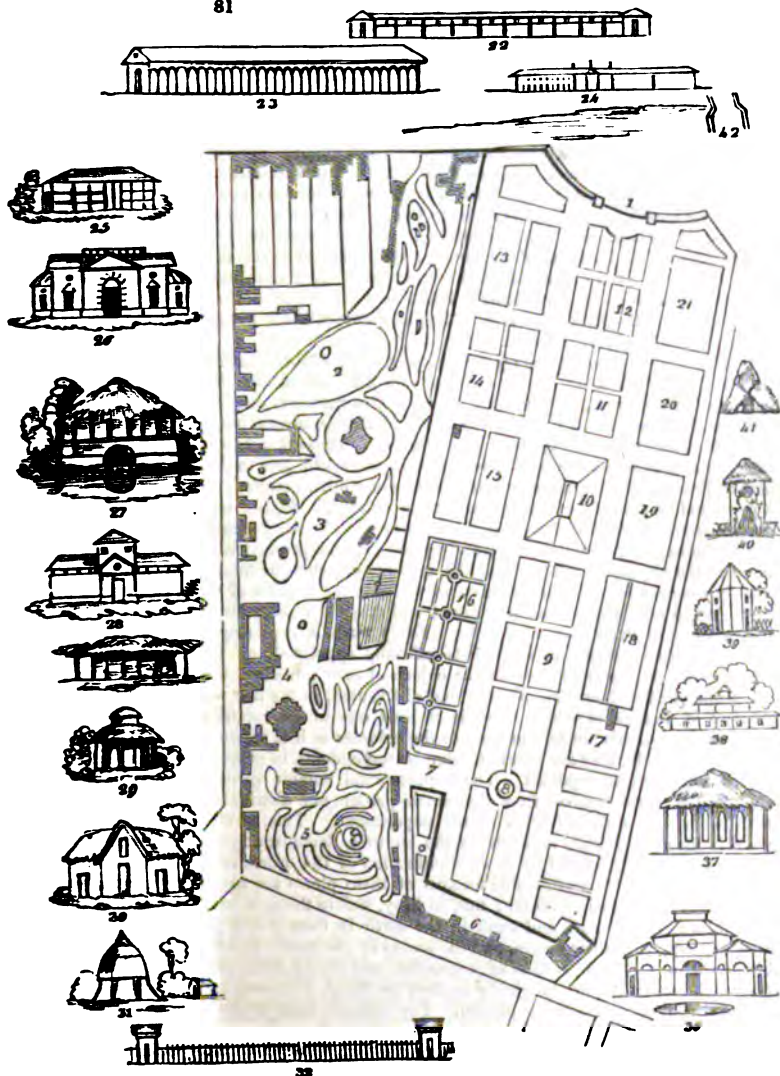
418. *The garden of Paris (Jardin des Plantes)* was founded by Louis XIII., in 1610, and finished in 1634; after, as La Brosse, the first director, remarks, "eighteen years of prosecution and six of culture." The subsequent history and description of this garden, at different epochs, are given by Adanson, Jussieu, and Thouin.

419. *A plan of the Jardin des Plantes* has been given by G. Thouin, in his *Plans Raisonnés des Jardins*, which contains not only the ichnography of the garden (fig. 81. 1 to 21), but in the margin are placed elevations (22 to 42) of the houses in which the living animals are kept; of the immense buildings in which the museum of natural history is contained (24), and of the hot-houses (23) and entrance gates (32). The entrance to the garden is through a handsome iron railing, between lodges (1 and the elevation 32), opposite the Bridge of Austerlitz (42). On the left is the menagerie, commencing with the ferocious animals, in a long building, with wings and a fore court; and next in order is a number of small irregularly-shaped enclosures of pasture, covered by trees, each devoted to one genus of animals, and containing a building in the centre for their repose or shelter (2 and 3). Passing these, we arrive at the dwelling-houses of the professors of natural history; and the large amphitheatre (4, and elevation 26), in which the lectures are given. Here is also the hot-house department (7, and elevation 23), with a sunk area in front, for pots and frames; a space called the seed-garden for raising seeds, and for nursing them till they flower. Adjoining is an artificial mount, crowned with a kiosque (5), which overlooks not only the whole garden, but great part of Paris; it contains a sundial, which, by means of a lens, is contrived to discharge a cannon every day at noon. The museum of natural history is a large building at the upper end of the garden, exactly opposite the entrance (6, and elevation 24); it is separated by a handsome low wall and iron rails from the open garden, which consists of 36 plots, enclosed by lattice-work from the walks, which are at all times open to the public. These plots contain specimens of the mode of propagating all herbaceous vegetables, all trees and shrubs (8) — a department which is particularly rich in specimens of grafting and inarching (9); a large basin for aquatics, and aquatic birds and reptiles, situated at the bottom of an excavation, more than ten feet below the level of the general surface of the garden (10): the sides of this excavation are planted with marsh trees and shrubs. The next divisions consist of florists' flowers, arranged according to their colours and times of flowering (11); medicinal plants (12); illustrations of the operations of agriculture on plants, as the different kinds of hedges, live fences, rows, &c. (13); all the sorts of fruit trees, vines, and fruit shrubs, which grow in the open air in France, with different modes of pruning and training them (14); all the sorts of vegetables used in rural economy throughout Europe, the more tender sorts, as the *Convólulus Baidtas*, being protected early in the season by glass (15). The general arrangement of all the plants grown in France, tender and hardy, occupies ten plots (16); the classification adopted is that of Jussieu. The tender species are brought from the hot-houses in June, and plunged in their places in the beds, where they remain till September; the hardy tree and shrub kinds are kept dwarf by pruning, and brought into flower by ringing. The different sorts of annual plants,

and the mode of raising seeds of every kind, are displayed in a large plot (18). There is a general arboretum (17); one of winter or evergreen trees (19); of trees in perfection in autumn (20); of summer trees (21); and of spring trees.

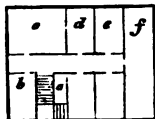
420. *The principal buildings* are the menagerie for ferocious animals (22); the conservatory (23); museum (24); lodge for East India deer (25); lecture-theatre (26); near which is situated the office of administration for the garden; retreat for buffaloes (27); stable for the *Equus* tribe, with pigeon-house over (28); merino and other sheepcots (29); cot for goats (30); for camels (31), for elephants (36), for foreign oxen (37), for red deer (38), for the dromedary (40), for packing plants (41), and for a public coffee and milk house, situated at the base of the mount (38). There is a restaurant in the spring arboretum (21), also a number of other buildings of less note; and so complete is this establishment, that in some of the areas destined to show certain branches for culture, there are lodges containing specimens of all the imple-

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ments in use in that branch. (*Annales du Musée ; Royer's Descriptive History of the Paris Garden.*)

421. In the office of administration, which is remarkably complete, is the botanical cabinet (fig. 82.), thus described in the *Horticultural Tour*:—"In the staircase (a) is preserved a tall palm stem from South America, which had been naturally clasped in a very extraordinary way by some line or twining shrub, and evidently strangled by the deeply indented grasp of its invader. Professor Desfontaines's working-room (b) adjoins, and next, the working-room for the professor's assistants (c). Here a respectable looking female was now employed in fixing dried specimens of plants to sheets of white paper, after they had been arranged for that purpose by Professor Desfontaines. There



is a room (d) appropriated to the keeping of the specimens of dried plants. They are contained in close presses, and so accurately and conveniently arranged, that the specimens composing any particular genus can be produced for examination the moment they are called for. Another (e) contains specimens of wood of very many species of trees, we believe of almost all that are figured in the quarto volume published by Sepp, of Amsterdam, and edited by Dr. Houttuyn, and of many unknown to these laborious Dutchmen. The samples are in general smoothed with the plane, the better to display the grain, and the extreme beauty of some kinds. A vase, nicely formed out of the stem of a date-palm, is a curious object: it is about a foot and a half in diameter, and somewhat more in height. A large apartment (f), extending the whole breadth of the building, contains the seeds and seed-vessels of plants, with specimens of vegetable products in general. In the same room several commodious presses and drawers are appropriated to the reception of the seeds saved in the garden from the more rare or tender plants, particularly those of only annual duration. We may add, that the great attention paid to this part of the business of the garden; the saving of seeds, and keeping them in the nicest order, received our unqualified approbation. A glazed frame, containing numerous skeletons of leaves and flowers, had a very pretty and unusual effect. Fronds of the great umbrella-palm of Ceylon (*Corypha umbraculifera*) decorate the ceilings of two of the rooms." (*Hort. Tour*, p. 353.)

422. As a school of botany and vegetable culture, the *Jardin des Plantes* was made what it is by the late Professor Thouin, during the first years of the consulship. Speaking with reference only to what concerns plants and their culture, this garden is unquestionably the first establishment of the kind in Europe. We have in Britain several botanic gardens, but none maintained for the same objects as that of Paris. These objects are two: first, to collect useful or remarkable plants from every part of the world, and to distribute them to every part of France, and, as far as practicable, to every other country; and, secondly, to form a perpetual school of botany and vegetable culture. Plants are brought to the Paris garden from all countries, by a universal correspondence; by particular naturalists sent out at the expense of the nation; and by the general protection and favour of government to the objects of science and the pursuits of scientific men. Objects of natural history destined for the Paris garden, in whatever description of vessels they may arrive in a French port, pay no entrance duty; and they are mostly forwarded by government conveyances to Paris free of expense. Every warlike, exploring, or commercial expedition, is accompanied by naturalists officially appointed, or voluntarily offering, to whom every facility is afforded in the objects of their pursuit. Plants received in Paris are propagated without loss of time, and distributed, in the first place, to all the botanic gardens of France, of which there is at least one in the capital of every department; next, seeds or plants are sent to such of the colonies as it is supposed may profit most by them; and, lastly, they are sent to foreign correspondents, in proportion to similar favours received, or returns expected. The departmental botanic gardens propagate with all rapidity the plants received from the central garden, and distribute them among the eminent proprietors and cultivators of the department. This, at all events, is remarkably good in theory. Botany is taught by the lectures, demonstrations, and herborisations of a professor, and illustrated by an exemplification of 124 orders of the Jussieuan system in living plants. A considerable number of these plants are necessarily exotic, and are kept under glass during winter; but, in May, before the demonstrations begin, they are brought out in the pots, and sunk in the earth in their proper places in the systematic arrangement, with their names, and the names of the orders to which they belong placed beside them. The cultivation of vegetables, and all the different operations of agriculture and gardening, are taught by another professor, with assistants, and exemplified by different compartments in the garden. For instance, there is one compartment in which all the different operations on plants, and on the soil, are exemplified, from the different modes of preparing the soil for sowing or planting, through all the species and varieties of propagation, training, and pruning, even to hedge-growing and fence-making: another compartment contains all the plants of field culture; another all the medicinal

plants; another all the principal timber trees; another, as far as practicable, all the fruit trees. Specimens of the different implements are kept in one building, and of the different soils, manures, and composts in an appropriate enclosure; and so on. The essence of the lectures, accompanied by figures, of such of the implements and operations as admit of representation by lines, will be found in *Thouin's Cours de Culture et de Naturalisation des Végétaux*, by his nephew, Oscar Leclerc, 3 vols. 8vo, with one quarto volume of plates; and a complete description of the garden is given in the well known work of Royer. (*Gard. Mag.*, vol. vi. p. 385.)

423. *The botanic garden of the Trianon*, according to Deleuze, was established by Louis XV., at the suggestion of the Duc de Noailles, for the display of exotic trees, and a general collection of plants, for the amusement of the royal family. Here B. de Jussieu disposed, for the first time, the plants in the order of natural families. The botanic department of this garden was, in 1828, in a state of neglect.

424. *The botanic garden of Malmaison*, in the time of Josephine, was among the richest in Europe. Various botanical collectors were patronised, some jointly with Lee of Hammersmith. The seeds brought home by the navigator Baudin were here first raised, and described by Ventenat in the *Jardin de la Malmaison*, in 1803. In 1819 Bonpland published the first volume of *Plantes rares cultivées à Malmaison*, which ruined him, and compelled him to seek an asylum in America. This garden, though comparatively neglected, contained, when visited by Neill, in 1817, some fine exotic trees as standards in the open ground, and protected in winter by movable houses. Among these were *Magnolia grandiflora*, and an orange tree as large as they grow in Spain. In the hot-houses were many fine exotics, and the original bulb of that splendid plant *Brunsvigia Josephineæ*; which, in 1817, measured two feet and a half in circumference, and produced a head of flowers three feet and a half in diameter. The hot-house contained a rock-work covered with exotics, and watered by a concealed pipe. (*Hort. Tour*, p. 403.)

425. *The botanic garden of Alfort* contains the remains of what has been a tolerably complete arboretum; a more extensive collection of hedge plants and specimens of live hedges than that of the *Jardin des Plantes*; a grass ground containing patches of several yards square of all the principal grasses, including the cultivated corns; and another compartment for large patches of the leguminous plants in field culture, the oil plants, and plants for clothing, cordage, dyeing, &c. Most of these are now run wild, and a great many of the examples of annual plants are wanting. There were at one time here, we were told, upwards of 150 sorts of potatoes, and a great many fruit trees: in 1828 several acres were under a potato crop, as a matter of profit. Close to the college, which is a large building, and was formerly, if we do not mistake, a convent, is a small systematic botanic garden, representing, perhaps, fifty of the Jussieuan orders. (*Gard. Mag.*, vol. v. p. 391.)

426. *The botanic garden of Rouen* contains nearly two acres, and is entered from the south, which is always a fortunate circumstance in a garden containing hot-houses; because, on entering, the glass meets the eye instead of the back sheds. The plants are arranged according to the natural system. There is an *Acacia Julibrissin* twenty feet high; and here the hybrid *Syringa chinensis* var. *rothomagensis* was first raised by M. Varin, the predecessor of M. Dubreuil, the present director. M. Marquis, the professor of botany, gives lectures in the green-house, and herborisations in the surrounding country. (*Gard. Mag.*, vol. v. p. 498.)

427. *The botanic garden at Orleans* is small, and situated on a poor sandy soil, exposed to the meridian sun. There are some hot-houses and pits, and a considerable collection both of hardy and house plants. Here *Poinciana pulcherrima* has been found to stand the winter in the open air for several years; and *Sterculia platanifolia* against a wall has attained the height of thirty feet, and ripens seed from which young plants have been raised. (*Annales d'Hort.*, vol. iv. p. 311.)

428. *In the botanic garden at Metz*, the *Anona Cherimolia* has been fruited in the stove, though it has not yet produced fruit in England. It grew in a pot about a foot in diameter, was crowded by other plants, and drawn up to the height of ten or twelve feet, when it produced fruit on its summit. (*Gard. Mag.*, vol. v. p. 68.)

429. *Among the botanical amateurs in the neighbourhood of Paris* may be enumerated M. Foulcheiron, M. Hamelin, M. Boursault, M. Soulange Bodin, and the late Baron Pappenheim. M. Foulcheiron devotes his attention to the palms, of which he has by far the best collection in France, and some specimens of a considerable height and great beauty. M. Hamelin devotes his attention exclusively to exotic bulbs, and is particularly rich in *Amaryllideæ*. M. Boursault has by far the richest collection of exotic plants of any private or public establishment, unless we except that of the *Jardin des Plantes*. The collection of M. Soulange Bodin, though chiefly made with a view to commerce, is yet very considerable. The late Baron Pappenheim devoted his attention chiefly to acclimating half-hardy trees and shrubs; and he succeeded in forming, on his estate of Combe-la-Ville, a collection of more than 4000 species of hardy plants, of which he was going to

print a very interesting catalogue, when he was lost to botany. As to M. Boursault, he is as well known at London as at Paris, by his enlightened taste and the magnificence of his collection. It is in his garden alone that the *Telœpea speciosissima* has been seen in France. The *Laërus Cinnamomum*, cinnamon tree; the *Garcinia Mangostha* and the *Ardisia paniculata*, have produced with him flowers and fruits. He possesses, without doubt, the finest *Areucaria excelsa*, Brazilian pine, in Europe. The large plants of *Magnolia grandiflora*, which border his walks, bring their seeds to perfect maturity. (*Gard. Mag.*, vol. ii. p. 223.)

430. *The amateur cultivators of plants in the provinces* are necessarily less generally known than those of the capital. M. Prevôt, fils, at Rouen, is a commercial amateur; as is M. Hodel at Strasburg. M. Durant, at Metz, is a cultivator of rare and curious hardy trees and shrubs. M. Filhe, at Hières, cultivates Cape plants and orange trees. M. Audibert, at Tonelle, though only a nurseryman, possesses the most complete general collection in that part of the country. M. Marsellin Vitellart, of Mons, cultivates a collection of orange trees of which he has 150 species and varieties. M. Leprince de Claircigny is considered the father of amateurs in the department of the Sarthe. He has three hot-houses, one of which is 100 feet long and 14 feet wide. In 1801, his collection was considered second only to that of Boursault at Paris. M. de Montbron has formed a collection of American and other hardy trees, at Clervaut, near Châtelleraut, of which a descriptive list is given in the *Annales de Fromont*, tom. iii. p. 52. A considerable number of rare hardy plants, and especially trees and shrubs, are cultivated in the gardens at Neuilly, and descriptive notices of some of the more rare of them will be found in the *Journal des Jardins* for 1828.

431. *The acclimatizing of trees and shrubs* was attempted on an extensive scale by the late Baron Pappenheim, at Combe-la-Ville, on the Yèrre, not far from Paris; and the plantations of the father have been continued by the son. The situation is on a high bank, facing the north, and sloping down to the river. The late baron commenced his experiments in 1819, assisted by his very intelligent gardener, Mr. Cappe. On the sloping bank he planted all the magnolias, several camellias, including the green tea; *Illicium floridanum*, *Olea europæa*, *Andrœmeda arborea*, *Araucaria*, *Cunninghamia*, *Photinia*, *Eriobótrya*, and a number of similar trees and shrubs; all of which had, when we saw them, in 1828, resisted the severity of the preceding nine winters, with no other protection than dry leaves laid about the roots, straw tied round the stems, and with the branches in some cases wrapped up in mats. A list of the species, with the treatment given to each, and its effects, will be found in vol. viii. of the *Gardener's Magazine*. It may here be observed, that though the climate of the neighbourhood of Paris is more severe than that in the neighbourhood of London, yet, the air being drier, plants enveloped in leaves, straw, or mats, are much less apt to damp off, when so treated, in the former district, than in the latter.

432. *The floriculture of France* is decidedly inferior to that of Britain; and it is still more so, when compared with that of Holland or Germany. The cause, however, is not to be found in any deficiency of skill in the practical gardeners of France, but in a want of demand for first-rate floricultural productions. The great wealth of the landed proprietors of England has called forth extraordinary exertions in the forcing department of floriculture; and the commerce of Holland has occasioned similar exertions to be made in that country in the culture of bulbous roots. The German gardeners have been compelled to cultivate the art of producing flowers in the winter season, to satisfy the demand created by the fondness displayed by many of the German princes for gardening and botany; and this, considering the difficulties of climate to be contended with, requires perhaps greater skill than forcing flowers in England. The germs of the same skill exist among the gardeners of Paris, who supply the flower-market, and they will be gradually called forth as the citizens increase in wealth and taste.

433. *The system of botanic gardens in France* is superior to that of every other country. The Paris garden serves at once as a perpetual school of botany and vegetable culture, and as a reservoir for the reception of new discoveries in botanical and horticultural science, and of new plants from every country in the world. In every department of France there is a botanic garden, situated in or near the largest town; which serves the same purpose for the department that the Paris garden does for the whole of France, and, indeed, for all the rest of the world. These departmental gardens receive whatever it is thought can be of use to their department from the garden of Paris, as soon as it has been rendered sufficiently abundant there, and have each a director, who gives lectures on botany and general culture, and whose duty it is to solve all the botanical, horticultural, and agricultural difficulties of the district. This system is at all events very perfect in theory, and we are not aware that it has been yet found defective in practice. The cause of the slow progress of science in rural matters in many of the departments of France is to be attributed to the general ignorance which prevails among cultivators, rather than to any defect in the system itself.

434. *The improvement which an English gardener may derive from the study of the floriculture of France* is chiefly, we think, in the preservation of plants through the winter. Nothing can be more striking in this branch of the art, than the shutting up of orange trees, camelias, and other evergreens, not even excepting some descriptions of heaths, in barn-like buildings, or even cellars under ground, for three or four months, without once admitting air during the whole time; with little or no light, with no artificial heat, and without water. The plants remain during this period in a completely dormant state; and when gradually inured to light, air, and water, in spring, they appear to suffer no injury whatever; but, if too suddenly exposed to the influence of these agents, they are apt to drop their leaves. The secret of this perfect preservation, under such apparently unfavourable circumstances, lies in the dryness of the air of France, and in the gardener having previously, by withholding water, matured the growth of the leaves, and ripened the wood; in short, in his having reduced the plants to a dormant state before housing them. We are persuaded that more might be done in this way in England than is generally attempted; though our moist atmosphere will probably ever prevent us from carrying it to the same extent as is done in France. We certainly think that provincial botanic and horticultural gardens, connected with a central one in London, would be useful in England, as they would tend to diffuse both a taste for and a knowledge of botany and vegetable culture; though they are less wanted in a country like England, possessing a wealthy aristocracy, with rich and extensive gardens at their country residences all over the empire. Were the landed property of Britain more equally distributed, and were the laws relating to it similar to those of France and America, we should then say that the system of botanic gardens adopted in France would be of essential value in England. In the mean time the arrangement of the plants in the French botanic gardens, according to the natural system, deserves imitation in those of England.

435. *Herb or physic gardens* are more common in France than in Britain. Plants form a much more important part of the *matéria medica* of the hospitals and French physicians than in this country, and their use is very popular among the lower orders. The herbarists of Paris occupy a particular lane, where they offer a great variety of dried plants for sale.

SUMMARY. 3. *French Gardening, in respect to its Horticultural Productions.*

436. *The hardy fruits of France* exceed in number those of Britain, by the olive, the fig, the jujube, the pomegranate, and a few others little cultivated. Nature, Professor Thouin observes (*Essai sur l'Exposition, &c. de l'Economie Rurale*, p. 55.), has only given to France the acorn, the chestnut, the pear, the wild apple, and some other inferior fruits. "Every thing else which we have, agreeable or useful, is the product of foreign climates, and we owe them in great part to the Phœnicians, Greeks, Carthaginians, Romans, and Saracens." The less ancient acquisitions are those of the crusades, or of accidental travellers. The vine, the peach, the fig, the mulberry, the cherry, and the olive were doubtless introduced to France by the Romans; the orange by the Italians; and the pine-apple by the Dutch. Apples, pears, and plums are the fruits recommended for cultivation by Charlemagne, in his *Capit. de Villis*, &c., prepared about the end of the eighth century, and referred to by Montesquieu as a *chef-d'œuvre* of prudence, good administration, and economy. The Abbé Schmidt informs us (*Mag. Encyc.*) that this monarch, who had domains in every part of France, gave the greatest encouragement to the eradication of forests, and the substitution of orchards and vineyards. He was on terms of intimate friendship with the Saracenic prince Haroun al Raschid, and by that means procured for France the best sorts of pulse, melons, peaches, figs, and other fruits. He desires that fennel, rosemary, sage, rue, wormwood, and above sixty other pot-herbs and medicinal plants, should be cultivated: one of these, which he calls *anthyllis* (thought to be the house-leek) was to be planted before the gardener's house, probably as being a vulnerary herb.

437. *Early in the sixteenth century*, it would appear the French had at that time all the fruits now in use, excepting the pine-apple. (*Oliv. de Serres*, and *Steph. and Lieb.*). Some remarks on the state of horticulture at the end of this century are given by Bénéard (*Mém. de la Soc. Agr. du Seine et Oise*, 1801) and L. Deslongchamps (*Bon Jard.*, 1817-18). Blaikie informs us that about 1779 only three sorts of melons were grown in France; viz., the netted or *Maraiche*, and two large sorts of poor flavour. Blaikie introduced the cantaloupes, which are now the prevailing sorts. The pine-apple has never been successfully cultivated in France: it becomes sickly from exhalation, and produces small fruit, as in Italy. But France excels all other countries in pears and plums, and produces excellent peaches.

438. *The culinary vegetables of France* do not appear to have been increased from the earliest period of horticultural history, with the exception of the sea-kale and the

potato. In consequence of the greater warmth of the summer, the French horticulturists can produce crops in the open air, which in Britain require the assistance of glass; but the greater severity of winter in France renders the open air vegetables scarcer at that season than they are in England. Melons are grown in the open air under hand-glasses, as cucumbers are in Britain, as far north as Honfleur on the Seine. (*Gard. Mag.* vol. v. p. 241.) Grapes are brought to great perfection in the open air at Fontainebleau, by a particular mode of planting, and training against low mud walls, which we shall describe hereafter. The sweet potato, *Convolvulus Batatas*, is cultivated in several gardens in the neighbourhood of Paris, and the tubers are sold in the market and in the fruit shops. It is also cultivated in the south of France, where the shoots and leaves are reckoned excellent forage for cows and horses, and are also used as greens and spinach. In salading and legumes they far excel most countries; but in the cabbage tribe, turnips, and potatoes they are inferior to the moister climates of Holland and Britain.

439. *A sort of forcing seems to have been commenced in France towards the end of the sixteenth century.* Cherries were ripened at Poitou by artificial heat in the sixteenth century, by laying hot limestones on the ground under the trees, and by watering the ground with hot water. The fruit was obtained by the 1st of May, and sent to Paris by post. In the following century, peas were sown in boxes, set in the sunshine in the daytime, and kept in the gardener's room in the night. They came to maturity about the same time as the cherries; and in a letter dated 10th May, 1706, Madame de Maintenon speaks of new peas as a rarity, which had been the principal talk at court for four successive days. (*Théâtre d'Agr. d'Oliver des Serres*, edit. 1804.) Bénard informs us, that arcades open to the south were first erected in Henry IV.'s time, for accelerating the growth of peas at St. Germain en Laye; and that, in the end of the reign of Louis XIV., Fagon, at the Jardin des Plantes, constructed some hot-houses with glass roofs, which he warmed with stoves and furnaces, for the preservation of tender plants; and which gave rise to all the hand-glasses, frames, and hot-houses subsequently erected in France. Melons and early cucumbers had been hitherto grown on beds of dung, and covered at night with loose straw; early salading was raised in pots and boxes, exposed to the sun during the day, and placed in sheds or arbours during the night. But Richard Senior, observing what Fagon had done, built for himself at St. Germain, and afterwards for Louis XV. at Trianon, hot-houses, in which were seen, for the first time in France, peaches, cherries, plums, strawberries, bearing fruit in the depth of winter. In the *École Potagère*, written about the year 1750, are the details relative to these buildings.

440. *French horticulture received a great accession of theoretical and practical knowledge from the writings of Quintinye.* Jean de Quintinye was born at Poitiers, in 1626, put to school among the Jesuits, took lessons in law, and afterwards travelled to Italy with Tambonneau. Here his taste for agriculture began, or greatly increased. He applied to its study as a science; and, on his return, Tambonneau committed his gardens to his care. He attracted the attention of the court soon afterwards, and was made director of several royal gardens during the reign of Louis XIV. He laid out a *jardin potager* of thirty acres at Versailles; the inhabitants of which, Neill observes, seem to have imbibed from him a taste for horticulture and botany; the "confrères de St. Fiacre," (the tutelar saint of horticulturists), or gardeners' lodge, held here, being the oldest in France. (*Hort. Tour*, p. 414.) Among other works, Quintinye wrote *The Complete Gardener*, translated by Evelyn, and abridged by London and Wise. He died in 1701. After his death the king always spoke of him with regret, and, Switzer says, assured his widow that the king and she were equally sufferers. Quintinye, in his work on fruit trees, has developed a system of pruning which surpassed that of any previous author. Before his time, the culture of wall or espalier trees, though ably treated of by Le Gendre (Arnauld d'Andilly), often referred to by Quintinye, was little attended to; gardens had been generally surrounded by high hedges; but for these were now substituted walls of masonry or of earth *en pisé*.

441. *French horticulture, during the consulate and the empire, gained but little ground.* Agriculture, however, was materially improved during the same period, in consequence of the attention bestowed upon it by men of science, such as Chaptal, &c., and by commercial men and others, as capitalists. Bonaparte, it is said, scarcely ever had a pineapple on his table during the whole time that he was at the head of the government of France; and we were informed that there were scarcely any forced productions, excepting mushrooms and salading, brought to the Parisian markets during his sway.

442. *After the restoration, the culture of fruit and culinary vegetables received a great stimulus.* Forced fruits and forced culinary vegetables are now common in all the Parisian markets, as well as mushrooms and salading; and pine-apples, which were introduced to the royal gardens at Versailles by Charles X., are now occasionally to be met with. In the *Annales de la Soc. d'Hort. de Paris* will be found monthly lists of the articles brought to market, and the prices paid for them; from which it appears, that in

1827, when these lists were first published, forced articles were altogether wanting, and that they have been since increasing every year. The kitchen garden belonging to the palace of Versailles was neglected for thirty years, from the commencement of the first revolution to the accession of Charles X. In 1828 it contained nothing very remarkable; but we observed that the pear trees against the walls were all trained in the fan manner. The forcing department of this garden is not without interest. It is coeval with the palace, and occupies nearly two English acres, originally chiefly covered with substantially built Dutch pits, with stone copings, &c. During the time of the Revolution, of Bonaparte, and of Louis XVIII., till 1819, it was entirely neglected; and the light downy seeds of the black poplars and willows of the neighbouring woods had sprung up from the ground and from the crevices of the walls of the pits, and attained even a timber size. The descriptions of forcing-houses here used are three:—1st, the old massive walled pits; immediately within the walls of which, and above the bark bed, is an earthen tube, about four inches in diameter, serving as a smoke-flue; 2d, pits with walks behind, in imitation of Baldwin's, and which were built from a manuscript translation of Baldwin's pamphlet; and 3d, common pineries, not unlike those of Kensington Gardens. The sorts of pines cultivated are chiefly the Queen, obtained from Holland, and the Enville, from England; but there are a number of other sorts: and M. Massey, the head gardener, was in London in 1829, in search of new sorts, and also to learn the mode of heating by hot water, though this mode is of French invention, and was applied, just before the first Revolution, to the hot-houses in the *Jardin des Plantes*. (*Gard. Mag.*, vol. vii. p. 9.)

443. *Grapes for the table* are chiefly cultivated in the village of Thomery, in the neighbourhood of Fontainebleau. The soil is a poor strong clay, and the surface a slope towards the Seine, and facing the north. The mode of culture is very peculiar. The plants are trained against mud walls, each plant being allowed only two branches, from which the bearing shoots are produced, and these are annually spurred in. The practice has been fully described in Lelieur's *Pomone Française*, and in the *Bon Jardinier* for 1827; and will be found in detail in this volume, where we treat on the vine. Grapes for the table are also grown in the market and flower-gardens within and around Paris, but incidentally and to a very limited extent. It is worthy of remark that the sort is almost every where the same, viz., the Chasselas de Fontainebleau, our muscadine: the Frontignans, our Frontignacs, are also grown, but to a very limited extent. Grapes for the wine-press, are grown every where south of 46° north lat. on the west coast, and 49° north lat. on the east. They are kept low; and at a distance they resemble a plantation of raspberries, excepting that they are not so regular. In the vale of Montmorency, where many of the stools are old, and where they are mixed with cherry and other fruit trees, the general effect is picturesque, and quite characteristic of that part of the country. We had a sketch made by an English artist on the spot, in 1829, which we subjoin (*fig. 83.*).

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444. *The pine-apple* is but little cultivated in France, except in the royal gardens at Versailles. The few that are brought to market are sent from Holland or England, or from the gardens of private gentlemen near Paris; no gentleman or independent man thinking it any disparagement, when he has more produce than he can consume, or when tempted by the state of the market, to send his produce thither. At the same time two or three market gardeners in Paris grow pine-apples in pits, among whom, in 1828, might be reckoned M. Decastillé, M. Gallois, and M. Maric.

445. *Mushrooms in the neighbourhood of Paris* are cultivated deep under ground, in the caverns formed by the exhausted lime quarries. These quarries are not generally open to the day, as in Britain. They are worked more like coal-pits, and the stones are brought to the surface, up a cylindrical well or shaft, by means of windlasses, worked by large vertical wooden wheels (fig. 84.). When the quarry is exhausted, and the bottom

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is not springy, or liable to be filled with water, it is let to a mushroom grower, who generally contrives to purchase a wheel and windlass that has become too frail to wind up stones, but which serves him as a means by which he descends and ascends; throwing down his stable dung, earth, and spawn, and managing them below, much in the same way as in England. Mushrooms are also grown in cellars in Paris, and in market-gardens on the surface of the ground. There appears to be two distinct varieties of this fungus: one grown in very firm soil, the colour of which is yellow; and the other, grown in very loose black, rich soil, and on dung ridges, which is of a small size and delicate white colour. We found, in 1828, both sorts in great perfection in the market-garden of M. Gallois, à l'Abbaye Saint Antoine.

446. *Bees* have long been an object of attention to the countrymen in France. The hive in most general use is of straw; but there are a great many fanciful kinds there as in England, and also many books on the subject. One author (M. La Grenée) has the merit of having shown that there is neither profit nor humanity in saving the hives of bees after they have been deprived of their honey.

447. *Ice-houses* are common in France in the neighbourhood of large towns, but are not, nor ever were, frequent in country residences. There is an immense one belonging to a public company at St. Ouen, near Paris, which holds upwards of ten millions of pounds. (*Revue Encyc.*, April, 1826; and *Gard. Mag.*, vol. i. p. 264.)

448. *Mutual improvement.* There are many points of practice in the horticulture of France which might be improved from the horticulture of other countries; and many in which other countries might derive improvement from France. In the forcing department, and in the culture of the pine-apple, the French have had little practice; and have consequently much to learn from the Dutch and the English, who have had a great deal. In the culture of salads during the winter, and in the growth of mushrooms throughout the year, the gardeners of Britain may learn a good deal from those of Paris. Fifty years ago, the pruning and training of fruit trees were better understood in France than in Great Britain; and we have nothing, even now, in the way of the culture of the vine in England, so simple and ingenious as the practice at Thomery. Perhaps, on the whole, considering the difficulties of climate to be overcome in France, the heat and drought in summer, and the great cold in winter, the French gardeners have more merit in producing or preserving the culinary vegetables at such seasons, in the open air, than those of Britain.

SUBJECT. 4. *French Gardening, in respect to the Planting of Timber Trees and Hedges.*

449. *Planting for profit* has never been extensively practised in France, owing to the abundance of natural forests in every part of the kingdom. These forests were much neglected till within the last thirty years; but they are now (being mostly national property) under a more regular course of management; their limits are defined by fences, and the blanks are filled up from the national nurseries. The roads of France being also kept up by government, much attention is paid to lining them with rows of trees. In some places, as in Alsacia, the walnut, cherry, apple, pear, and other fruit trees are used; in other districts the elm, oak, or poplar are employed; and in the south we frequently find the mulberry, and sometimes the olive. The resinous tribe are rarely planted but

for ornament ; the oak, elm, beech, and Spanish chestnut are the chief sorts used to fill up blanks in the natural forests. "Every where in France," says Mr. Moggridge, "plantations of the *Pinus Pinaster* are intermixed in vast masses with the native productions of the forest. They have been raised from seed sown on the spot, as is common in France both in public and private forests, and are of good heights, but slender in bulk, for want of timely thinning. Every where, without regard to soil or climate, the government and individuals continue to plant this worthless tree ; content to raise whole forests of them for firewood, instead of cultivating the Norway spruce, the larch, or even the Scotch pine, as local circumstances might indicate, the timber of which is applicable to much more valuable purposes." (*Gard. Mag.* vol. vii. p. 657.) The pine forest of Hagenau is supposed to consist of a superior variety of *Pinus sylvestris*, and the seeds are collected for the principal seedmen of France, Holland, and Germany. (*Gard. Mag.*, vol. v. p. 67.) The *Pinus Laricio*, a native of the island of Corsica, and of which there are in that island immense forests, is said to grow faster than the Scotch pine, even in England. (*Gard. Mag.*, vol. i. p. 79.)

450. *The idea of cultivating and naturalising foreign trees in France* was first projected by Du Hamel, in the time of Louis XV. He procured many seeds from America, raised them in the royal nurseries, and distributed them among his friends. A vast plantation of exotic trees was then made at St. Germain-en-Laye by the Maréchal de Noailles. Lamoignon naturalised on his estate at Malesherbes a great number of these trees ; and, at the age of eighty-four, Deleuze observes, saw spread generally in France plants of his own introduction.

451. *Hedges* are not in general use in France ; the plants employed in field-hedges, in the northern parts, are the hawthorn and the birch ; or a mixture of native shrubs, as the hazel, briar, laburnum, &c. In ornamental hedges the French have attained great perfection ; for these the favourite plants are the yew, the hornbeam, and the box ; and for tall hedges, the lime and the elm.

452. *The French planter of timber trees* affords excellent examples to the British arboriculturist in the art of planting trees in lines, and, indeed, in all geometrical forms. He is also superior to him in his mode of preparing the soil, pruning the trees, planting them, and pruning them afterwards, in the case of plantations made in cities, public walks, or avenue roads. In France, the British gardener may receive the same lesson so admirably taught him in Belgium (§ 300.). "The gardens of the peasantry, and small proprietors in France," says Moggridge, "are small ; but the latter grow many vegetables in their open plots of land, which, in England, are grown in our best cottage gardens. The house, however small, has invariably a vine or apricot tree trained against it, frequently both ; and the woodbine and the rose cluster round the door and windows." (*Gard. Mag.*, vol. vii. p. 488.)

SUBJECT. 5. *French Gardening, as empirically practised.*

453. *The use of gardens is very general in France.* Few cottagers are without them, and in the northern districts they commonly display a considerable degree of neatness, and some fruit trees and flowers. The southern parts of the country are the least civilised : there the gardens of the labouring class are less attended to ; and gourds, or melons, and Indian corn, as in Italy, are the chief articles grown. The gardens of the ordinary citizens and private gentlemen, in France, are greatly inferior to those of the same class in Holland or Britain ; they are seldom walled round, and rarely contain any arrangements for foreign or tender exotics. A green-house, indeed, is a rare sight, and there does not seem to exist the slightest desire for enjoying any vegetable production either earlier or later than their natural seasons.

454. *Nurseries.* France long supplied a great part of Europe with fruit trees, from the celebrated nursery of the fathers of the Chartreux, near the Luxembourg, established in the time of Louis XIV., and including eighty acres. (*Catalogue des plus excellens Fruits qui se cultivent chez les Chartreux*, &c. 12mo, Paris, 1752.) That establishment does not now exist ; but Ville Hervé, the son of its former manager, has the care of the collection of fruit trees and vines in the national garden of the Luxembourg. The extensive collection of grapes in this garden was formed by Chaptal, the celebrated chemist, when minister of the interior, with a view to ascertain the best sorts, and distribute them in the provinces ; and the fruit trees were brought by the elder Hervé from the Chartreux. (*Preface to the Catalogue of the Luxembourg Garden*, 1814 ; *Cours d'Agriculture*, &c. art. *Vigne*.) When Blaikie went to France in 1776, there was not a nursery for timber trees and ornamental shrubs in the kingdom. About Vitry only a few of such forest trees were cultivated as were used in avenues ; and so few fruit trees, that the sorts were not tallied, the cultivators, like the orange nurserymen at Nervi (§ 205.), recognising the few sorts by the leaves and bark.

455. *The principal nurseries in France for timber trees, hedge plants, and fruit trees,*

are at Orleans, about ninety miles, and at Vitry, about five miles, from Paris. The growers at Vitry are not, like the English nurserymen, a few individuals who have acquired large capitals, but a numerous class of small proprietors, who cultivate their own soil, and bring their trees to market in the same manner as is done with other garden produce. The more rare articles of the trade are grown almost entirely by Paris nurserymen, and a few others in the very largest towns; and when the former have an order for fruit or forest trees, they procure them from the country, or attend the next weekly tree market at Paris or Orleans. It must be confessed that this is a very bad method of selling trees; for, after the roots have been two or three days exposed to the air in severe weather, the trees, if they grow at all, have little chance of thriving.

456. *Vitry* may be described as a village of nurserymen; a circumstance sufficiently indicated by the following signs to the public houses there: — *Au rendezvous des pépiniéristes; au bon pépiniériste; café des pépiniéristes, &c.* It is estimated that there are about 400 growers here, and at Choisy, the adjoining village; each of whom cultivates his own property, and grows trees, alternately with corn, forage crops, and culinary vegetables, in the open or enclosed fields. The quantity of ground covered at a time by trees in this neighbourhood is supposed to be nearly 4000 acres. The principal demand for forest trees in France is for lining the public roads; and they are, therefore, allowed to grow till they attain considerable size, without much trouble being taken in transplanting them, as in Holland. By far the greater number of the fruit trees grown here are exposed for sale in the streets of Paris; and the same may be said of the shrubs and roses, of which only the more common sorts are dealt in by the nurserymen of Vitry. M. Chatenay's nursery grounds are at least a mile from his house in the village of Vitry. His stock is about as well grown as that of the English nurseries, but the order and keeping are less neat.

457. *Choisy le Roi* is also a village of nurserymen, but smaller than Vitry, and of much less note; indeed, as already observed, the number of growers and quantity of acres mentioned as connected with the latter village may be considered to include those of the former.

458. *Noisette's nursery*, at Paris, was established in 1802; it appears to occupy about six or eight acres; contains a considerable collection of green-house and some hot-house plants under glass; a moderate collection of hardy trees and shrubs; and an extensive collection of roses, standards and dwarfs. There are few herbaceous plants, with the exception of georginas. There are a stock of pine-apples, and a collection of about twenty sorts of table grapes, which M. Noisette informed us, in 1819, had been obtained from England; besides about a dozen sorts of French and Dutch table grapes. The hardy trees and shrubs in this nursery were formerly cultivated in masses according to the natural system. A specimen of each of the more rare and hardy trees and shrubs is named by a tin label soldered to the top of an iron rod about two feet long. The green-house and hot-house plants have their names printed on small plates of earthenware; each of which has a hole behind, in which may be inserted a stick to support it from the ground, or a wire to tie it to the plant.

459. *Cels's nursery* was established in 1797. Here peat-earth plants are chiefly cultivated; and of these it contains, perhaps, the best collection in or around Paris. They are chiefly grown in pits without flues, covered in winter with boards, mats, or reeds. In one of the peat borders we found *Asimina parviflora* in fruit. There is a good collection of green-house plants, some hot-house plants, and a good many orange trees. We were sorry to see this nursery in very indifferent order.

460. *Godefroy's nursery*, at *Ville d'Avray*, near Sèvres, appeared to us, in 1828, one of the most prosperous and English-looking nurseries we ever saw on the Continent. Its extent may be three or four acres; the surface is a uniform slope, laid out in parallelogram compartments, with narrow alleys between; and the soil is a saponaceous yellow loam, not unlike that of some parts of the Hammersmith Nursery. Most nursery articles are grown, hardy as well as hot-house; though the collection of the latter is, of course, the most limited. Magnolias are grown in abundance, and to great perfection. *Magnolia macrophylla* ripens its seeds: and M. Godefroy has raised plants from them; as he has also from seeds ripened in his own garden, of *Magnolia tripetala*, glauca, and auriculata; *Fagus pumila* and americana have also ripened seeds. We saw *Asimina triloba* in fruit, and were told that *Calycanthus acerifolius* (?), *Crataegus* (*Mespilus*) *orbifolia* (?) and *Chamaemepilus*, also ripened fruit or seeds. The bramble-leaved moss-rose, the oak-leaved laburnum, the shell-leaved paper mulberry, the willow-leaved chestnut, and a number of other *lusus naturæ*, were pointed out to us; for the English, whether in trees, furniture, books, or other objects, are generally understood by the French to value what is rare, curious, or difficult of attainment. The ties used for training plants in this nursery are the withered leaves of the Esparto rush (*Lýgeum Spartum*), which are sent from Spain in the packages of soda, and bought by M. Godefroy and other gardeners from the soapmakers. *Amýgdalus geórgica*, a species of

Ceanothus, and two species of *Vitex* (we regret our inability to be more particular), were pointed out to us as being remarkably showy plants.

461. *Vibert's nursery*, at *St. Denis*, was commenced in 1828; *M. Vibert* having been driven from his former situation at Paris by the ravages of the *ter blanc*. The only article which he cultivates is the rose, of which he has several hundred varieties, a great many of which were raised by himself from seed.

462. *M. Vilmorin and Co.* have two nurseries, or seed gardens, one in Paris, and the other at *M. Vilmorin's* country residence, at a few miles' distance: both are chiefly used for proving seeds. *M. Vilmorin and Co.*, though unquestionably the first seedsmen in the world, because they deal in the seeds both of the south, and of the north of Europe, are not nurserymen; that is, they do not grow either plants or trees for sale. (*Gard. Mag.*, vol. vii. p. 11.)

463. *The provincial nurseries of France* are not numerous; the largest is that of *Messrs. Bauman, frères*, at *Bollwiller*, on the Rhine, who deal extensively in fruit and forest trees, and have a catalogue of them in French, German, and Italian. The nursery of *Audibert*, at *Tonelle*, near *Tarascon*, in *Languedoc*, is also extensive, and is noted for fruit trees, especially figs and vines. *M. Audibert*, being a scientific botanist, has published a very accurate catalogue, with authorities for all the names, and references to published figures of most of the fruits. The nursery of *Messrs. Simon, frères*, at *Metz*, is extensive; and when we saw it, in 1829, they had commenced an arboretum. The principal fruit and forest tree nurseries of *Orleans* are those of *Madame Desfosses* and of *M. Trançon Gombault*. The principal nursery at *Bordeaux* is that of *MM. Catros and Géraud*. There is a good nursery at *Dijon*, kept by *Chambellon Frapillon*; one at *Angers*, by *Andusson*; one at *Annonay*, by *Jacquemet Bonnefont*; and one at *Manosque*, by *Ville Vieille*. *Antoine's* nursery, at *Nancy*, is noted for its auricules (300 varieties), carnations, roses, and pelargoniums; but it is not rich in fruit or forest trees. *Hodell's* nursery, at *Strasburg*, is one of the best in the north of France; it contains a general collection, and is rich in New Holland and Cape plants, American trees and shrubs, and the varieties of Switzerland. *M. Hodell, jun.* has been some time in England, is a scientific botanist, and possesses an herbarium of the plants of all countries, classically arranged. The nurseries and market gardens of *Rouen* will be found described at length in the fifth volume of the *Gardener's Magazine*, p. 369. to p. 378. The principal nurseries are those of *Prévost, fils*; *Fremont, le jeune*; *Vallet, Détennemare, Savoureux*, and *Calvert*; the market gardens, those of *Berquier* and *Renard*.

464. *The nursery of Mesdames Bruzot, at Orleans*, is an ancient and extensive establishment, which has long dealt extensively in timber and fruit trees. The timber tree most extensively cultivated in all the *Orleans* nurseries is the common birch; and next, the Italian and Carolina poplars. *M. Jaques (Annales de la Soc. d'Hort. de Paris, tom. ix. p. 302)* saw in this nursery, in 1831, a cut-leaved common oak, and a cut-leaved lime; also *Spiræum multiflorum* and *radiatum*, grafted standard high on the common *laburnum*; *Pinus Cembra*, grafted on *Pinus sylvestris* in the herbaceous manner: this last species of grafting is generally practised at this and most of the *Orleans* nurseries. The nursery of *M. Trançon Gombault* contains the best collection of roses at *Orleans*, and a great many American shrubs. The compartments in this nursery are sheltered by hurdles on which are trained fruit trees. The nursery of *M. Mangie* is chiefly devoted to roses and georginas: it has lately procured the addition of some new phloxes from England. (*Annales de la Soc. d'Hort. de Paris, vol. ix. p. 312.*)

465. *The nursery of Messrs. Calvert and Co., Englishmen, of Rouen*, was established soon after the peace of 1814, with a view of exchanging the Cape and New Holland plants of British commerce for the roses and orange trees of France. A great expense was incurred in the erection of hot-houses; and a considerable commerce in roses, camellias, and orange trees was carried on for several years; but the establishment is now, we believe, either relinquished or on the decline.

466. *The botanic nursery of Racine fils, at Dieppe*, is small, containing little more than an acre, but it abounds in curious roses, and contains one of the richest collections of georginas in that part of France. Here a new species or variety of *Pópulus álba* was first heard of; and, with other articles, sold to nurserymen, or exchanged with commercial cultivators or amateurs who frequent that part of the French coast. (*Gard. Mag.*, vol. v. p. 123.)

467. *The nursery and seedsmen of France* supply those of England with a variety of articles; but the principal, or what may be considered the national articles, are roses and orange trees. Some peaches, vines, figs, and other fruit trees, are occasionally sent to England; but more for the sake of introducing the sorts than for the trees. The seeds sent from Paris to London are various; and include flower seeds of some kinds which ripen with difficulty in England; seeds of pot herbs, cauliflower, broccoli, lettuce, &c., seeds of anise, for distillation and the purposes of the confectioner, and sometimes clover, lucern, broom, furze, and other agricultural seeds. It appears to us that considerable

improvement could be made in the culinary vegetables of France, by simply obtaining the seeds of the greater number of the *Brassica* tribe from Britain; and, when the two countries shall know the horticulture of each other better, this and various other changes of seed, and exchanges of both seeds and practices, will doubtless take place. The British nurserymen have the *greffe herbace* to learn from the French; and the French nurserymen have the British mode of performing the common whip-grafting, and various other practices, to acquire from the British. There exist in the two countries the germs of intimate connection and extensive commerce, both in the nursery and seed business.

468. *Florists' Gardens.* There are numerous florists who devote themselves exclusively to the culture of flowers, and supply the market with roses, lilies, stocks, and the more common green-house plants and orange trees. The latter are very neatly grafted, and otherwise well managed. In the winter time forced flowers are exposed for sale, and also summer flowers, which have been dried in stoves, and preserve their colour perfectly. The same thing is done with aromatic herbs, and some pot herbs, as parsley, chervil, &c. The gardens of the commercial florists of Paris are numerous, but not large. Their produce is chiefly disposed of at the flower market of Paris; for the purchasers of flowers there have not leisure, as in England, to go in search of them among the suburban gardens.

469. *The garden of M. Fion* is one of the first of a great number of this class in and about Paris. M. Fion joins to a knowledge of botany and gardening, invention, enthusiasm, and taste; and he has applied all his energies in rendering an acre of ground brim-full of botanical and picturesque interest. He first began to grow orange trees in 1818; and in 1828 his garden contained a number of houses and pits, in which were not only an extensive stock of popular plants, such as camellias, ericas, pelargoniums, oranges, &c., but also some of the most rare hot-house and green-house plants to be found in Paris. There were also some ornamental buildings; a small temple, containing a bust of Thoin (and it is paying M. Fion no mean compliment to say, that he duly appreciates the character of this most scientific of French gardeners); rockwork, fountains, painted landscapes, as terminations to walks in the open air, and also for completing the effect of certain compositions of rockwork, water, and succulent plants, which M. Fion had formed within the houses. There was a wall covered with orange trees, which bore abundantly, and had a fine appearance. Every part of M. Fion's grounds was as neat and orderly as it was tasteful; and, in short, there is no commercial flower garden in Paris that will so well repay the visitor. (*Gard. Mag.*, vol. vii. p. 132.)

470. *The garden of M. Tampionet, florist to Charles X.*, occupies about two acres, and displays one of the best collections of large orange trees, and camellias, in the neighbourhood of Paris. The young orange trees, and all such as by accident or design are in a growing state, are preserved through the winter in green-houses, with glazed roofs like those of England, and in flued pits. Those which are not in a growing state are packed close together in one of those barn-like orangeries, which are common to commercial gardens in France. The largest tubs are placed on the ground; the next largest upon them in the interstices between the trees; and above these a third tier of still smaller boxes; so that not a foot of room, from the floor to the ceiling, is lost. An English gardener would hardly believe it possible that plants so closely packed together, in a house having no more light than an ordinary room, and totally without flues, or any means of supplying artificial heat, would pass the winter without losing their leaves. It is certain, however, that they do so; and the secret of this is, that the trees are thrown into a dormant state, about the middle of September, by withholding water. During winter, the frost is effectually excluded by wooden shutters, and over these, when necessary, straw mats. The windows are not opened after winter has fairly set in, till its greatest severity is believed to be over; and, unless in houses where there is a flue, no water is given during that period, and sometimes not till the end of February. This treatment would scarcely answer in the moist climate of England; but yet it affords important hints for preserving oranges in pits, and against flued walls. (*Gard. Mag.*, vol. vii. p. 133.)

471. *The garden of M. Doube, florist*, contains not quite an acre. In an extensive barn-like orangery, we saw, in 1828, a collection of very large orange trees, purchased at the sale of a nobleman's effects, during the first revolution, and now kept for their flowers. Some of the tubs bore inscriptions, signifying by what king of the last century the tree had been presented to the former owner; a proof that an orange tub will last at least 40 years: the material is oak. Neapolitan violets are here cultivated in large quantities; they are planted in beds enclosed by boards, on which sashes are placed during the winter: with this protection, and without any heat, they continue to produce flowers from November till May. The variety of rose, called *quatre saisons*, forms a main article of culture; the plants are cut down about the end of August, in consequence of which they come into bloom from the middle of October to Christmas. The latest are covered with glass, in the same manner as the violets. (*Gard. Mag.*, vol. vi. p. 134.) There are numerous other flower-gardens in and about Paris, independently of certain market-

gardens and nurseries, which also grow flowers to send to market. Those mentioned above, however, were, in 1828, considered the most worthy of notice.

472. *Market Gardens.* There are excellent market gardens in the neighbourhood of Paris, where, by force of manure and daily waterings, the olitory tribe are brought to a large size and very succulent quality. Figs, for the market, are grown by a particular class of fruit-growers at Argenteuil; grapes, at Fontainebleau; peaches, at Montreuil, and cherries at various villages to the east of Paris. The market gardens of Paris are numerous, generally of small extent, and cultivated by manual labour; but a few of them may be designated farm gardens, in which are used the plough and other agricultural implements. As vegetables enter more into the cookery of France than they do into that of England, an immense quantity is consumed at the hospitals and similar institutions; and, in consequence of this, the more extensive market gardeners employ their produce chiefly in executing contracts entered into with public bodies. With this exception, the produce of the Paris market gardens is sold in the vegetable markets, as in London. (*Gard. Mag.* vol. vii. p. 257.)

473. *The fig gardens at Argenteuil*, a village about six miles from Paris, are intermixed with the vineyards there; and, at a short distance, only distinguished from them by the larger size of the plants, and the deeper green of the foliage. The fig trees are low spreading bushes, none of them higher than six or seven feet, with the branches proceeding from the centre or stool in five or six clusters or bundles; each bundle consisting of three or four leading branches with their side shoots. The angle which the bundle makes with the ground may be about 45°. The cause of the shoots being in bundles, and of the obliquity of this angle, is, that the bundles are every winter bent down to the ground, and either held down to it by stakes or stones, or partially or wholly buried in the earth. It is a mistake to suppose that a covering of earth is required to protect them from the frost; pressing them to the surface of the ground, and retaining them there, as done with the vines in the south of Germany, is sufficient. It is only because it is found the cheapest mode, labour being less costly than either stones or stakes, that the branches are most frequently partially buried. An old man and his wife described to us the manner in which the trench for each bundle of branches was dug out; and told us that the bundle was held down by one man, while another covered the extremities with about a foot of earth. The centre of the bush is sometimes enveloped in straw; but this is considered too expensive to pay. Any leaves and unripe fruit which may be on the branches are taken off when the latter are laid down, to prevent their rotting the young shoots. In spring, when the earth is removed, the bundles are untied, and the branches restored to their former position; the dead wood is then cut out. Almost the only pruning is in June, when the points of all the young shoots are pinched off, to enlarge the size and hasten the growth of the fruit. Whenever a shoot becomes too stiff to bend down, it is cut off close to the ground, and a young sucker is allowed to take its place. The figs which proceed from the wood of the past year ripen naturally; but those on the wood of the current year frequently do not ripen at all, and almost always require artificial aid. This aid consists in dropping a little oil into the eye or flower of the fruit. The woman mentioned was employed for this purpose, and showed us how it was performed. She had a small phial of olive oil suspended from her apron strings, and in her hand the upper part of a stalk of wheat, forming a tube open at both ends, about five inches long. She inserted the small end of this tube in the phial; and, before taking it out, placed her thumb on its upper and broadest end, to prevent, by intercepting the pressure of the atmosphere, the oil which had risen in the tube from flowing out; with the other hand she then turned towards her the eye of a full-grown fig, and applying to it the small end of the straw tube, lifted her thumb from the other end, just long enough to let a small drop of oil enter the orifice in the fig. Before requiring a fresh supply of oil, she performed this operation to ten or twelve figs. The object of this application, she told us, was to occasion a sort of artificial ripening, or easy separation (*pour les faire partir*), of the fig from the shoot. It certainly renders them eatable; but they are far from being equal to those which are ripened naturally. (*Gard. Mag.*, vol. vii. p. 262.)

474. *The peach gardens of Montreuil*, a village near Paris, are walled enclosures of from half an acre to three acres each; and M. Otto remarks, that if the walls were extended in one line, they would reach to the distance of several miles. From these gardens the private establishments of the principal proprietors in France are furnished with trained peach and nectarine trees, and the Paris market with peaches. The soil on which the trees are grown is on the secondary limestone common to the Paris basin; the exposure to the south-east, with no shelter except what is given by the walls, which are generally from eight to eleven feet high. The gardens are in square or parallelogram enclosures, the walls planted on both sides, and the interior devoted to the culture of vines, for their fruit for the dessert. The trees are generally budded by the growers on almond, apricot, or plum stocks; they are planted, when budded one year, against the

walls, and made fast to them, to prevent their being stolen, by iron hooks which pass through the wall, and are riveted on the other side. The mode of training may be described as an imperfect fan manner; two leading branches, one on each side, being kept as the parents from which all the others are to spring; and these leading branches, are elevated or depressed, so as to keep the wall equally covered with shoots, with the exception of the centre, which is generally somewhat open. This mode, known as that à la Montreuil, has been greatly lauded in France, and will be described at length when treating of the peach tree.

475. *The cherry and strawberry gardens* are chiefly to the east of Paris, and in the vale of Montmorency. The cherry trees are standards, planted among vines, and sometimes among beds of strawberries; they receive very little culture or pruning. The sorts are for the most part the *médoc* (our May Duke), and the Kentish or Flemish. Cherries, indeed, like apples and pears, are common in all gardens in France. They are more especially excellent in Touraine, as apples are in Normandy, and pears in the north of Picardy.

476. *The field market garden of M. Cadet de Mars* consists of fifty or sixty acres, lying round the village of Aubervilliers, about three miles from Paris. M. Cadet de Mars has been repeatedly mayor of his village, and he is unquestionably at the head of the field-market gardeners in the neighbourhood of Paris. He has accumulated what he considers a very good fortune, chiefly by making large contracts to supply the hospitals, and has now given up his business to his sons. The largest contracts he ever had were with the Hospice Salpêtrière; for which on gourd day, i. e. the day on which the vegetable used in the soup served to the inmates is the pumpkin or the gourd, he used to supply 6000 lbs. He has had a fruit of the mammoth gourd which weighed 195 lbs. He had also large contracts with the manufacturers of sugar from the beet root; especially during the years 1812 and 1813, when the price of sugar in Paris was five francs per lb. These companies failed, for the most part, in 1814 and 1815, when sugar fell to fourteen sous per lb. His sons still cultivate large quantities of mangold-wurzel for feeding cows; and it deserves to be remarked, that these cultivators, and also others in their neighbourhood, who formerly used to gather a part of the leaves to sell as fodder while the plants were growing, have now left off the practice, from finding that it lessens the size of the roots. In the field garden culture practised here, and in other field gardens in the neighbourhood of Paris, the soil is ploughed for the crop with a two-wheeled plough; but all the operations of gathering the crop are performed by manual labour. Irrigation, either by manual labour or by channels on the surface, is seldom resorted to. There is no regular rotation of crops; but in general, after three or four crops of vegetables, a crop of wheat is taken, or the whole is sown with lucern, under which it remains from two to five years. Turnips are seldom sown in the spring, because the drought and insects destroy them; but in August, after the crop of peas, wheat, or rye is removed, they are sown with success. Onions and leeks are sown together in February; neither grow large. The onions are grown early in September, and the leeks remain to be taken up as wanted. Small leeks are preferred in the Paris market, as having more flavour; and the same as to onions and asparagus. Where the soil is deep, soft, and inclined to moisture, the marsh mallow is cultivated for the apothecaries, and found to pay well, because suitable ground for this plant is rare on secondary limestone. Asparagus is grown in single rows along the bottom of shallow trenches; and, instead of covering the plants during winter, as we do in England, their crowns or buds are laid almost bare, so as to receive the first influence of the sun in spring. As the plants begin to push, they are earthed up. A part of the grounds is planted with vines, in rows about three feet apart; between each row of which is a row of asparagus; and in the rows of vines are asparagus plants, which alternate with the vines. When the vines are in fruit, the stalks of the asparagus are tied together in bundles, to admit more air to the vines. On expressing our surprise at the practice of laying bare the buds of asparagus during the winter, M. Cadet de Mars acknowledged that highly succulent varieties of asparagus, grown in deep, richly manured soil, such as might be seen in private gardens, and particularly in that of the king, at Versailles, would suffer from this practice; but that field asparagus, such as that before us, was nearer a state of nature, and suffered no injury. He observed, that a covering of earth or litter, while it prevented the escape of heat, at the same time prevented its entrance; and he gave as an instance in favour of the practice, the well-known early flowering of bulbs planted on the surface, as done with crocuses about Paris, in comparison with those which are inserted deep in the soil. He is of opinion that cold serves to force forward plants as well as heat; having remarked that, after a very severe winter, provided it were short, bulbs flowered earlier, and asparagus was ready to cut sooner. Of course, this doctrine can only apply to very hardy plants; but, relatively to them, it appears to be one well deserving the consideration of British gardeners. (*Gard. Mag.*, vol. vii. p. 259.)

477. *The market-garden of M. Decoufflé* is noted for its forced productions. In extent it does not exceed an acre, and it is surrounded by a wall about twelve feet high. In small, narrow, Dutch forcing-houses, grapes are forced so as to be ready to cut in May; and the muscat of Alexandria and the Frankendale are grown on the open wall, and preserved till near Christmas by being covered with coarse gauze, and protected from rains by boards projecting from the wall, in horizontal lines three feet apart. In the interior of the garden early salading is grown in the Dutch manner, and other culinary vegetables are forced by dung heat; and in summer, melons and Spanish sweet potatoes are cultivated. A detailed account of the mode of culture practised in this garden will be found in the *Annales de la Société d'Horticulture de Paris*, tome iii., October, 1828.

478. *The market-garden of Fanfan Cantin*, Grand Rue de Reuilly, is small in extent, but has long been celebrated for forcing asparagus on dung-beds so as to be ready by the 10th November. This kind of forced asparagus is not blanched; but the stalks are encouraged by light to assume a bright green for the purpose of being cut into pieces so as to imitate green peas. The plants are purchased from the extensive market-gardens in the neighbourhood of Paris, where they are grown among the vines with little care or culture. In this garden, asparagus is also grown in beds in the open garden; and forced, as in Denmark, Holland, and England, by digging trenches between the beds, and filling them with hot stable dung. Pine-apples are grown in this garden in pits; those in fruit are covered with glass all the year; but young plants are uncovered night and day during the summer months. The fruit produced is small, but high flavoured. There are here 1900 sahes occupied with asparagus in the winter season, and in summer used for covering melons.

479. *The market-garden of M. Marie*, in the Rue de Charron, Cul de Sac Delaunay, is also celebrated for asparagus; and indeed these two gardens vie with each other to an extreme degree. M. Marie told us, in 1828, that "he was the first asparagus grower in the world; that M. Cantin was second to him; and that the two together had the complete monopoly of the Paris market during the winter months." A few pine-apples are grown in this garden, and abundance of melons in the summer season.

480. *There are numerous other small market-gardens within the walls of Paris*, in which every vegetable or fruit demanded in the Paris market is grown with unwearied labour, and the greatest care and skill. The point in which the Parisian market gardeners chiefly excel those of London is the culture of winter salading, especially cabbage lettuce. This is grown on old melon beds, covered with glass, and heated by linings of dung, in the Dutch manner; or, in favourable situations and dry soil, composed entirely of dung rotted into a black mould, in the open garden. The demand for cabbage lettuce in the Paris market, during the whole winter, is very great, and it is abundantly supplied with an excellent article.

481. *The market-gardens and orchards of Touraine* have long been celebrated. Those in the neighbourhood of Tours are numerous, and extend in some places to a considerable distance from the town; most of them are small, and they are for the greatest part cultivated by the proprietors. A very interesting description of these gardens is given by Mr. Moggridge in the *Gardener's Magazine* for 1831 (vol. vii. p. 89. and p. 487.). Early in spring, the almond, the apricot, the peach tree, the cherry, and the plum beautifully chequer the scene with their blushing and delicate blossoms. They are planted freely in the vineyards, as well as in the gardens; are generally standard trees; and most years yield their respective fruits in great abundance and excellence. In the market gardens, not only do nearly all of the hardy and spring vegetables which we cultivate find a place, but the cardoon and many other plants (used chiefly for their soups and salads, of which we know little, and cultivate less,) are intermixed in almost endless variety. Excellent and cheap, surprisingly so, are the vegetable productions of these gardens; and, in general, they are taken to market at least a month earlier than the same articles are in the most favoured parts of England. On the 1st of April, 1830, asparagus was served up at table, and had been in the market a week before; the heads were sold on that day for a franc (10d.) the botte, containing from seventy-five to eighty well-grown asparagus shoots; and by the 16th two larger bottles, of from ninety to 100 stalks each, were to be had for one franc four sous, equal to a shilling of our money. Vast quantities of this excellent vegetable were by this time not only exposed for sale on the market-day, but hawked about the streets daily. The cultivation of the asparagus plant in the neighbourhood of Tours, if cultivation it can be called, is curious, as affording a striking proof of the peculiar excellence of the soil, the general mildness of its winters, and the early warmth of its springs. After the seeds are once sown, no other care is bestowed upon the beds but to keep them free from weeds. Every stock cut throws up several, and continues to do so for many years, without renewal of the plants, or change of the beds; and in the winter they are scarcely ever covered with manure as in England, either to protect them from the effects of frost, or to hasten their sprouting early in the spring. Green peas were plentiful in the market by the end of

April; and I was assured by English persons who had resided many years in Tours, that peas were late this year. (*Gard. Mag.*, vol. vii. p. 487.)

482. *Markets.* In France, as in other countries where nurseries are not common, or to be found in every town or village, as they are in Britain, their produce, whether trees, plants, roots, or seeds, are exposed for sale in the market places. This is a bad practice, both for the seller and the purchaser; and, in every country, as the facilities of communication are increased, it must inevitably be abandoned. The produce of market gardens, being of immediate consumption, always has been, and always will be, exposed publicly for sale, in quantities together, for the choice of the consumer.

483. *The Paris market for trees and shrubs* is held every Wednesday and Saturday, on the Quai de la Cité. There are 200 stands. The nurserymen exposing trees for sale are obliged to be furnished with a certificate from the mayor of their district, that the articles they offer are all grown by themselves. (*Annales d'Horticulture*, tome i. p. 106.)

484. *The flower-market of Paris*, established in 1808, is held every Wednesday and Saturday, and occupies an open area of about two acres on the Quai Dessaix; and the stands of the different florists (324 in number) are held under four parallel rows of the common and three-thorned acacia: in the middle and at the extremities there are basins of water, for the purpose of watering the plants. The stands are almost always kept by the wives or daughters of the growers; and not, as in London, by a distinct class, intermediate between the gardener and the consumer. The place of each person is marked; and each pays the town of Paris 25 cents (twopence halfpenny) a day. Every thing connected with the stands is portable; the pots and plants are, for the most part, set on the ground; and only such as sell seeds, and cut flowers, have small benches, on which they are placed. In summer, the attendant lady sits in a chair, close behind which is a pole or rod, terminating in a hole, for the insertion of an umbrella, which serves also as a parasol. In winter, she has a mat round the chair, and straw upon a board, on which to place her feet. Some have small portable houses, with a brazier of charcoal embers. We visited this market on September 13th, and on December 20th. (*Gard. Mag.*, vol. vii. p. 130.) It is necessary for each person to prove that he cultivates a certain portion of land (25 acres) as a flower-garden, to be entitled to a stand in this market. (*An. d'Hort.*, &c.)

485. *The fruit and vegetable markets of Paris* are numerous, and are situated in different parts of the town; but the principal is the *Marché des Innocens*, which may be considered the Covent Garden of Paris. The area of this market, which was established in 1788, exceeds an acre; and it is surrounded by a quadrangular range of sheds open on both sides, with a walk in the centre. There are very few close fruit-shops under these sheds, as in the London market. In the open area, in the centre, potatoes, turnips, carrots, and the commoner and more bulky vegetables, are sold by wholesale. Under the sheds, these and all other vegetables and fruits, with some descriptions of flowers, are sold by retail. Adjoining the market are shops, in which are sold pistachios and other dried fruits, oranges, nuts, &c., burnt onions, burnt carrots, dried pears, plums, apples, and apricots. The onions and carrots are charred, so as to become as black as ink: this effect is produced by baking them slowly in an oven, and taking them out at intervals, during several days. They are used in cookery for colouring soups. Sprigs of orange tree in blossom are, we were told, to be found in this market throughout the year. These are considered essential accompaniments to the dress of bridal parties; and although artificial flowers, perfumed with orange water, are sometimes employed by those who cannot afford the living article, yet the latter is by far the most generally used. On the whole, the supplies of the Paris vegetable markets are inferior in point of excellence to those of London. The quality and variety of fruits are greatly inferior, and also the dryness and flavour of potatoes, and the succulency of turnips, cabbages, and the other common culinary vegetables; but the Paris markets approach to equality with those of London, in mushroom, salads, and aromatic herbs, during summer; and far surpass them in those articles during winter. (*Gard. Mag.*, vol. vii. p. 259.)

486. *The Marché St. Honoré* is also for all kinds of garden products; it is of considerable extent, and is well supplied. Besides these general markets, there are several set aside for selling some of the most useful vegetables by wholesale. Of these the potato market is the principal. It is held in the Rue de la Grande Friperie; and, though it has not been established above fifty years, is now one of the most important in Paris. The market for peas and kidneybeans is also a very considerable one. It is held at eight o'clock in the evening, in the Place St. Eustache. There are also separate markets for artichokes, carrots, &c., and one exclusively for the sale of medicinal herbs. This last is held in the Rue de la Poterie, and is under the superintendence of a medical botanist, who is also charged with the examination of all the mushrooms exposed for public sale. Nothing can exceed the order and excellent arrangement of these markets. (*Annales de la Société d'Horticulture*, tome ii. p. 32.)

487. *The operative gardeners in France* are, in general, very ignorant. Few of them have learned their art by regular application, or the customary engagement of apprentice-

ship. At Paris they are poorly paid, and work much harder than the same class in England. Evelyn, in 1644, informs us that the work of the royal gardens was all done in the night-time, and finished by six or seven in the morning, in order, no doubt, that nothing offensive might meet the eyes of the great of these times. Happily such a custom does not now exist between the rich and the poor; but still, partly for the same reason, but principally to avoid the mid-day sun, the great part of the work, in most private gardens, is performed from three to nine o'clock in the morning, and again from six to nine in the evening. The greatest recommendation of a French gardener used to be, Blaikie says, to be able to conduct a garden *à bon marché*; and the next greatest to prune trees *à la Montreuil*.

488. *Of artists in gardening (artistes jardiniers, architectes des jardins)*, there are a number in France, chiefly resident in Paris. Blaikie, already mentioned, and Gab. Thouin, brother to the late professor, and author of *Plans Raisonnés des Jardins*, &c. (1818), may be reckoned the most eminent. Girardin, Morel, and Delille may be considered as having established the principles of gardening in France, as an art of design and taste; but it does not appear clear that the artists in general have caught their principles.

SUBJECT. 6. *French Gardening, as a Science, and as to the Authors it has produced.*

489. *The science of gardening is well understood in France* among the eminent gardeners and professors; perhaps better than in any other country. Quintinye and Du Hamel applied all the physiological knowledge of their day to the treatment of fruit and forest trees; and the theories of grafting, of healing wounds, and of artificial excitements to fruitfulness, were explained in their works. Rozier, Aubert du Petit Thouars, Boec, and above all Professor Thouin, have brought the sciences of chemistry and of botany to bear on the various parts of gardening and rural economy, which they have treated of in various works, but especially in the *Nouveau Cours d'Agriculture* (14 vols. 8vo), published in 1810. The art of heating hot-houses by hot water was invented in France by a physician of the name of Bonnemain, in 1777, and the hot-houses in the Jardin des Plantes were heated in that manner in the time of Louis XVI., though it was afterwards given up, on account of a deficiency in the quantity of heating surface. (*Gard. Mag.*, vol. iii. p. 429; and vol. iv. p. 28.) Herbaceous grafting was first invented and extensively practised by the Baron de Tschoudy, in the neighbourhood of Metz. (*Ann. de l'Agr. Franç.*, tom. xxix.) Dutrochet, well known to the scientific world, as connected with anatomical and physiological researches, has made extensive discoveries in physiological botany, and illustrated the laws of vital motion in plants. (*Agent immédiat du Mouvement Vital*, &c.; and *Gard. Mag.*, vol. iii. p. 78.) The supposed influence of the moon on plants, is shown by M. Arago to be founded on fact; and he explains its effects on the principles established by Dr. Wells in his Treatise on Dew. In clear moonlight nights, the uninterrupted radiation from the earth's surface does injury by the cold it produces; while cloudy nights, or those without moonshine, prevent radiation, and keep plants on the surface of the ground warm. (*Gard. Mag.*, vol. iii. p. 464.)

490. *L'Institut Horticole de Fromont* is an establishment for the advancement of gardening; and though it is the sole work of the Chevalier Soulange Bodin, it may well be considered as national in its effects. It was opened on the 1st of May, 1829, for pupils, and the *Annales de l'Institut* have been since published in monthly numbers. (*Gard. Mag.*, vol. v. p. 322.)

491. *The court and national gardeners* have, for the last thirty years, been men eminent for scientific and practical knowledge; who have received a regular education, and rank with other crown officers. It is not there as in England, where too frequently the royal situations have been occupied by mere empirical practitioners, recommended by some court favourite, or succeeding by the common chances of life.

492. *The great mass of operative gardeners* in France, both as masters and labourers, are incomparably more ignorant both of gardening as a science, and of knowledge in general, than the gardeners of this country; few of them can read: and the reason of this ignorance is, that there is no demand for good master-gardeners. The pupils and apprentices of the Jardin des Plantes are mostly sent to manage the provincial botanic gardens, or to the few proprietors who have first-rate gardens. The chief of them are foreigners, who return to Germany or Italy. Indeed, where there is no forcing, and few plants in pots, scientific gardeners are less necessary; the management of fruit trees in France being reduced to mere routine.

493. *The French authors on gardening* are very numerous: La Quintinye, Schabol, Du Hamel; and afterwards, Thouin, Boec, Butret, and Du Petit Thouars. But Quintinye is their most original and meritorious writer on horticulture, Du Hamel on forest planting, Lelieur on fruit trees, and Girardin and D'Argenville on landscape-gardening. Their works on florists' flowers, such as D'Ardène, *Traité des Tulipes*, &c., are chiefly trans-

lations from the Dutch. The best general work is *Le Bon Jardinier*, a new edition of which is published annually with all the modern improvements.

Sacr. IV. *Of the Rise, Progress, and present State of Gardening in Germany.*

494. *The Germanic confederation, as arranged in 1815*, includes the empire of Austria, the kingdoms of Prussia, Bavaria, Saxony, Hanover, Wirtemberg; the Grand Duchy of Baden, the electorate of Hesse, and nine other small states and free towns. The materials which we have been able to collect from so extensive a field, are exceedingly scanty; and, indeed, it appears from Hirschfeld that gardening made little progress in Germany till the seventeenth century. At present, (1839) the taste for our art there is very considerable, and it seems to have received a new stimulus since the peace. "Gardens," Madame de Staël observes, "are almost as beautiful in some parts of Germany as in England; the luxury of gardens always implies a love of the country. In England, simple mansions are often built in the middle of the most magnificent parks; the proprietor neglects his dwelling to attend to the ornaments of nature. This magnificence and simplicity united, do not, it is true, exist in the same degree in Germany; yet, in spite of the want of wealth, and the pride of feudal dignity, there is every where to be remarked a certain love of the beautiful, which sooner or later must be followed by taste and elegance, of which it is the only real source. Often, in the midst of the superb gardens of the German princes, are placed Æolian harps, close by grottoes, encircled with flowers, that the wind may waft the sound and the perfume together. The imagination of the northern people thus endeavours to create for itself a sort of Italy; and during the brilliant days of a short-lived summer, it sometimes attains the deception it seeks." (*Germany*, chap. i.) "I do not know how," says the amiable and philosophic Hodgskin, "to express my notion of the quietness, amiableness, and general content of the German character in any other manner than by repeating the facts on which it is founded. One of the most conspicuous of these is the numerous little gardens, with arbours, hills, walks, and flowers, which surround all German towns, and in which the greater part of the inhabitants may be seen every afternoon, smoking their pipes; cultivating their flowers and fruits; reposing in their summer-houses; sewing or reading, or lovingly walking to and fro, with their arms encircling each other; taking their evening meal among the trees; or singing as if all were happy." (*Travels in Germany*.)

495. *The gardening of Germany, as compared to that of Britain*, is, on the whole, inferior in the splendour of its productions; but it is nevertheless pursued in Germany with greater ardour, in proportion to the wealth of the inhabitants. If there are no gardens in Germany in the natural style equal to many of the parks of Britain, it is not for want of skill on the part of the Germans in laying them out, but rather owing to the obstacles thrown in their way by nature. The severity of the winters is not only adverse to the growth of evergreens and turf, but good gravel is scarce, and the best substitutes for it are too expensive for general use. The gardens of Munich, the public gardens of Magdeburg, and the names of Sckell and Linné, prove that both the principles of landscape gardening and their application are better understood in Germany than they are in Britain.

496. *In arboriculture* the Germans are in advance of the gardeners of Britain; because wood is, in most parts of Germany, the principal fuel, and because, in the interior, all timber for the purpose of construction is supplied from the territory, and not, as in Britain, imported by sea. The culture of hedges, however, is not so far advanced as in Britain; because agriculture, in most parts, is not yet in such a state as to require them; and, in other parts, where the snow lies six months on the surface, or where the vine is generally cultivated, they are of little use.

497. *The culture of flowers and plants of ornament* is very general in Germany among the wealthy; and the forcing of flowers, during the winter season, is perhaps as far as, or further advanced than in Britain. In the propagation of rare green-house and hot-house plants the German gardeners are not equal to those of Britain.

498. *In horticulture*, when the difficulties that German gardeners have to contend with are taken into consideration, the German gardener is at least upon a par with those of Britain, and he may confidently be pronounced superior to them in forced productions, and in the preservation of vegetables and fruits throughout the winter. This and the preceeding branches of horticulture have received a great stimulus, since the peace of 1814, by the establishment of the Prussian Horticultural Society; and by the correspondence of this society, and of the gardeners of German princes with the Horticultural Society of London.

499. *In science* the German gardener is decidedly in advance of every other in Europe; and in the routine of practice he is surpassed by none in steadiness, or, where he has leisure, and is properly encouraged, in order and neatness.

500. *The school of gardeners established by the Prussian Horticultural Society consists of several classes, according to the time which they may have been in the institution. In an examination of this society, in 1827, it appeared that the pupils had made great progress in botany and drawing; their knowledge of geography, including the physical description of the earth, which they receive from Professor Dittman, proved very respectable. Not less had they profited by Dr. Bergmann's lectures on chemistry and mineralogy. They also produced themes on the subjects of their instruction, and the diaries, which they are taught to keep, were mostly executed in a satisfactory manner. Their answers to all the questions as to the practical cultivation of plants, vegetables, and flowers, were good, and their general conduct had been such, that there had been no punishment inflicted in the establishment for the whole year. Under these considerations, all the pupils were forwarded to the next class at Potsdam, with the exception of one, who was returned on account of his youth and bodily weakness. The examination of sixteen pupils, who had been transferred to this school, during the two preceding years, from the establishment of the Schönberg, was equally satisfactory. With exception of one, the pupils had invariably displayed steadiness of conduct and industry in their studies. The seven pupils of the second class are practically trained by the royal gardeners of the palace; besides which they are theoretically instructed in the cultivation of vegetables and trees, in arithmetic, algebra, and drawing in its different branches. The nine pupils of the third class are taught as follows:—1. A continuation of instruction on the culture of fruit and other trees. 2. On forcing gardening (treibgärtnercy). 3. Geometry, with practical surveying and measuring. 4. Continuation of instruction in botany. 5. Drawing plans and laying out kitchen-gardens, orchards, and pleasure grounds, with a calculation of the expenses. 6. Themes on the most important subjects connected with gardening. In all these branches the progress of the pupils, in 1827, had been satisfactory; and three of the number were discharged, as competent gardeners, with permission to seek employment in the royal gardens, for their further improvement. The remaining six were admitted into the fourth class, as garden artists (garten künstlerer). (Gard. Mag., vol. iii. p. 93.)*

SUBJECT. 1. *German Gardening, as an Art of Design and Taste.*

501. *The French style of landscape-gardening has prevailed in Germany from the earliest period of history or tradition. "The German architects," observes Hirschfeld, in 1777, "in making themselves masters of the gardens, as well as of the houses, tended to spread and perpetuate the prejudice. A singular and deplorable Gallomania pervaded Germany, from the prince to the peasant, which neither irony, patriotism, nor productions which show the force of our natural genius, could destroy. 'Ainsi font les Français; voilà ce que j'ai vu en France:' these words were sufficient to reduce the German to a mere copyist; and, in consequence, we had French gardens as we had Parisian fashions. Our nobles gave the first example of imitation, and executed on their estates miniatures of Versailles, Marly, and Trianon. But now (1777)," he adds, "the dawn of judgment and good taste begins to break in our country, and the accounts of the happy changes made in England in the gardens there, have prepared the way for the same revolution in Germany. However, we cannot complain of the suddenness of that revolution, and that the imitation of the English taste spreads too rapidly; it appears, on the contrary, that we begin to think for ourselves; and reflection proceeds much slower than mere imitation. We may meet, perhaps, here and there, with several copies of the British manner, and perhaps even of the Chinese style; but we expect to see the Germans inventing and combining for themselves, and producing gardens stamped with the impression of national genius." (Théorie des Jardins, tom. i. p. 83.)*

502. *The climate and circumstances of Germany are less favourable to landscape-gardening than those of Britain. Mayer, a scientific practical gardener and author, who studied his art in the royal gardens at Paris, and afterwards spent some time in England, viewing the principal country-seats, is of this opinion. (Pom. Franc., 1776.) He considers grounds laid out in the ancient style as "insipid and monotonous, from their regularity, and only calculated to produce sadness and ennui. If their aspect strikes at the first glance, it fatigues and tires at the second, and certainly is revolting and disgusting at the third." He admires English gardens in England, but states three objections to their introduction in Germany: the inferiority of the pasturage, the expense and want of space, and the necessity and advantage of attending to the culture of legumes and fruits. A mixed style is what he prefers, and what he adopted in the episcopal gardens which he laid out and managed at Würzburg.*

503. *The first example of an English garden in Germany, according to Reichard (Reise durch Deutschland, &c.), was the Garten der Schwobber, in Westphalia, in the neighbourhood of Pymont. It was laid out about the year 1750, with winding walks and clumps, and a rich collection of rare trees and plants. Hinuber's English garden, at Hanover, and that of Marienwerder in its neighbourhood, were begun about the same time; and*

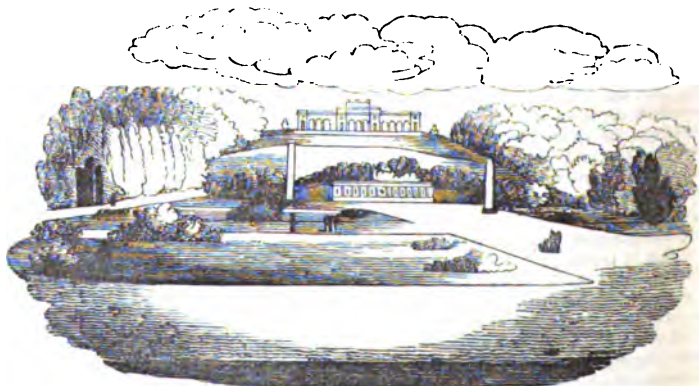
soon after was commenced the splendid example exhibited by Field-marshal Lacy, at Dornbach, near Vienna, which, it is said, originated in the family connections of that warrior with England. It was finished in part by an English gardener, in 1770, at an expense of half a million of florins. Its picturesque views and distant prospects are much and deservedly admired; but, on the whole, as an English garden, it owes much more to nature than to art. After this, the new taste, as Hirschfeld remarks, became general in the empire.

Division i. *Gardening, as an Art of Design and Taste, in Austria.*

504. *The taste for gardening in Austria* is not so great as in some of the other states; probably from the want of wealth, and the general stagnation of ideas in a city so far inland as to be totally without foreign commerce. There are, however, a few large parks, the property of the Emperor, and one or two of the principal nobles; and the public promenades at Vienna are among the finest in Germany. The imperial gardens have been greatly improved in their management, since 1827, when M. Bredemayer was appointed general director: horticultural exhibitions were established, and young men employed as head-gardeners at the imperial residences who had studied their art in England.

505. *The gardens of Schönbrunn* were laid out in the French style in 1696, from the design of the celebrated architect Fischer, of Erlach; and they were enlarged and embellished during the reign of Francis I., from 1775 to 1780, after the plans of Steinhoven, a Dutch artist. The palace is an immense building, with walls full of windows, but without much grandeur of style. The garden embraces it on three sides; to the right and left are private flower-gardens and hot-houses, for the exclusive enjoyment of the imperial family. The principal garden, which is open to every one, at all times throughout the year, covers a level space, which extends 500 feet from the front of the palace to the base of a hill, on the summit of which, directly opposite the palace, is an ornamental building called the *Gloriette* (fig. 85.), which forms a conspicuous feature from most parts of the garden

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and of the surrounding country. The level part of the garden is composed of intersecting clipped avenues and alleys, and forms a whole, grand though formal. The most conspicuous ornaments of these gardens are the *Gloriette*; the artificial ruins of a Roman building; an obelisk; a fountain richly ornamented, in compliment to the name of Schönbrunn (beautiful fountain); and a monument to the memory of the Queen of Naples. The minor ornaments are jets d'eau, and between 30 and 40 marble statues of the heathen gods and goddesses. There is a menagerie in the form of a circle, having in the centre an octagon pavilion, from the windows of which the animals are seen in their different dens, in the building which forms the circumference to the circle. All the alleys, avenues, and vistas, in these gardens, are bordered with hornbeams, which are clipped twice a year, to the height of fifty feet. The effect is a great sameness of vegetation. The botanic garden excels all others in Austria in respect to the quantity, rarity, and size of the plants in the hot-houses. On the other side of the hill containing the *Gloriette* is a Tyrolean cottage constructed of wood, and serving as a cow-house and dairy. On the whole, these gardens are inferior to those of Peterhoff and Versailles in respect to fountains, and to those of Sans Souci and Ludovisi for statues and antiques; but for simple massive

grandeur, for shade and verdure, and for all the more simple beauties of the ancient style, they are, we believe, superior to any gardens now existing in Europe.

506. *The park and gardens of Lazemburg*, containing about 300 acres (fig. 86.), belong also to the imperial family. The palace is a building of little interest but from its immensity. The surface of the park and gardens is slightly varied by nature, but more so by art; and considerable effect has been produced by planting in imitation of the natural manner, by pieces of artificial water, and by winding walks. The following are details:—

- a. The village of Lazemburg.
- b. Palace of the emperor.
- c. Servants' offices.
- d. Old palace.
- e. Soldiers.
- f. Theatre.
- g. Barracks.
- h. Greenhouse.
- i. Private garden of Prince Francis, the emperor's son.
- k. Head gunsmith's lodge.
- l. Goldfish pond.
- m. Maison de caprice, including a museum of antiquities.
- n. Artificial rockwork.

- o. Farm-house.
- p. Nursery.
- q. Place for tournaments.
- r. Phœnistray.
- s. Rustic work.
- t. Temple of Concord.
- u. Artificial lakes, covering 33 acres.
- v. Lakes and islands.
- w. Branch of the river Tirocha.
- x. Halls.
- y. Hills formed by the earth excavated in making the lakes, the rest of the park being nearly flat.

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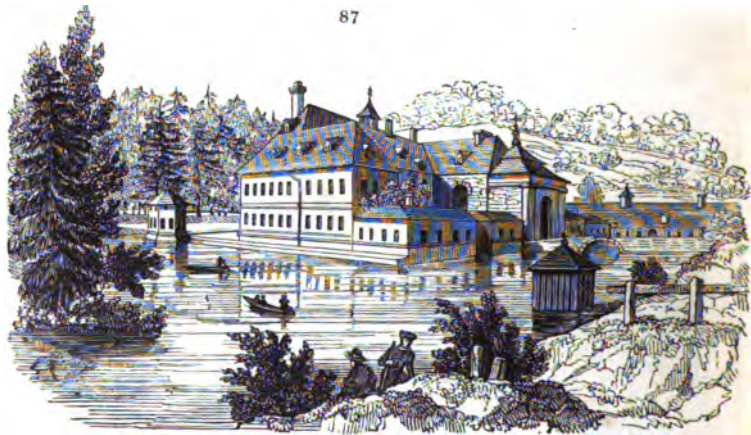
The most remarkable object in this park is the *Maison de Caprice*; a piece of grotesque architecture, spreading over a surface of two or three acres, and filled with all sorts of curiosities, and many absurdities. In the kitchen may be seen the figures of

devils sitting before the fire playing at cards. Near this is a dressing-room, in which dogs, apes, and bears hold in their paws and hands the different articles used in dressing. Other apartments and their uses are similarly caricatured; but there are nevertheless a great number of superbly furnished suites of rooms, containing collections of pictures, engravings, sculptures, ancient armour, specimens of natural history, medals, and books. A detailed account of this park, and of all the others in the neighbourhood of Vienna, will be found in *Pexzel's Environs de Vienne*, 12mo, 1814. The garden director at Laxemburg is M. Rauch, one of the most intelligent young men in the profession in Germany.

507. *The gardens and park of Dornbach* were formed by Count Maurice de Lacy, between 1766 and 1796, in which latter year he died. The grounds are much varied by nature, and were, as we have already observed (§ 503.), planted in the English manner. They are full of variety, from the inequalities of their surface, their distant prospects, and the buildings, statues, and other artificial objects which they contain.

508. *Among other specimens of landscape gardening in the neighbourhood of Vienna* may be mentioned the following:—Hetzendorf, laid out in the French style, and noted for its excellent orchards, and for a small summer garden laid out in the English manner; Belvidere, celebrated for its collection of Austrian plants; Kahlenberg, a hill, at the base of which was the house and garden of the celebrated Prince de Ligne. The prince made a zigzag road to the summit of the hill, and furnished it with seats, at all the best points of view, for the use of the public. In ascending this walk, the views of the surrounding country become gradually more and more extensive, till, arriving at the summit, the prospect on all sides is inconceivably rich and magnificent. Hadersdorf, a château (of which we took a sketch in 1814 (*fig. 87.*), belonged to the celebrated

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Marshal Loudon. The house is a very simple old building, approached by a bridge over a fine piece of water which surrounds it like a moat. There is a small ancient garden, and a park, beautifully varied by hills, valleys, and natural wood. At the extremity of this park is what is called the *jardinet Turc*, a small square, planted with cypresses at regular distances, and containing, in the centre, the tomb of the marshal. Lichtenstein is on an elevated situation, with terraced gardens, commanding extensive prospects, especially from a garden building named the Belvidere. Schönau, on the road to Styria, is notable for its varied surface, and for a mixture of park scenery with vineyards, meadows, and cornfields. Near the village of Baden are some romantic public gardens on the side of a hill, and the private garden of Baron Dobblhof, also open to the public, and laid out in the ancient manner, with an adjoining farm. Voelau, the garden of Count Fries, which contains some fine statues and monuments, is also in the neighbourhood of Baden.

509. *The public gardens at Vienna* rank among the most beautiful in Germany. In general, all the gardens of continental palaces, whether belonging to sovereigns or private noblemen, are open at all times to the people, and may be considered as public promenades; but public gardens, properly so denominated, are used not only for walking, but for music, dancing, taking refreshments, &c. The ramparts round the fortified towns are also now generally used as promenades. The principal public gardens at Vienna are the Prater, the Augarten, and Tivoli.

510. *The Prater*, or meadow, is an extensive public promenade, suited both for horses and carriages and pedestrians. It forms part of an island in the Danube, and consists of an artificial grove, used as a tea-garden; of an avenue as a course for carriages; but chiefly of the scattered remains of an ancient forest of oaks and thorns used for walking, and for exhibiting all manner of fêtes. We consider it the most agreeable scene of the kind on the Continent. Here, in the summer evenings, all Vienna is assembled: the imperial family mix familiarly with the people; and Francis the First, unattended, and in the plainest garb, selects his table and rush-bottomed chair, and calls for his coffee like any other citizen. Economical in his administration, frugal in his personal expenses, and exemplary in his morals, though a century behind the rest of Europe in his opinions, and in his system of government, he has nevertheless nothing to fear from a personal familiarity with his subjects.

511. *The Augarten* is a level spot of ten acres, close to Vienna, surrounded by an elevated broad terrace walk, commanding extensive views in all directions. The interior is planted with trees, crossed and recrossed by broad straight gravel walks; the sides of the trees next the walks being shorn like hedges. There is a magnificent banquetting-house at the entrance, for the use of the public. In this house there is an immense room, in which any decent man or woman may open a place of sale for liquors, fruits, and other refreshments; and as these persons pay no rent, every thing in this coffee-house bazaar, as it may be called, is remarkably good and cheap. The tables for the guests are ranged round three sides of the room: the fourth is for the sellers of refreshments, and the centre is devoted to walking or dancing. The Augarten was formed during the reign of the benevolent emperor Joseph; a man who appeared as much before his time, as some of his successors have lived after theirs. It was his particular wish, says his biographer Pezzel, that this garden should be open to every class of citizens. Both it, and the grove formed by the same emperor in the Prater, were planted with full-grown trees; because, as Pezzel observes, the emperor, like every man of ardent mind, wished to see the immediate effect of all his improvements.

512. *The Twioli Garden* (fig. 88.) is a private speculation, and was first opened in



the spring of 1830. It is one of those public places of amusement which, since 1814, have become fashionable in some of the large towns on the Continent, such as Paris, Naples, Milan, &c. It is situated on the east side of the garden of Schönbrunn, on an eminence called the Grüenberg (Green Mountain), about two English miles from town; and, in the fine evenings of summer, is frequented by the most respectable society. The building is sufficiently spacious to contain from two to three thousand persons; and its appearance and internal arrangement are particularly striking and elegant. In the centre is a large saloon, with billiard tables, and at each end are various rooms for refreshments. The principal amusement of the place is riding on little carriages, each containing two persons, which are set off from an elevation of about twelve feet, at the one end of the building, and by their own weight are propelled along a descending undulated railway, which passes in an extended circle to the other extremity, where the people alight, and either ascend the steps in the front to the refreshment rooms, or walk in the gardens. The carriages are then drawn under the building up to the place from which they set off, ready for a new course. The thunder-like noise occasioned by their continual passing along the wooden railway is agreeably softened by two bands of music, which play alternately. Those persons who do not choose to ride, may enjoy the scene from a broad terrace which is over the colonnade, and which affords a fine view, not only of the garden, but also of the surrounding country. On the other side of the building are winding walks, in the manner of a labyrinth; and the endeavours of some to

extricate themselves afford much amusement to the spectators from the terrace. In the evening the whole place is brilliantly illuminated with various-coloured lights, which have a most pleasing effect; and occasionally the amusements of the day are terminated with a display of fireworks. (*Gard. Mag.*, vol. viii. p. 67.)

513. *The public cemeteries at Vienna* have for a long period been in the suburbs. They display no particular arrangement, and are less ornamented with monuments and trees than might be expected from the inhabitants of the metropolis of Germany. The cause is to be found in the want of commerce, and the consequent poverty of the middle classes. In public matters, money is the soul of grief, as well as of joy.

514. *In Hungary*, Hirschfeld, in 1783, says, there were only the gardens of Esterhazy, a seat of Prince Esterhazy, worthy of notice, and that they were chiefly indebted to the beauty of the palace for their attractions. Dr. Townson, in 1793, mentions Count Vetry as laying out his grounds in the English style, aided by a gardener who had been some time in England. The gardens of Count Esterhazy of Galantha, at Dotia, he considers very fine; and those of the Bishop of Eszau, at Félcho-Tarkan, as romantic. Dr. Bright (*Travels*, 1815) mentions Körmond, the property of Prince Bathiani, as "containing a very handsome garden in the French taste, with considerable hot-houses and conservatories." Count Brunswick, of Marton Vassar, had passed some time in England, and his garden was laid out in the English style. The favourite mansion of Prince Esterhazy is Eisenstadt; the palace has lately been improved, and the gardens, which were laid out, in 1754, in the French taste, were, in 1814, transforming into the English manner. (*Travels in Hungary*, p. 346.)

Division ii. Gardening, as an Art of Design and Taste, in Prussia.

515. *The parks and landscape gardens of Prussia* are situated chiefly in the neighbourhood of Berlin; and, like those of Austria, are, for the most part, the property of the king. Frederick II. accumulated immense wealth, and displayed it principally in building and gardening, in Berlin, Potsdam, and their environs. Royal palaces are there common; and, as Hodgskin observes, they only want human beings to enjoy them. It is difficult, indeed, for a man imbued with the idea that the natural rights of all mankind are equal, to look on these palaces, notwithstanding the beauty of their architecture, without a feeling of disgust. "There are few monarchs," observes the enlightened and benevolent Hodgskin, "who dwell in the houses of their predecessors. They build palaces for themselves, which fall in their turn into ruin. How many stately mansions I have seen, that serve no other purpose but for birds to roost in, or to employ persons to keep them in repair! What an expense of human labour, to heap merely stones on stones; and how may its misdirection be deplored, when so many wastes of the earth yet remain untilld, and when the intellect of the great multitude is utterly neglected! There are no monarchs of Europe, who, in proportion to the extent and wealth of their dominions, have built so much, so splendidly, and yet so uselessly, as the monarchs of Prussia." (*Travels in Germany*, vol. i. p. 79.) Though the landscape gardens in the Prussian dominions chiefly belong to the royal family, there are still a few belonging to private individuals deserving of notice, in the neighbourhood of some of the principal towns. There are many in the neighbourhood of Dantzic; some in the suburbs of Königsburg, Meinel, and Stettin. Hirschberg, a handsome town in Silesia, has near it several gardens. A gentleman in that neighbourhood has a garden, to the different parts of which he has given poetical and mythological names. On the hill called the Hansberg many of the citizens have formed shady bowers, and built pavilions with fireplaces in them for tea-parties. The banks of the Oder, near Frankfort, are, on one side, bordered by small hills, upon which, at short distances, are little summer-houses with vineyards; and in these, in summer, many of the inhabitants reside. (*Adams's Tour through Silesia*, 1800, 8vo, 1804.)

516. *All the geometrical gardens of Prussia* were formed during the reign of that great palace-builder Frederick II. Frederick William II. introduced the English style; and the present king, Frederick William III., patronises every branch of gardening, as head of the Horticultural Society of Prussia.

517. *The ancient gardens of Sans Souci, at Potsdam*, are in the mixed style of Switzer, with every appendage and ornament of the French, Italian, and Dutch taste. Various artists, but chiefly Manger, a German architect, and Salmann, the royal gardener (each of whom has published a voluminous description of his works there), were employed in their design and execution; and a detailed topographical history of the whole, accompanied by plans, elevations, and views, has been published by the late celebrated Nicolai, of Berlin, at once an author, printer, bookbinder, and bookseller. The gardens consist of, 1. The hill, on the summit of which Sans Souci is placed. The slope in front of this palace is laid out in six terraces, each ten feet high, and its supporting wall is covered with glass, for peaches and vines. 2. A hill to the east, devoted to hot-houses,

culinary vegetables, and slopes or terraces for fruit trees. 3. A plain at the bottom of the slope, laid out in Switzer's manner, leading to the new palace; and, 4. A reserve of hot-houses, chiefly large orangeries, and pits for pines, to the west, near the celebrated wind-mill, of which Frederick could not get possession.

518. *The Sans Souci scenery* is more curious and varied than simple and grand. The hill of glazed terraces crowned by Sans Souci has, indeed, a singular appearance; but the woods, cabinets, and innumerable statues in the grounds below, are on too small a scale for the effect intended to be produced; and, on the whole, distract and divide the attention on the first view. Potsdam, with its environs, forms a crowded scene of architectural and gardening efforts; a sort of royal magazine, in which an immense number of expensive articles, pillared scenery, screens of columns, empty palaces, churches, and public buildings, as Eustace and Wilson observe, crowd on our eyes, and distract our attention. Hirschfeld, who does not appear to have been a great admirer of Frederick, and who, as the Prince de Ligne has remarked, was touched with the *Anglomania* in gardening, says, in 1785, "according to the last news from Prussia, the taste for gardens is not yet perfect in that country. A recent author vaunts a palace champêtre, which presents as many windows as there are days in the year (fig. 89.): he praises the high

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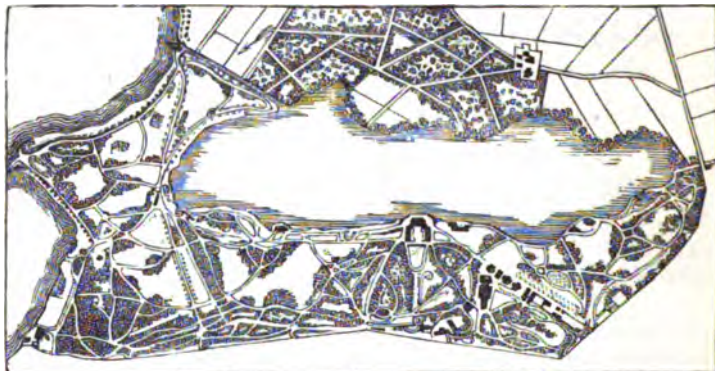
hedges, mountains of periwinkle, regular parterres of flowers, ponds, artificial grottoes, jets d'eau, and designs traced on a plain." (*Théorie*, &c., tom. v. p. 366.) Hodgskin, who visited Prussia in 1817, says, "I merely looked at the gardens, and the outsides of the palaces at Potsdam. Truly, the lodgings which are here provided for one family might almost serve a nation. There are not less than eight spacious palaces in Potsdam and its vicinity belonging to the sovereign. I doubt if the profusion of the sovereigns of France, whatever their splendour might be, ever equalled the profusion of the sovereigns of Prussia. The extensive gardens of these palaces are ornamented with a number of statues and busts. Many of them are mutilated, and most of them are covered with moss. The climates of Greece and Rome, from which countries we have borrowed the custom of placing statues in gardens, were much more suitable to it than the cold and wet climate of the North. The Greeks and the Romans, also, lived much more in the open air, in their public places, in their gardens, and amongst their statues, than we do or can. We live, principally, in our houses; and it is our houses, therefore, which we ought to render convenient, and to adorn. Statues in our gardens accord neither with our climates, with our habits of life, nor with the best mode of laying out our grounds. The great expense of so many carved pieces of marble is a mere absurd imitation of an ancient custom; it is unsanctioned by reason, and is equally condemned by good taste and sage economy." (*Travels in Germany*, vol. i. p. 76.) Braamsen, speaking of the same gardens, in 1818, says, "they are very spacious, and tastefully laid out. Near the staircase of the pavilion of Sans Souci are the tombs of some of the favourite dogs of Frederick II. The concert-room is adorned with no less than ninety-six lamps, and vases in the shape of pine-apples. The kitchen represents a Roman ruin. The grotto is elegant. The garden lies on the borders of the lake called the Heiligen See, and on the banks of the river Havel. It commands an extensive prospect, and can boast of some very picturesque scenery." (*Letters of a Prussian Traveller*, p. 51.) "The charming and sylvan retreat of Sans Souci," says the courtly physician Granville, "is approached through the Brandenburg Gate. On a small hill, disposed in terraces, stands the château, to which the ascent is by a flight of steps, with quickset hedges on each side. The terraces, and the well-arranged shrubberies, by the side of the palace, are ornamented with flowers and fruit trees, vases and busts. At the foot of the hill, the gardens are decorated with single statues and groups of figures in marble, and with two large marble reservoirs of water. A little to the right of the pavilion a handsome edifice, containing a gallery of pictures, forms, together with the principal buildings, an exceedingly pleasing landscape, which we viewed with pleasure from the western extremity of Potsdam." (*Granville's Travels*, &c., vol. i. p. 266.)

519. *The principal examples of the English style in Prussia* are the royal gardens at the summer residence of Charlottenburg, near Berlin, begun by Frederick the Great, but

chiefly laid out during the reign of Frederick William II. They are not extensive, and are situated on a dull sandy flat, washed by the Spree; under which unfavourable circumstances it would be wonderful if they were very attractive. In one part of these gardens, a Doric mausoleum of great beauty contains the ashes of the much-lamented queen. A dark avenue of Scotch pines leads to a circle of the same trees, 150 feet in diameter. Interior circles are formed of cypresses and weeping-willows; and within these is a border of white roses and white lilies (*Lilium candidum* L.). The form of the mausoleum is oblong, and its end projects from this interior circle, directly opposite the covered avenue. A few steps descend from the entrance to a platform, upon which, on a sarcophagus, is a reclining figure of the queen: a stair at one side leads to the door of a vault containing her remains.

520. *The garden of the palace of the Heiligen See* (fig. 90.) is avowedly English, and

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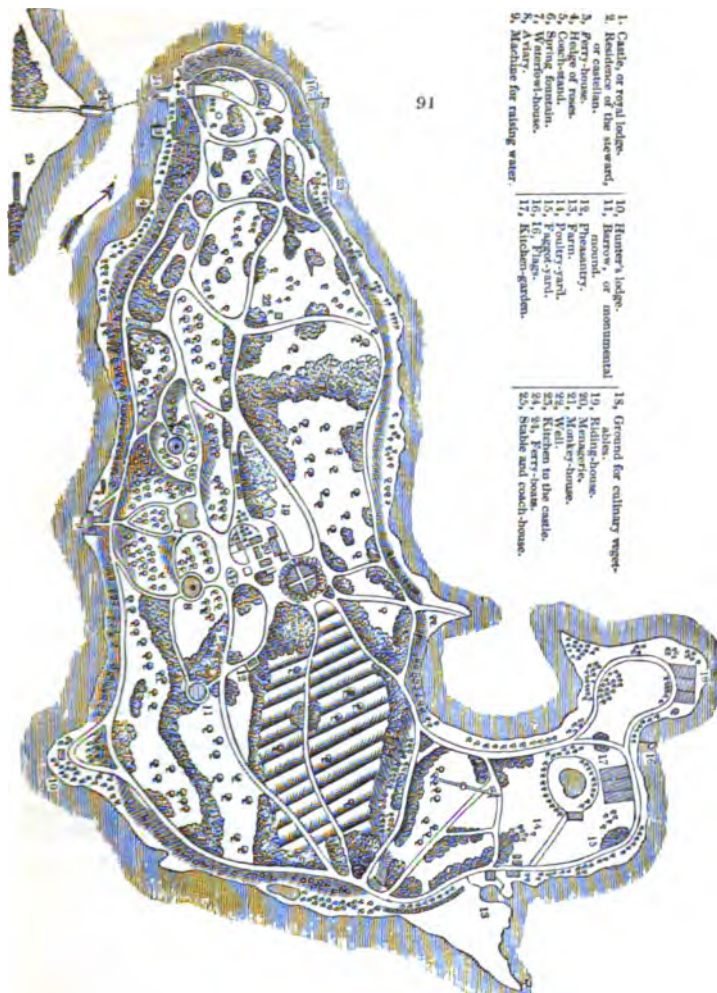
is in much better taste than that at Charlottenburg. The palace is cased externally with marble; it is in a chaste style of Grecian architecture, and is praised by Wilson (*Tour on the Continent*, 1820), as one of the best pieces of architecture in Prussia. It is built close to the lake, and the kitchen is placed in an island, disguised as a temple, and connected by a subaquarian passage. Those sumptuous works were the joint productions of the counsellor Langhaus, professor Hirschfeld, and the architect Gontard, during Frederick William II.'s reign.

521. *Count Schulenburg's garden*, near Freyenwalde, was laid out when Harris, author of *Hermes*, was envoy at Berlin; and that philosopher is said, by Hirschfeld, to have rendered the count some assistance: but so transient are these things, that we were unable (in 1813) to find out its site.

522. *A taste for landscape gardening* is stated by M. Otto, director of the botanic garden at Berlin, to be, in 1827, gaining ground in Prussia; "the Island of Peacocks (Pfauen Insel) (fig. 91.) has been so much beautified, that it may be pronounced the most perfect garden scene of its kind in Prussia; the gardens of Sans Souci have also been enlarged and improved; Prince Charles has had a new park made near Potsdam, called Glinike, which is very beautiful; and, connected with it, and the other works (anlagen) of the place, is a Russian colony of twelve houses, as a remembrance of the late war, laid out in the taste of their own country. (*Gard. Mag.*, vol. iii. p. 93.)

523. *The public gardens and promenades of Prussia* are chiefly in the neighbourhood of Berlin and Magdeburg; and, being generally on flat surfaces, they are much more indebted to art than to nature.

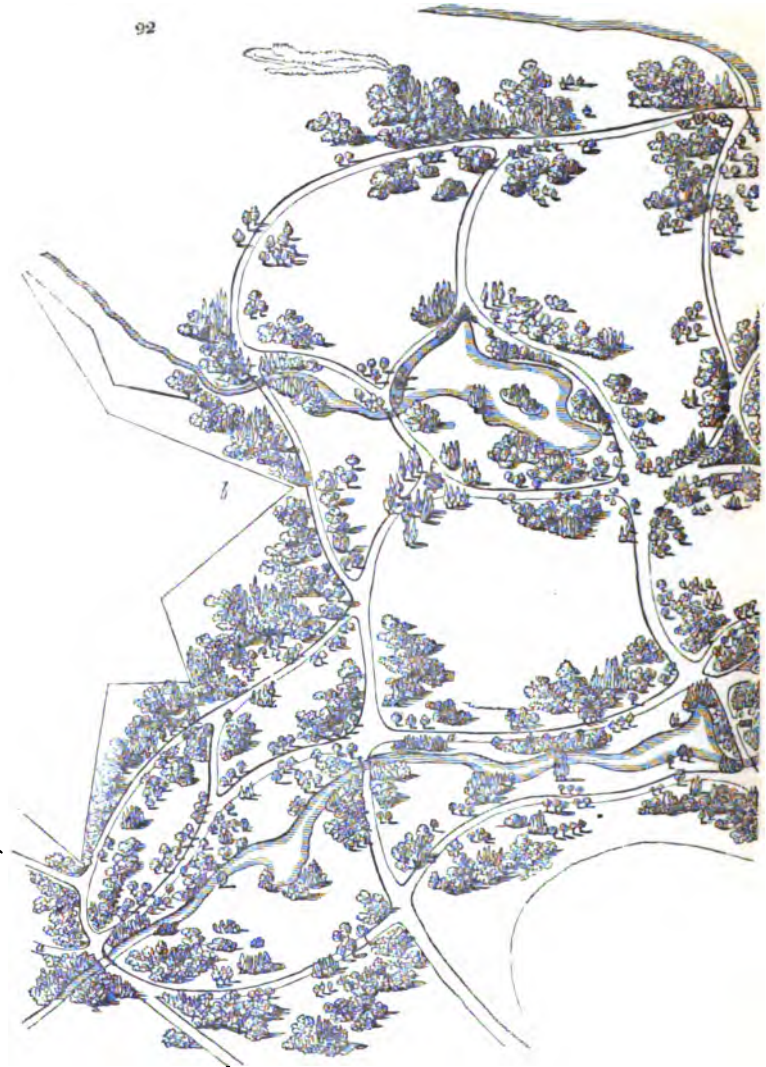
524. *Unter den Linden* (under the lime trees) is a celebrated street, at the end of which is the no less celebrated Brandenburg Gate. "This gay and splendid street," Granville observes, "is planted with double avenues of lime trees, and presented to my view a scene far more beautiful than I had hitherto witnessed in any town, either in France, Flanders, or Germany." (*Travels*, p. 270.) "It is called the Linden walk," says Bramsen, "from its being overshadowed by triple rows of linden, or lime trees, of the most graceful appearance. It forms the centre of a street, having a carriage road on each side, from which it is protected by handsome lines of granite posts, connected by iron chainwork, and illuminated by large reflecting lamps. One end of it leads into the park through the celebrated Brandenburg Gate, which is an elegant structure, designed after the Propyleum of Athens." (*Letters, &c.*, p. 29.) To complete this



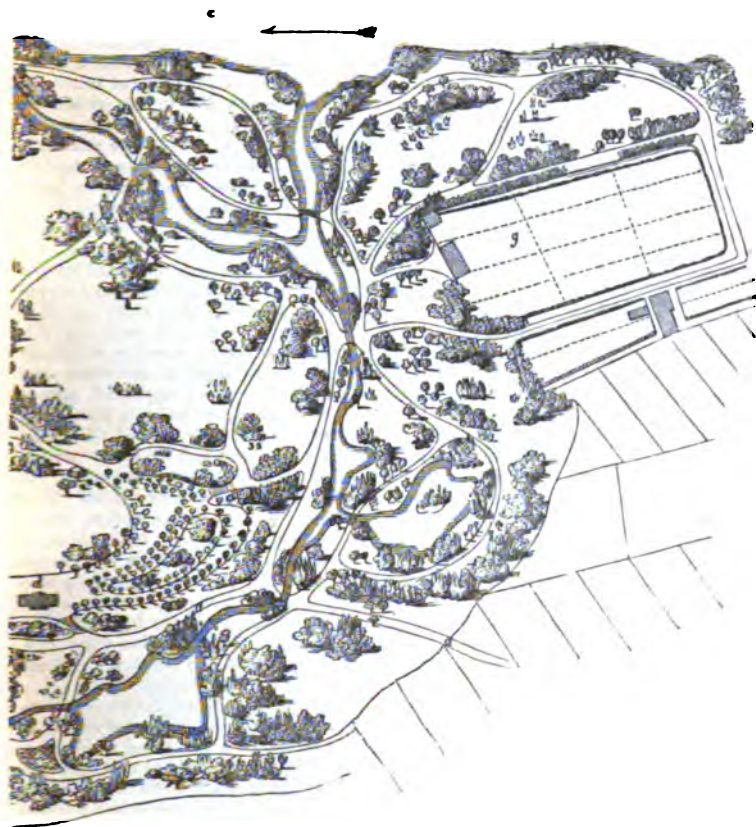
beautiful street, however, in a suitable manner, Granville remarks that paved footways are still wanting. (*Travels*, p. 270.)

525. *The Thier Garten* (wild beast garden) lies immediately outside the Brandenburg Gate, the road from which forms a straight avenue through it from Berlin to Charlottenburg and Potsdam. The extent is upwards of 200 acres, the surface perfectly flat, and the soil a loose barren sand. It was not to be expected that art could effect much with such a subject; but nevertheless, by planting the commoner sorts of deciduous trees, and by the aid of Scotch pines and Norway firs as evergreens, the surface has been covered with wood, moisture retained in the soil, and an annual manure obtained from the dropping of the leaves. Here, then, is a foundation laid, not only for sheltering and nourishing the finer sorts of trees and shrubs, but for the production of turf, without which no park deserves the name. Accordingly, this has been done to a certain extent; and there is no want of rural coffee-houses, and other places of enjoyment. We do not, however, agree with Bramsen in his opinion that the Thier Garten is one of the finest public gardens in Europe.

526. *The park and gardens of Magdeburg*, containing 120 acres (*fig. 92.*), were laid out, in 1824, by M. Linné, a landscape-gardener not surpassed in science and taste in his profession either in Germany or England. The space the gardens now occupy was formerly



covered by the outworks of the celebrated fortifications of the town. M. Linné has described these grounds in the *Prussian Horticultural Transactions* (vol. ii.), and given a working plan, with a general profile of the whole. As they display great science and beauty, considered as works of art, we shall here shortly describe the profile (fig. 92.), and shall give the working plan, with its details, in a future part of this work. M. Linné observes, that his principal object was to enable the people of Magdeburg to enjoy the distant country through the medium of a beautiful foreground. This he has contrived to do, from the ground being in some places considerably elevated above the river Elbe, and from the surface being either varied by nature, or admitting of considerable variation by art. The bare inspection of this plan, without reference either to its situation or to the nature of the surface of the ground, affords an almost inexhaustible source of instruction in the art of grouping trees and shrubs, and accommodating them to the lines of walks and of water; and when it is considered that not one of these groups is put down without a parti-



1. Road from Magdeburg to Schönebeck.
 2. Part of the fortifications of the town.
 3. The river Elbe.
 4. Banqueting-rooms.

5. Kitchen and offices to the banqueting-rooms.
 6. Temple from which very fine views are obtained.
 7. Private property.

cular reason why it should be in that pretise spot, and in no other, as we shall elsewhere explain from the description of the working plan, it is impossible not to admire the taste and applaud the skill of the excellent artist who designed it.

527. *Public winter gardens* appear to have originated in Berlin soon after the peace of 1814; and there are scarcely any, excepting those of that city, some at Potsdam, one or two at Vienna, and one at Strasburg, in France. They are the invention of M. Bouché, whose garden, however, is long since gone to decay, and the principal establishment of this description at Berlin is now that of M. Teichmann.

528. *The Berlin winter gardens* are simply large green-houses, or what would be called in England orangeries, with paved floors, a lofty ceiling, plastered like that of a room, and upright windows in front. The air is heated by stoves, which are supplied with

fuel from behind. On the floor are placed, here and there, large orange trees, myrtles, and various New Holland plants, in boxes. The plants are mostly such as have a single stem of at least three or four feet in height, and round the stem and over the boxes a table is formed by properly contrived boards; so that the tree appears to be growing out of the centre of the table. These tables, which are sometimes round, and sometimes square, are for the use of the guests, either to take refreshments upon, or for pamphlets and newspapers. Sometimes on each table there is a circle of handsome odoriferous flowers, such as hyacinths, narcissuses, mignonette, &c., in pots, round the stem of the tree; in other cases there is no table, but the box is covered with beautiful flowering plants: and in some parts of the floor, one handsome tree in the middle is surrounded by several smaller trees and plants; so as to form a mass or clump of verdure and flowers, such as we see in pleasure grounds. The flowers which are generally found in these winter gardens, throughout the winter, are hyacinths, narcissuses, ranunculuses, tulips, crocuses, roses, heaths, camellias, acacias, epacris, corraes, &c. There are also various climbers, curious or showy stove plants, pine apples in fruit, cactuses, &c., and sometimes even hardy fruit trees in pots, which have been forced, the latter both in flower and in fruit. The proprietors of the gardens have generally small forcing stoves, for the purpose of bringing forward and keeping up their supplies. It is almost needless to say that in these gardens or orangeries there are plenty of seats and small movable tables; there are also, generally, bands of music, a reciter of poetry, a reader, a lecturer or some other person or party to supply vocal or intellectual entertainment; and short plays have even been acted on the Sundays. In the evening the whole is illuminated, and on certain days of the week the music and illuminations are on a grander scale than ordinary. In some of these orangeries there are separate saloons, with billiard tables for ladies who object to the smoke of tobacco, also for card-playing, and for select parties. If you enter these gardens in the early part of the morning, during the winter season, you will find gentlemen reading the newspapers, taking chocolate, and talking politics; after three o'clock, you will see ladies and gentlemen, and people of every description, sitting among the trees, talking or reading, and smoking; or with punch, grog, coffee, beer, or wine before them. In the saloons, you will see those gentlemen and ladies who cannot bear tobacco; which, however, in some orangeries, is not allowed, and in others is only permitted till a certain time in the day. When the audience leave the theatre in the evening, a great number of well-dressed people, of both sexes, are in the habit of visiting these gardens before they go home, to see the beauty of the vegetation when brilliantly illuminated by artificial light, and to talk of the play and the players. (*Gard. Mag.*, vol. v. p. 251.)

529. *The public garden of Aix la Chapelle* is formed on the site of the ancient ramparts of the city. It includes a very considerable extent of ground. On the outside of the walls the old ditches have been filled up, and converted into walks and shrubberies, for the use of the inhabitants. The Boulevards, within the walls, have undergone the same change. But the grand promenade at Aix la Chapelle is the slope of the hill of Louisberg, which descends to the very walls of the town, and has a convenient carriage-road, as well as a handsome footwalk leading up to the summit, whence is exhibited a magnificent panorama of the whole horizon. (*Tour in South Holland, &c.* p. 326.) Granville says, that, in addition to these resources, it is proposed to form a *jardin Anglais*. (*Travels, &c.*, vol. i. p. 86.)

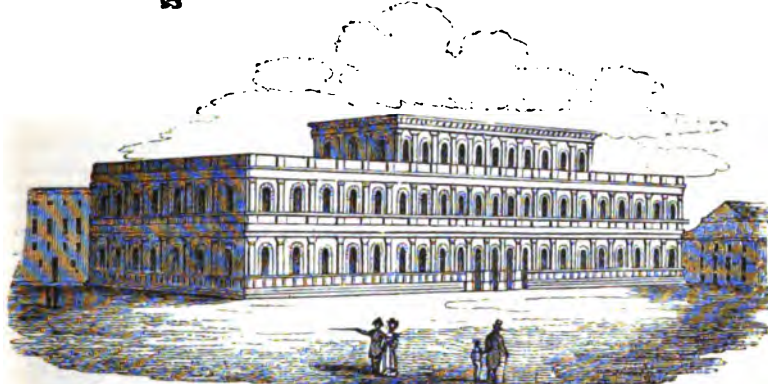
530. *The cemeteries in Prussia* offer nothing remarkable. Those of Berlin are within the exterior walls of the city, but still at some distance from the houses, and totally unconnected with the churches. They contain few good monuments, and still fewer trees and shrubs; because the people of the north are comparatively cold in their affections for the dead, as for the living. The cemetery of Aix la Chapelle partakes of the more ornamented character of its latitude; the churchyards of Königsburg, and of all the most northern parts of the Prussian dominions, are characterised by wooden crosses and crucifixes, but are almost totally without trees or walks.

Division iii. Gardening, as an Art of Design and Taste, in Bavaria.

531. *Landscape gardening* is more encouraged in Bavaria than it is in any other state of Germany. The first impulse given to this taste was by the laying out of the English garden of Munich, under the direction of Count Rumford, by Louis Skell, 1789. Previously to that period, Maximilian I. had a geometric garden planted in Munich in 1614, and subsequently Maximilian Joseph greatly enlarged Nymphenburg, and added the English garden by Skell, and formed an extensive botanical collection. The present king, Louis I., a bigot, but a poet, and a great lover and encourager of the fine arts, is much more attached to building than to any other description of improvement; and contrary, as we believe, to the wishes of the majority of the nation,

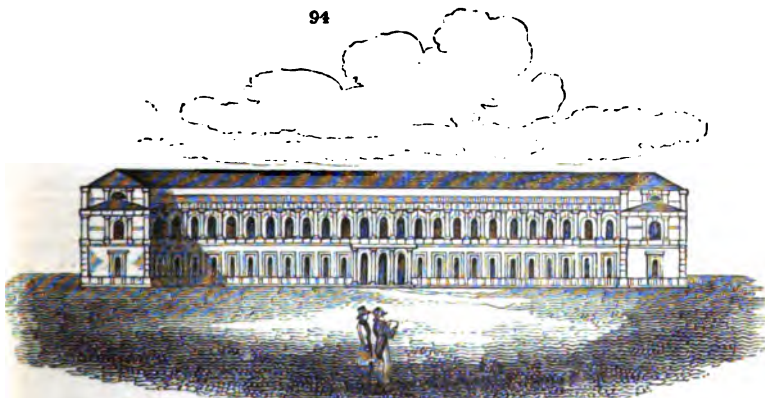
has sunk immense sums in a massive palace in the Tuscan manner (*fig. 93.*), in a Glyptothek, or building for statues and sculptures (*fig. 105. p. 156.*), in a Pina-

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kotheek, or building for pictures (*fig. 94.*), and in a variety of other buildings of luxury, for himself, for his relations, or for public display. The only argument that can be urged in favour of these buildings is, that they are generally in good taste. In our account of the gardens of Bavaria, we shall commence with those in the geometric style, as being the most ancient.

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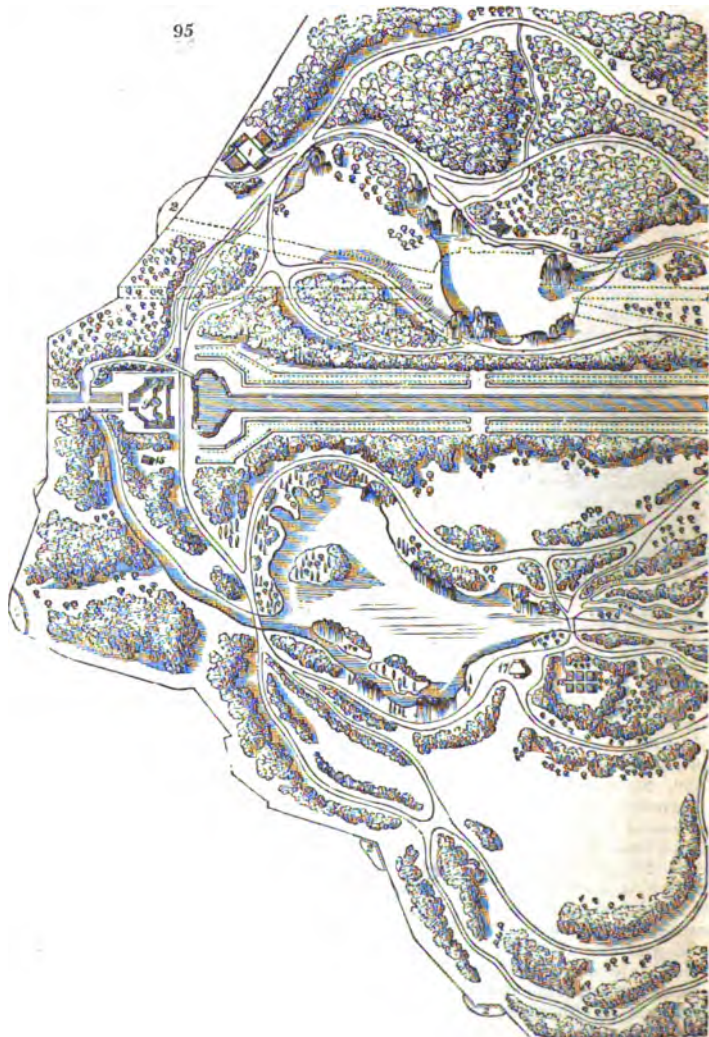
532. The palace of *Schleissheim* is an immense Italian building, with Venetian chimney-tops, never entirely completed. The park and gardens are perfectly flat, and of great extent. Water, walls, terraces, and vases, which, with the palace, must have been erected at an enormous expense, were, in 1828, in a deplorable state of decay. The kitchen-garden forms part of one of the extensive government nurseries elsewhere described. The coach-houses and stable offices constitute the buildings of the *Schleissheim* agricultural establishment, under the direction of M. Schönleutner, in which pupils are instructed in all the departments of agriculture, both theoretically and practically.

533. The episcopal palace and gardens of *Würzburg* were formerly reckoned the finest in Germany. They have been described at length, accompanied by plans, by Mayer, in his *Pomona Franconica*, 1776, and there is also a general profile of them in the *Recueil des plus beaux Jardins de l'Europe*. They are at present in a neglected state.

534. The garden of the palace of *Anspach* contains twenty or thirty acres, laid out in the simplest form of the French manner, being intersected by walks, so as to throw it into square and parallelogram compartments, bordered by rows of trees. Some of these compartments are in turf, but the greater part are used as a royal nursery of fruit trees, the king of Bavaria being unquestionably the greatest nursery gardener in Europe. There is an orangery here, that has long been celebrated in Germany: it is about 300 feet long, 30 feet high, and 30 feet wide; it contains 107 large orange trees in boxes, which were, in November, 1828, covered with fruit. The stems of some of these trees

were upwards of a foot in diameter, and the heads from ten to twelve feet across. There were a few other common green-house plants, such as pomegranates, olives, myrtles, &c. In an adjoining green-house was a small collection of ordinary green-house plants, and there were pits and frames for forcing and protecting culinary vegetables. In travelling through a small kingdom like that of Bavaria, it is impossible not to be struck by the circumstance that every thing great and good in the way of architecture and gardening belongs to the king; and one cannot help feeling it to be singular that a people who are at once poor and enlightened, should submit to the very heavy burden of taxes which are necessary to keep up these establishments.

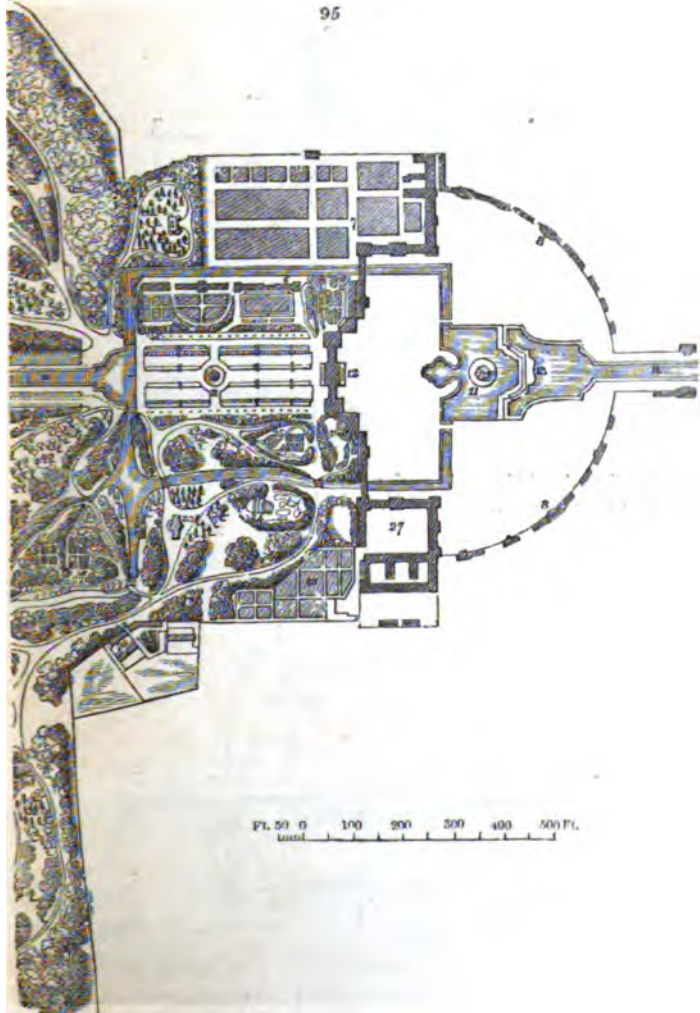
535. *The palace and gardens of Nymphenburg* are situated about four miles from Munich, on a perfectly flat surface, without any distant prospect, the country around being elevated table-land for several miles in every direction. There never was an English garden, the merits of which might be more completely ascertained by the study of the plan. (fig. 95.) These gardens were laid out by Louis Sckell, and contain two of the finest jets of water in Germany. These jets are not supplied by elevated fountains, but by the pressure produced, in one case, by a machine driven by water, and in another, by a steam engine: both are the invention of M. Baader, the chief of the



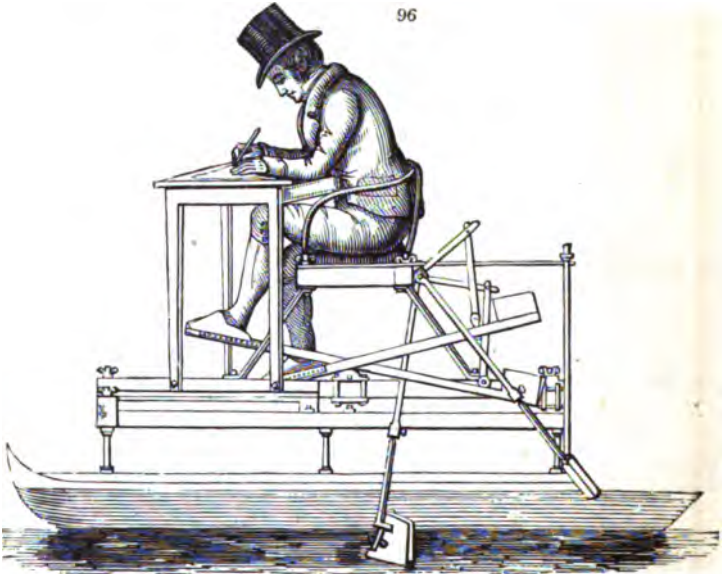
engineers of the mines of Bavaria. The water is forced into powerful air-vessels by pumps, driven by undershot water-wheels; these air-vessels unite in a main which supplies a jet that will send a column of water, about $1\frac{1}{2}$ inch in diameter, 130 feet high; or a thin, hollow cylinder of water, nine inches in diameter, eighty feet high. The thickness of the water forming the circumference of the cylinder may be about one-eighth of an inch. Air is drawn in along with the water; and, when it escapes by the jet, it makes a loud crackling noise. Several animals were at one time kept in this garden, but at present there are only some beavers. The following are details:—

- | | | |
|--|--|---------------------|
| 1. Aviary and cottage. | 14. Small temple. | 16. Grecian temple. |
| 2 2 2. Stank fence, in order to admit of a view beyond the boundary. | 17. Garden pavilion, containing pictures, statues, china, &c. | |
| 3. Garden pavilion. | 18. Place for beavers. | |
| 4. Statues. | 19. Gamekeeper's cottage. | 20. Phœnœtry. |
| 5. Covered seat or alcove. | 21. Magazine-house. | |
| 6. Range of hot-houses in the botanic garden. | 22. Bridge and water wheel. | |
| 7. Kitchen-garden. | 23. Banqueting-house for the use of the public. | |
| 8. Buildings connected with the palace, for different officers, troops, &c. | 24. Private flower-garden and summer-house. | |
| 9. Cascade. | 25. Private flower-garden and open bower. | |
| 10. Straight canal. | 26. Private garden and entrance to the palace. | |
| 11. Jetts proceeding from rocks, which throw the water, in columns nearly 6 inches in diameter, upwards of 30 feet high. | 27. Quadrangle of buildings for the officers of the court, and their establishments. | |
| 12. Centre of the palace. | 28. Small gardens for the officers of the court. | |
| 13. Cascade. | 29. Poultry yard, sheds and keeper's cottage. | |
| | 30. Shelter for game. | |

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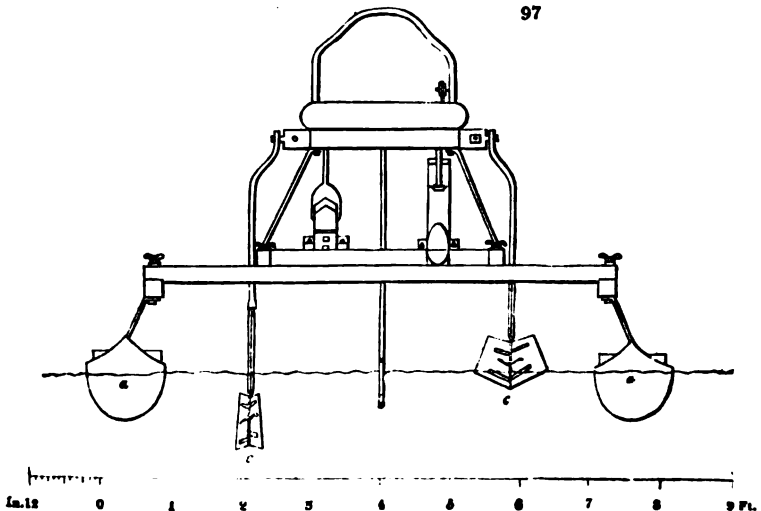


When the natural disadvantages of Nymphenburg, with regard to situation and climate, are considered, it must be allowed to be one of the greatest and the most successful gardening efforts in Germany. The trees, it will be seen from the plan, are beautifully massed and grouped; and at the same time breadth of lawn is preserved, and depth of view maintained. The straight walks on both sides of the central canal are lined with large orange trees in the summer season. As compared with English gardens, however, of the same extent and style, the gardens at Nymphenburg are deficient in evergreens, and in variety of trees and shrubs; but this defect is owing to the climate. As far as art is concerned, the late M. Sckell and his successor have done every thing that modern skill in planting, and in artificially undulating the surface, could suggest. Every part of these gardens is open to the public at all times, and without any distinction.

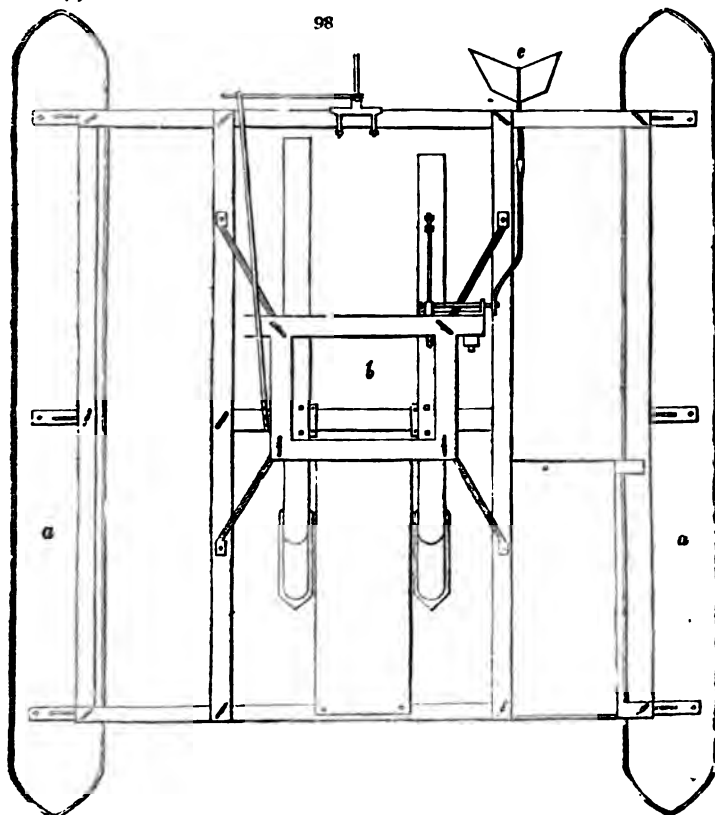


536. A curious description of boat (Figs. 96. to 98.), the invention of M. Baader, is used on the waters of the gardens at Nymphenburg during the summer season. It

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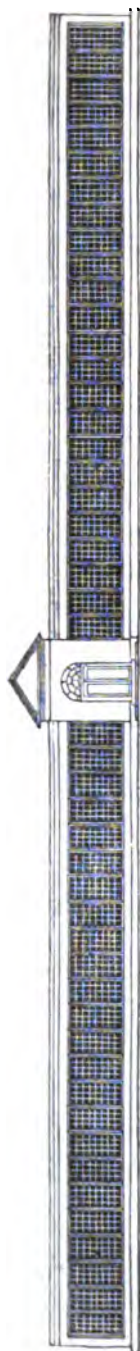
consists of two small boats (a), on which a platform is fixed (b); and on this platform a chair may be placed, in which a person may sit, and read, or angle, or shoot, and either float about as the wind may direct, or guide himself, by working with his feet two paddles. (c)



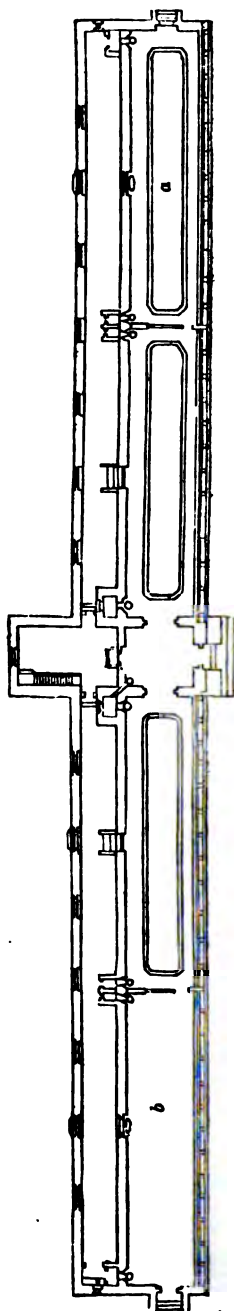
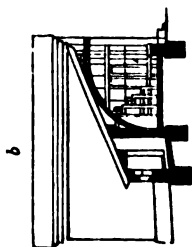
557. The architecture of the palace is by no means proportionate to the magnificence of the gardens; but we believe it is more intended as a simple country house than as a splendid regal residence. In the view of the entrance front (fig. 99.), and in the



plan (fig. 95.), the multitude of parts into which this palace and its dependent buildings are divided, give the whole more the air of a market-place surrounded by dwellings,



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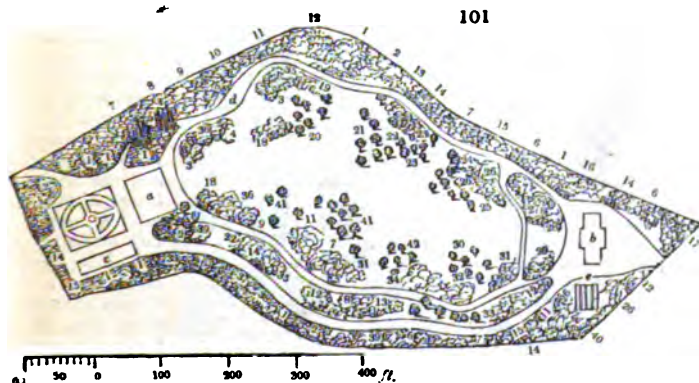


than of a palace residence in the country. This impression, however, is counteracted by the trees, the long canal, and the grandeur of the jets d'eau.

538. *The range of stoves and green-houses in the botanic garden (fig. 100.)* is very substantial, with opaque roofs; and the front glass forms an angle to the horizon of 71° , agreeably to the directions of Boerhaave. The collection of palms in the stove, in November, 1828, consisted of about 70 species, all large plants, recently procured from Holland. The catalogue of the open garden, published in 1826, by Sterler, contains upwards of 3000 species of herbaceous plants.

539. *The royal château of Berg, on the lake of Würmsee, is a private summer retreat of the king's, on the nearest hilly and picturesque ground to Munich.* The house is nothing; but the grounds, which occupy 200 acres, are hilly, irregular, rocky, bordered by an immense lake, and very picturesque. The groundwork of the wood was the remains of a forest, composed chiefly of beech, hornbeam, and spruce fir. This wood Louis Skell has judiciously enriched, and distinguished from the common woody scenery of that country, by the introduction of a number of exotics; and he has displayed the whole to the greatest advantage, by walks, by baring the rocks in some places, by deepening the glades in others, and by shutting out or exposing to view exterior objects, as the effect might require. The cherry is the only fruit tree that will thrive here as a standard, so severe are the winters. The walks are made of calcareous tuffa; and being brim-full, of a brownish colour, and firmly rolled, become as hard as solid stone, and in appearance are only inferior to Kensington gravel. This tuffa, which is the deposition of the limestone of the country, is perfectly soft when taken out of the quarry; but it very soon afterwards becomes hard: it is put upon the walks in a state of powder, only six or eight inches thick, and immediately rolled. As many of the walks at Würmsee are on very steep surfaces, were it not for the description of material of which they are composed, they would be constantly washed down by the rains. So formed, they scarcely ever require either weeding or future repair.

540. *The château of Baron Eichthal, at Ebersberg, is more remarkable for being the residence of a distinguished Bavarian patriot, who has introduced Scottish agriculture on his estate, than for its gardening.* The situation, however, is of singular grandeur and beauty. The château is placed on an elevated platform, on one side of a basin, which has once been a lake, but which is now covered with fertile fields, and surrounded by hills, partially wooded, having one outlet by a valley, in the extreme distance of which is seen Hohenlinden, the site of the famous battle of that name. A plan (fig. 101.) for laying out a pleasure-ground in front of the château was formed, in 1824, by Charles Skell; and as it is instructive, as illustrating his manner, we shall submit it with its details:—



a, Dwelling-house.
b, Stable offices.

c, Orangery.
d, Temple.

e, Frames and pits.

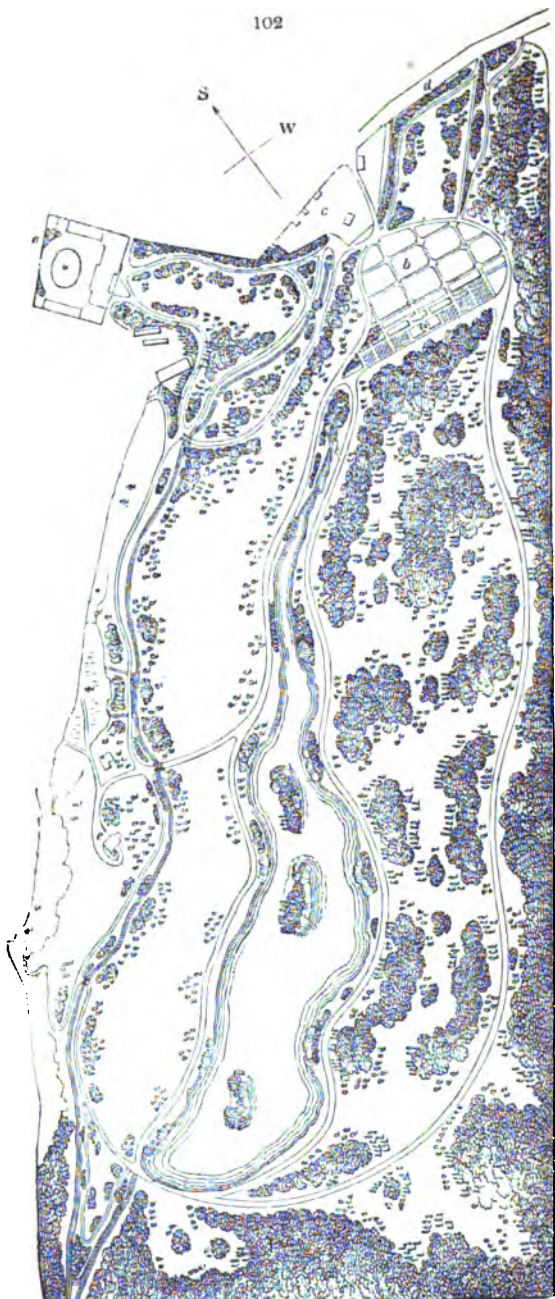
The following numbers indicate the kinds, and the disposition, of the trees and shrubs:—

- 1, *Prunus excochlor.*
- 2, *Acer Fraxin. Platanus.*
- 3, *Alnus campestis.*
- 4, *Sparg. anglica.*
- 5, *Populus italica.*
- 6, *Prunus Padus.*
- 7, *Acer Negundo.*
- 8, *Populus canadensis.*
- 9, *Spirea's opulifolia.*
- 10, *Spirea's cuneata.*
- 11, *Sparg. virginica.*
- 12, *Salix Pursh. Achela.*
- 13, *Populus canadensis.*
- 14, *Prunus Michx.*

- 15, *Acer dasycarpum.*
- 16, *Acaculus Hippocastanum.*
- 17, *Populus balsamifera.*
- 18, *Rosa sempervirens.*
- 19, *Fibrium roseum.*
- 20, *Robinia inermis.*
- 21, *Liriodendron Tulipifera.*
- 22, *Alnus Coccinea.*
- 23, *Ciste occidentalis.*
- 24, *Pyrus spectabilis.*
- 25, *Lonicera carolin.*
- 26, *Lonicera tatarica.*
- 27, *Sparg. vulgaris flore rubro.*
- 28, *Sparg. chinensis.*

- 29, *Robinia viscosa.*
- 30, *Catalpa syriensis.*
- 31, *Cornus alba.*
- 32, *Crataegus Oxyacantha fl. rubro.*
- 33, *Juglans cinerea.*
- 34, *Cytisus Laburnum.*
- 35, *Rubus odoratus.*
- 36, *Spirea's hypericifolia.*
- 37, *Ulmus salvia.*
- 38, *Acer glabrum.*
- 39, *Acer platanoides.*
- 40, *Philadelphus coronarius.*
- 41, *Salix occidentalis.*
- 42, *Populus alba.*

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- a. Proposed mansion and offices.
 b. Kitchen-garden and hot-houses already existing.
 c. Farm yard.
 d. The river Iser, which separates the park of Monteglas from the public English garden.
 e. A picturesque Swiss cottage, serving as a summer house to the count's family when they visit the garden.

541. *Schönbusch*, a favourite retreat of the king of Bavaria, about twenty-five miles from Frankfort, was formerly a forest; but, within the last fifty years, it has been changed into a park by the late M. Sckell, of Munich. M. Rinz, junior, of Frankfort, a gardener of science and taste, who has been some time in England, says, "the disposition of the trees and shrubs at Schönbusch is executed so superiorly, that the place is a masterpiece for Germany and England." (*Gard. Mag.*, vol. vi. p. 32.)

542. The garden and grounds of Count Monteglas at Bogenhausen, near Munich (fig. 102.), are partly situated on a piece of alluvial soil, left by the Iser, and partly on a high bank. There is no house; but when Louis Sckell laid out the grounds, he did so with a view to a situation, on which it is supposed the son of the present count will build. In the mean time, the kitchen garden and forcing ground here are the most celebrated of the private gardens about Munich for showy flowers. Pine apples are also grown in considerable quantity, and every description of forcing is practised. There is a good collection of orange and lemon trees; two hundred sorts of *Pelargonium*; five species and twenty varieties of *Cineraria*; a genus which seems to sport here as much as *Brassica* or *Georgina*. Bulbs are forced very early in this garden; and *Iris chi-*

nénais is much valued for the same purpose. Knoll, or bulbous-rooted celery, is grown here and in the other kitchen-gardens about Munich, to the utter exclusion of the common celery. Mignonette is grown, throughout the winter, in pits; and also *Iberia purpurea*, which, when turned out of the pots, in spring, attains a large size in the open border. There are seventeen sorts of *Chrysanthemum indicum*; eighty sorts of stocks, and a number of varieties of China roses. Among the conspicuous plants of the green-house are *Lavandula multifida* and *Phlomis Leonurus*. The fruit trees here are all named; and, every autumn, their stems are rubbed over with tallow mixed with bruised gunpowder, which is found to keep away the hares. Count Monteglas, though at present not in favour at court, is considered the regenerator of Bavaria; having, after the breaking out of the French revolution, been the first German minister who induced his government to abolish monastic institutions, and to appropriate their estates to the use of the government, and for the maintenance of a national system of education; and also to establish a representative system of government.

543. *The garden of the Prince of Tour and Taxis, at Ratisbon*, is laid out in what is there considered the English manner, and is not without some agreeable glades and points of view. There is a handsome pavilion, as a substitute for a mansion, with two wings, which serve at the same time as apartments for receiving company, giving fêtes, and preserving plants. One of these wings is heated to the temperature of the tropics, and contains palms, scitamineous plants, the bamboo, orchideous epiphytes, &c.; the other contains orange trees, camellias, and Chinese, Japan, Cape, and Australian plants. On entering the grounds, a board, elevated on a post, invites all to enter and enjoy themselves who come without dogs, and who are lovers and friends of nature. On the whole, these grounds may be considered as a delightful public garden for the inhabitants of Ratisbon.

544. *The gardens of Baron Wöhrlich, at Augsburg*, are not extensive, but they contain a considerable variety in the disposition of the parts, and in the trees and shrubs. There is also a collection of Cape and Australian plants, and some good orange trees.

545. *The gardens of Madame Heppe, at Nuremberg*, are the richest in Bavaria in botanical interest, next to those of the king, at Munich. It contains only five or six acres, but these are brim-full of interest. Madame Heppe, who is a lady of considerable wealth, devotes the whole of her time and the greater part of her fortune to botany and gardening. She has seen all the principal gardens in Europe, and makes annual excursions to wherever she hears there is any chance of procuring an addition to her collection. The garden is laid out in the regular style; and contains, besides botanical collections, in the open ground, spaces devoted to showy flowers, collections of fruit trees, culinary vegetables, a hop-ground, two large green-houses, a large stove, numerous pits and frames, and the upper part of a house, for the preservation of plants of rosemary, which is the only garden article sold by Madame Heppe, and for which there is a great demand in Nuremberg, during the winter season, for religious purposes. We observed here a good collection of gooseberries, a thing rare in Germany; and an arcade of lime trees, terminating in a perspective view of the estate of Madame Heppe, near Würzburg. Madame Heppe pursues the very commendable practice of every year trying to acclimatise a number of green-house plants; and she was the first in this part of Germany to find that *Caprifolium flexuosum* was quite hardy.

546. *The garden of M. Stüttner, at Schweinau, near Nuremberg*, is on a level surface, and occupies between five and six acres. It is celebrated for its collection of pelargoniums, which is the best in Bavaria. The published catalogue contains nearly 300 species and varieties. The gardener pointed out to us, in 1828, some hundreds of sorts, exclusive of seedlings which had not yet received names; we also saw nineteen sorts of camellia, and several hundred pots of rosemary for sale, either entirely, or in sprigs. A plant, *Astrape's Wallichii*, was pointed out to us, which cost about five guineas.

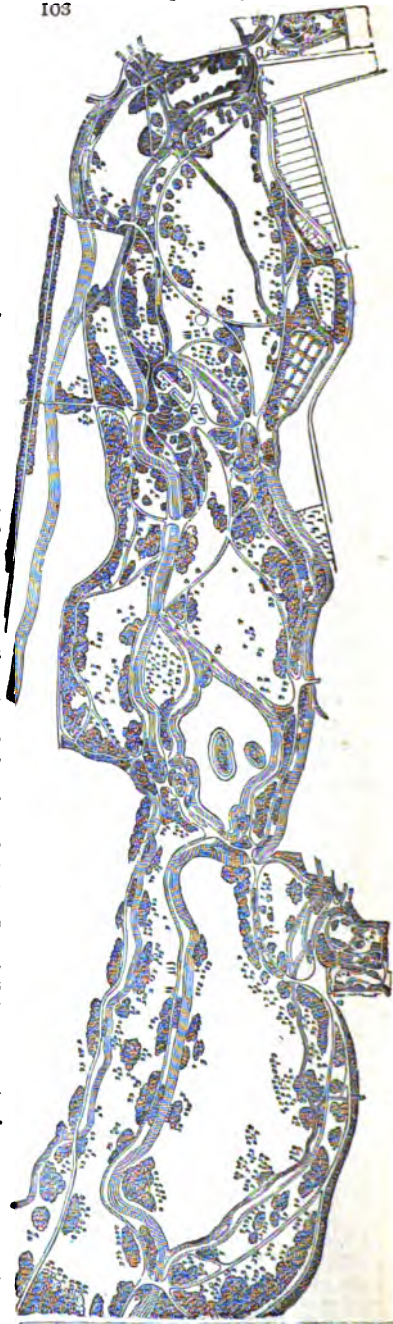
547. *Suburban gardens at Nuremberg*. The garden of M. Wiss contains six or seven acres of varied surface, with a large lake, and an island, surrounded by banks, planted with trees, and intersected by walks, from a plan of Charles Skell. The garden of M. Beitemeyer forms a striking contrast to that of M. Wiss, being laid out in the French style, and, indeed, consisting almost entirely of small circles surrounded by box; each circle containing a lime tree in the centre, clipped to a conical shape, and underneath displaying a variety of low shrubs and flowers. Nothing could exhibit greater sameness than the general plan; but every circle, individually, was full of beauty. We were informed that this garden is kept up at a great expense; the plants which do not thrive under the lime trees, being continually renewed from the commercial gardens. The garden of M. de Schwartz, at Weigelshoff, contains twelve or fifteen acres, and is laid out in a style which aims at combining a kitchen-garden, from which articles are sent to market; a nursery, from which trees are sold; and a flower-garden, in which tulips, hyacinths, and other bulbous roots are grown, with the general

effect of a landscape or English garden. The gardener we found a very scientific young man, a beautiful ichnographic draughtsman, and priding himself on his knowledge of Euclid. In this garden we found the Hamburg parsley of an extraordinary size, and were informed that seeds of it were sent to various parts of Europe, including England. We saw roots of it two inches in diameter and three feet long. We also saw large quantities of marsh-mallow roots, which are cultivated round Nuremburg by the acre, for the apothecaries and the paper-makers. Stramonium is also cultivated here for the apothecaries; and pine-apples, for the master's own table, and for sale, whenever an opportunity is offered. This garden presents a singular combination of objects of profit and arrangements for display; and it is difficult to conceive how it can attain both ends; but the satisfaction may be in the idea of attempting to attain them. Plan, though it is generally the means, is sometimes also the end. The garden of M. Campe, the principal bookseller of Nuremburg, is highly kept, and contains a good collection of green-house plants. At Erlangen, the garden of M. de Lobenicht is celebrated; at Krafthof, that of Irrgarten; and those of Weissendorff, Greiffenslein, Reinbreicklar, Plattner, Bucher, and others, are also well worthy of notice.

548. *The English garden at Munich* (fig. 103.) is the largest public garden in Germany. It contains above 500 acres, and was laid out in 1789, under the direction of Count Rumford, of whom it contains a handsome monument. The plan was made by Louis Sckell, to whom also a monument is erected in this garden. The surface is flat, but a river, always containing abundance of water, flows through it; and from this a lake of considerable size has been formed, and some cascades. The roads extend four miles. The trees are planted in masses and groups, one sort always prevailing in one place; and the only fault they have (as has been noticed by a talented writer in the *Gard. Mag.*, vol. vi. p. 408.) is, that this is done in rather too formal a manner. When passing through this garden, we could not help observing the effect of the different kinds of trees, even when stripped of their leaves. *Cornus sanguineum*, a very conspicuous red; *Lonicera Xylósteum*, white; *Salix áurea*, yellow; birch stems, white; larch, yellow; *Spiræa frútex*, dwarf and brown; *Hippóphæe rhamnóides*, very white, &c. The details of the working plan of this extensive garden will be given in a future department of this work.

549. *The public gardens of Bavaria* are numerous and extensive. Count Rumford's English garden, at Munich, is unquestionably the finest thing of the kind in Germany. Even the public roads form a species of promenade, being everywhere lined with fruit or forest trees; and where

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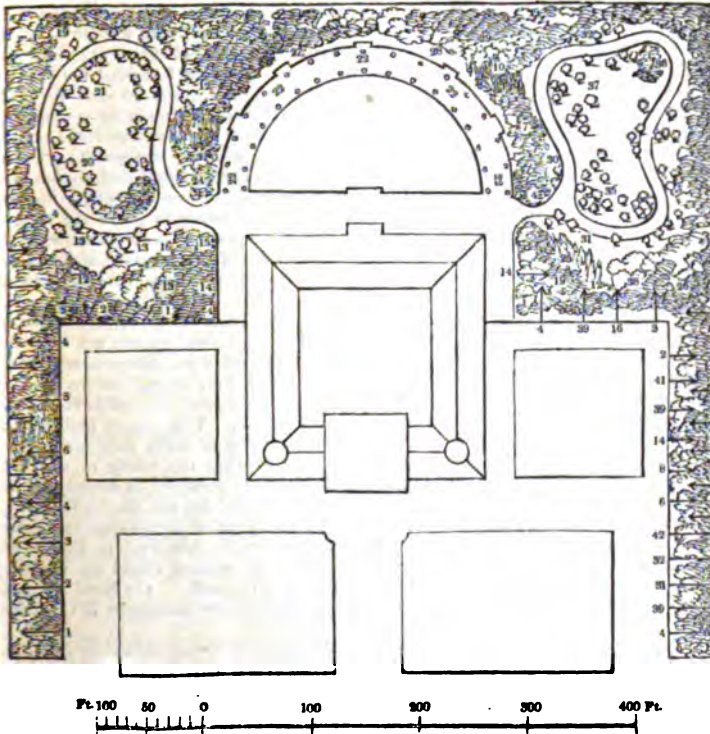
the milestones occur, they are, on several roads, placed in the radius of a semicircle of turf, surrounded by a bench of stone, and shaded by trees. The duty of ornamenting the country, by planting and otherwise improving the sides of the public roads, and by widening the streets, and raising the character of the architecture of the towns, is delegated by government to an especial commissioner, whose labours are published from time to time in a journal, entitled *Landverschönerung*, &c.

550. *The Hof Garten, or court garden*, is situated in Munich in front of the palace: it is not extensive; but it is beautifully shaded by lime trees; the ground underneath which is covered with turf, and the turf is renewed every year.

551. *The Chinese Tower, the Paradise, Tivoli, Kleinhesellohe, and Volksfeste*, are other public gardens within Munich, or in its suburbs, and they are all highly kept during the summer season.

552. *The garden of the Glyptothek* (fig. 104.) was laid out and planted, in 1837, from the design of Charles Sckell. The Glyptothek (fig. 105.) is a handsome quadrangular building, enclosing an open court, and containing a collection of statues and other sculptures, arranged in chronological order. The garden is liable to all the objections which have been made to the style of the Messrs. Sckell; that of too great a formality in the masses of one kind of tree or shrub. The following are the plan and details:—

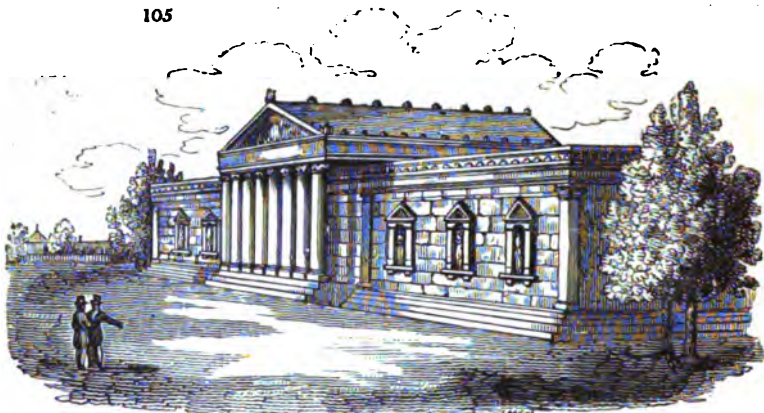
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1. *Salix a. spaldingii.*
2. *Cydonia Labillardieri.*
3. *Podocarpus neriifolius.*
4. *Cornus alba.*
5. *Cornus masculina.*
6. *Cydonia austriaca.*
7. *Prunus lauro-cerasus.*
8. *Prunus cerasus.*
9. *Prunus cerasus.*
10. *Prunus cerasus.*
11. *Prunus cerasus.*
12. *Prunus cerasus.*
13. *Prunus cerasus.*
14. *Prunus cerasus.*

15. *Robinia viscosa.*
16. *Robinia viscosa.*
17. *Platanus chinensis.*
18. *Acer Negundo.*
19. *Acer platanoides.*
20. *Larix laricina.*
21. *Platanus occidentalis.*
22. *Platanus occidentalis.*
23. *Platanus occidentalis.*
24. *Platanus occidentalis.*
25. *Acer dasycarpum.*
26. *Alnus Hippocastanum.*
27. *Crataegus oxyacantha sive rubra.*
28. *Syringa vulgaris.*

29. *Juglans nigra.*
30. *Myrica coccinea.*
31. *Syringa vulgaris.*
32. *Lonicera tatarica.*
33. *Juncus virginiana.*
34. *Thalictrum occidentale.*
35. *Alnus glandulosa.*
36. *Rosa centifolia.*
37. *Prunus pedunculata.*
38. *Robinia viscosa.*
39. *Rhus odorata.*
40. *Sorbus aucuparia.*
41. *Staphylea trifolia.*
42. *Syringa chinensis.*



553. *The general cemetery at Munich* is surrounded by a border of trees and shrubs, with the exception of one end, in which is placed a semicircular building, composed of an open colonnade in front, with vaults underneath. In the centre of this semicircular building is a projection behind, called the *Leichenhaus*, containing three large rooms, in two of which (one for males, and the other for females,) the dead, as shrouded and deposited in their coffins by their relations, are exposed to view for forty-eight hours before they are committed to the earth. The other room is for suicides and unowned bodies. The principal monuments in this cemetery are placed under the colonnade of the *Leichenhaus*, and against the boundary walls; and they are seen to great advantage from the surrounding walk. The compartments in the central part are bordered by shrubs, flowers, and tombs; and the space in the interior is devoted to graves without tombs, or to graves with monuments, for those who do not choose to go to the expense of placing them in the borders. Where interments take place without tombstones, the ground is not re-opened for seven years; and the relations of the deceased, if they come forward when that period is expired, can defer it for any longer time, according to the payment that they may choose to make.

554. *The Munich cemetery, on All Saints'-day* (Nov. 1.), presents one of the most extraordinary spectacles that is to be seen in Europe. The tombs and graves are decorated in a most remarkable manner with flowers natural and artificial, pictures, sculptures, crucifixes, vessels with meat, corn, seeds, water, oil, bread, &c., crape, feathers, drapery, canopies, branches of trees, dried moss, and, in short, with every conceivable object that can be applied to the purpose of ornament or decoration. The labour bestowed on some tombs requires so much time, that it is commenced two or three days beforehand, and protected while going on by a temporary roof. During the whole of the night preceding the 1st of November, the relations of the dead are occupied in completing the decorations of the tombs; and, during the whole of All Saints'-day and the day following, the cemetery is visited by the entire population of Munich, including the king and queen, who go there on foot, and many strangers from all parts of the country. In 1828, when we were present, it was estimated that 50,000 persons had walked round the cemetery in one day; the whole, with very few exceptions, dressed in black. On Nov. 3., about mid-day, the more valuable decorations are removed, and the remainder left to decay from the effects of time and the weather.

555. *The garden of the general hospital at Munich* (fig. 106.) was laid out by M. Louis Skell, in 1815, and is well deserving of imitation in the case of similar buildings. The only regret is, that there is not half a sufficiency of ground to keep the inmates employed. The following are the details:—

a, a, Courts of the hospital.
b, House of the director.

c, Overseer's house.
d, Kitchen-garden.

e, Summer-house.
f, Temple.

g, g, Sent boxes to admit the exterior scenery.

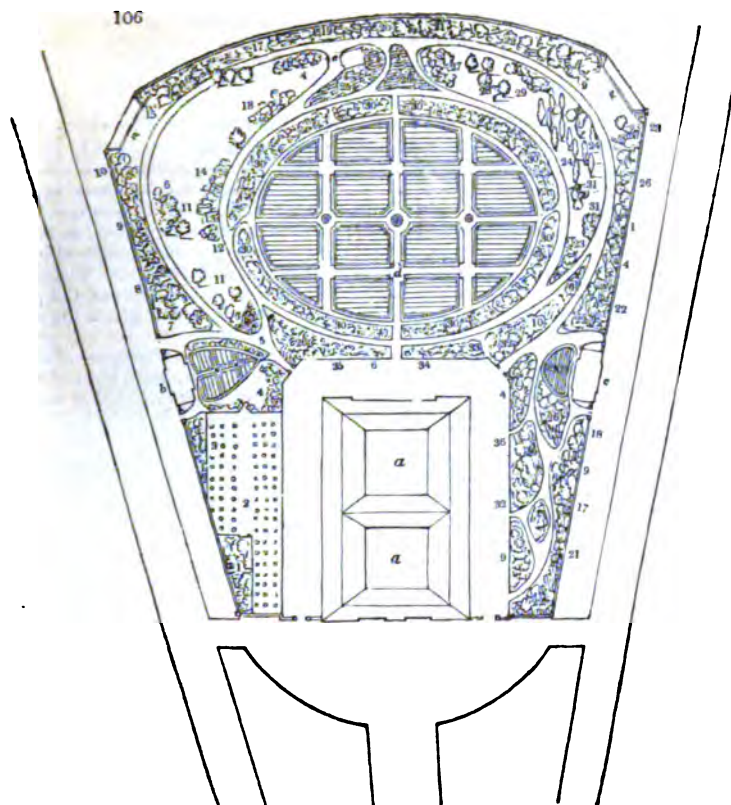
The following are the kinds of trees and shrubs used, and the manner in which they are disposed:—

- 1, *Cornus mascula*.
- 2, A grove of lime trees on turf, with benches under them.
- 3, *Cornus alba*.
- 4, *Philadelphus coronarius*.
- 5, *Ribes rubrum*.
- 6, *Ribes coccineum*.
- 7, *Cytinus latifolius*.
- 8, *Philadelphus ruscus*.

- 9, *Spiraea opulifolia*.
- 10, *Spiraea hypericifolia*.
- 11, *Populus alba*.
- 12, *Cytinus semilobatus*.
- 13, *Cytinus alpinus*.
- 14, *Cytinus nigricans*.
- 15, *Robinia hispida*.
- 16, *Robinia viscosa*.
- 17, *Robinia pseudo-Achillea*.
- 18, *Lonicera tatarica*.

- 19, *Acer Negundo*.
- 20, *Acer platanoides*.
- 21, *Prunus Padus*.
- 22, *Prunus Mahaleb*.
- 23, *Lonicera carolinensis*.
- 24, *Populus italica*.
- 25, *Ribes typhina*.
- 26, *Philadelphus ruscus*.
- 27, *Ribes Coccineum*.

- 28, *Robinia hispida*.
- 29, *Ribes coccineum*.
- 30, *Medicinalis herbata*.
- 31, *Ruscus*.
- 32, *Cornus mascula*.
- 33, *Philadelphus ruscus*.
- 34, *Philadelphus ruscus*.
- 35, *Philadelphus ruscus*.
- 36, *Philadelphus ruscus*.



Division iv. Gardening, as an Art of Design and Taste, in Saxony.

556. *Saxony*, though one of the most beautiful countries in Germany, is very deficient in magnificent gardens. The cause is to be found in the general absence of landed monopolists, and in the personal character of the electors and kings. Granville calls Dresden the German Florence, and describes its magnificent promenade, the Brühl. This consists of a terrace, ascended by a grand flight of forty steps, fifty feet wide, and follows the winding bank of the Elbe to a certain extent. On the other side, it surrounds a palace and garden, which formerly belonged to the Count de Brühl, but which are now converted to different purposes, among which may be mentioned the annual exhibition of pictures, &c., and the Academy of Arts. In one part of this succession of walks, gardens, and plantations, a Belvedere has been erected, which would be considered as a fine specimen of Doric architecture, had it not been spoiled by the subsequent addition of wooden sheds, for the purpose of affording accommodation to a *restaurateur*. (*Travels*, &c., p. 597.)

557. *The park, or Grosser Garten, at Pilsnitz*, has been considerably improved under the direction of a general officer, who has introduced the English style of gardening, and parklike plantations. (*Ibid.*, p. 646.)

Division v. Gardening, as an Art of Design and Taste, in Hanover.

558. *Hanover* is still more deficient than Saxony in fine gardens, and it has the additional disadvantage of an unvaried surface, and a miserable sandy soil. Till lately, Hanover may be considered to have been half a century behind the rest of Germany in rural matters, and in every description of knowledge. Travellers mention the garden of the residence, which was situated in the capital, and marked by a few lime trees. The garden of Herrnhäusen has long been celebrated for its double alley of lime trees, and for its jet d'eau of three feet in circumference, at the opening from which the

water issues, and rises to the height of eighty feet. The garden of Wallmoden, like the others mentioned, is open to the public; but contains little worthy of particular notice. The garden of Hinuber, already noticed (§ 503.), in which the English style of laying out grounds was first exhibited in the electorate, no longer exists.

Division vi. *Gardening, as an Art of Design and Taste, in Wirtemberg.*

559. *Landscape-gardening* has been as much patronised in Wirtemberg as in Bavaria; but, as in that country, it is almost exclusively confined to the gardens of the sovereign, and those of the members of his family. The extravagance of some of these, in laying out gardens in the ancient style, excites surprise, when we consider the smallness of the state which supplied the wealth thus lavished; and contempt, when we look at the taste of the designs, even estimating them, in good faith, according to the times in which they were produced. The ruins of the numerous royal palaces and gardens in Wirtemberg, and the yet continued creation of such works, say little for the energies of the people, blest as they are by nature, but blighted by man. We shall first notice the ancient gardens, and gradually proceed to those most recently laid out.

560. *The palace of Ludwigsberg* consists of three immense quadrangles, about 300 years old, in a good style of Italian architecture, with tiled roofs, high, but not vulgar. The apartments within are numerous, and some of them very large; but they are badly finished, and wretchedly furnished. There are two chapels, and a large hall, devoted to the meetings of the order of the Golden Eagle. There are innumerable pictures, many of them going to decay, but no catalogue. The whole interior conveys the idea of a mural desert.

561. *The gardens and grounds of Ludwigsberg* occupy 300 or 400 acres; they are principally laid out in the geometric style; but a part is in the English manner. This part lies in a hollow, surrounded by high banks; and, in one place, bounded by a perpendicular rock of red sandstone. In this hollow, a great number of objects are crowded together; a small piece of water, surrounded by weeping willows; horses, dogs, and stags, carved out of wood, in imitation of life; swings, up-and-downs, roundabouts, two places for playing at skittles, a billiard-room, a bowling-green, a trellised arcade, a marble vase, from the summit of which issues a spring of water, a rose garden, a flower garden, a rock garden, an aquarium, a vineyard, a circular tower, a grotto, and other objects. In all this assemblage there is only one part worth recollecting, and that is, the perpendicular rocky side, which is crowned with wood. The hollow appears to have been a stone quarry; and deserted stone quarries, in all countries, and in all ages, from that of the gardens of the Hesperides to the present, form the finest situations for highly enriched gardens.

562. *The park at Ludwigsberg* is laid out in avenues, with lime trees, acacias, and fruit trees; and there are some thickets in masses, the remains of natural forest scenery.

563. *The queen's garden at Ludwigsberg* is a small spot, about 100 feet by 60 feet, full of irregular walks among grass and trees, with summer-houses overlooking a public road at two of the corners. In one or other of these houses the late queen, the eldest daughter of George III. of England, and remarkable for her corpulence, used to spend six or eight hours every day looking at the passengers.

564. *The king's garden* is situated at the opposite extremity of the same quadrangle; it is about the same size as that of the queen; and, like it, has two summer-houses, overlooking a public road. The walls of these summer-houses within are covered with English prints. The late king, the heaviest man of his day, is said to have spent as much time in his summer-houses as the queen did in hers. In the interior of this garden are the remains of an aviary and of a green-house.

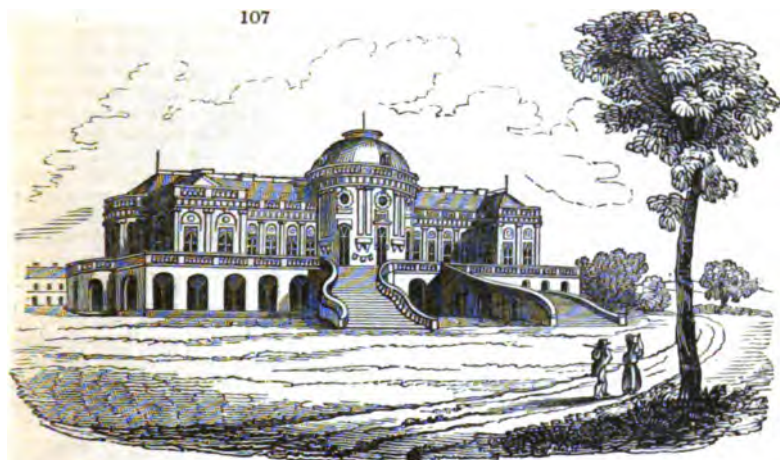
565. *The gardens of Ludwigsberg*, says an English writer, "are among the most celebrated in Germany; but, mixed with some unspoilt natural beauties, they have much trumpery and baby-house taste. By dint of being made on a large scale, the ruins, the summer-houses, the rocks, &c., are preserved from the striking insignificance common to such ornaments; but they only approach a little nearer to nature; like the young lady's wax doll, which is made as large as life, and yet is but a doll after all." (*An Autumn near the Rhine*, p. 309.)

566. *The kitchen-garden at Ludwigsberg* contains the ruins of immense ranges of glass, in which the grape, the pine, and the peach were cultivated to a great extent; and there are still three large orangeries, one of which is filled with trees as large as those at Versailles, and estimated to be between 300 and 400 years old. All the gardens here are now open to the public; though, in the late king's time, no one could enter them without a ticket of admission signed by his own hand.

567. *Solitude* is, or rather was, another extravagant absurdity of the Ludwigsberg school; and, that we may not be accused of misrepresentation when speaking of it, we shall devote a page to an engraving of the plan. (fig. 108. p. 160, 161.) It may do good as a warning beacon; and we think will cure any who may have a lingering hankering

after the antiquated royal gardens. This palace was built in a great hurry, between the years 1763 and 1767, during the reign of the Archduke Charles, who, however, could not raise money enough to finish all its appendages and details. It is situated on high table-land in the midst of a very extensive forest, consisting chiefly of beech; but with oaks, spruce firs, pines, birches, and trembling poplars intervening occasionally. This natural forest is now what it has always been; but of the ancient gardens there is scarcely a trace remaining. The palace, or *lust-haus* (pleasure-house), may be described as resembling that of Mon Repos (§ 574.) upon a larger scale. (fig. 107.) It exhibits

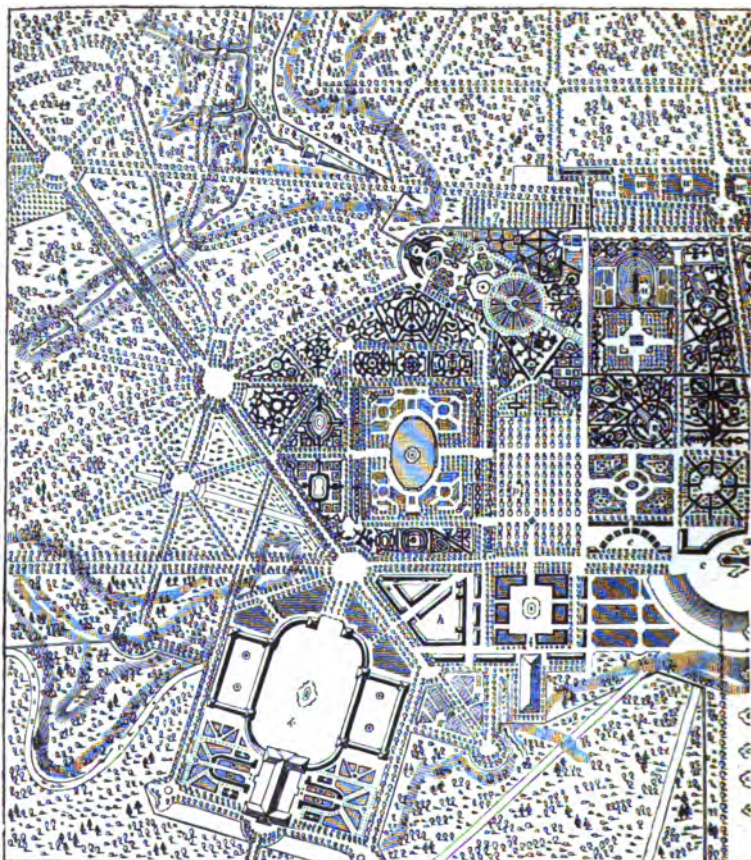
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the same surrounding arcade, surmounted by a broad terrace, and ascended by a ramp, with the same cupola in the centre. The architecture, however, is in worse taste; it is covered with painted and gilt ornaments of the most tawdry description; which, with the wooden balustrades, are now fast falling to decay. The rain, in 1828, was falling through the roof in a great many places, and rotting the painted and richly gilt ceilings and cornices, and the miserable remains of the once costly furniture and pictures. If the effect of solitude can be heightened by desolation, the whole may be said to be in excellent keeping. There is, however, one fine feature of this place, which must not be forgotten; and that is, the prospects which extend in all directions from the terrace. The extent of these prospects will be understood, when we mention, that the situation of Solitude is nearly 3000 feet above the level of the sea; and that the country falls from it, though gently, on every side. For miles around the palace, this country is covered with forest, which forms a foreground to upwards of sixty towns and villages seen in the distance. But the finest view is that towards the palace of Ludwigsberg, along an avenue of several miles in length, distinctly seen from one end to the other. This avenue descends into a broad valley, and rises again on the opposite side, till it reaches Ludwigsberg, in a truly magnificent manner.

568. *Hohenheim* was the favourite residence of the Archduke Charles. The situation is on an elevated flattened hill, altogether without natural beauty, except in the distant views. It was laid out in the ancient style, at an enormous expense, and, as appears from the plans which remain, with little grandeur of effect. The gardens have ceased to exist for several years, and the palace and its offices have been converted into an agricultural institution, of some note, as having been under the direction of Schwartz. The plan of the gardens has not even the merit common to geometrical plans, of looking well on paper; and, with it before us, we cannot help experiencing a mixed feeling of wonder and disgust, that men should have been found to admire such a design, and a people so abject as to raise the money for its execution. That it did not please for any length of time may be inferred from its being destroyed before it was fully completed.

569. *The English garden of the new palace at Stuttgart* was laid out, in 1809, from a design by the late king. It was planted with lime trees, from twenty to forty years old, from the avenues of Ludwigsberg and Solitude. All of these trees died in three years; their heads were not reduced, and their roots were not cut round and prepared a year or two before transplanting. The places of the dead trees have been since supplied by lime trees, with stems of four inches in diameter; horsechestnuts, eighteen inches in diameter; poplars still larger, and platanus nine inches in diameter; all of which were planted with their branches severely cut in, and have succeeded perfectly. An avenue



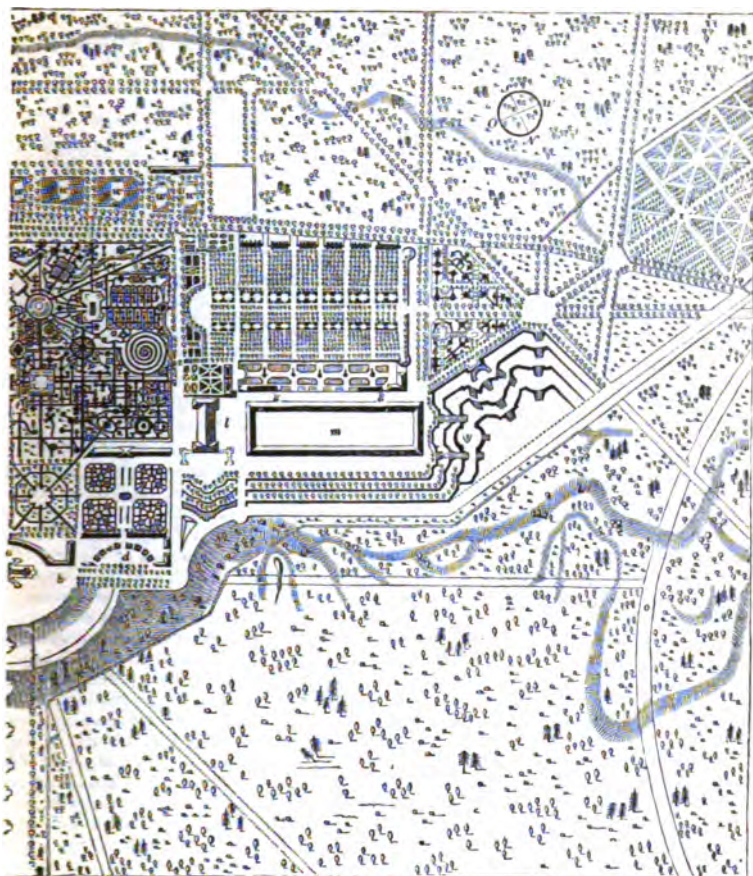
- a. Palace.
 b. Chapel, assembly-room, and buildings for gentlemen attendants.
 c. Theatre and apartments for officers and gentlemen attendants on the archduke.
 d. Summer dining-room, billiard-room for the archduke, billiard-room for his gentlemen attendants, and lodgings for servants.
 e. Kitchen and other offices.
 f. Orangeries.
 g. Vineyard.
 h. Academy of art.
 i. Evangelical chapel.
 j. Aviaries.
 k. New military academy.
 l. Riding-school.

from the front of the palace through the centre of this garden, planted with platanus, rising from hedges of mixed roses, chiefly of the Provence sort, leads to the new palace of Rosenstein.

570. *The palace at Stuttgart*, says the author of *An Autumn near the Rhine*, "has the centre of the pediment surmounted by an enormous gilt crown and cushion, which would make an admirable sign for a flashy hotel by the roadside. On est toujours fier de ce qu'on ne possède que depuis peu. The interior of this palace is full of ostentation and costliness. There is a double carriage-road, with a footpath on each side, from the palace to the court farms, and to the village of Constadt. It is forbidden to enter by the exit road, or to go out by the entrance path; and walking in the high road is as much contrary to law as driving on the footpath." The author afterwards mentions that he received a reprimand from a cocked-hat Swiss for the latter error (p. 268.).

571. *Scharnhausen* is a villa residence occupied by the late king when he was crown prince. It is in a fine natural situation, on the side of a narrow valley, but spoiled by artificial objects, and by too great a prevalence of Lombardy poplars.

572. *Klein Hohenheim* is a Swiss cottage, with adjoining stables and cow-houses, on the margin of an extensive park devoted to the breeding of horses. The park is naked,



- m. Stables, coach-houses, &c.
 n. Open space for feeding the deer and sheep during winter.
 o. Broad open grass-walks for the pasturage of the sheep.
 p. Orange gardens, in which the trees are not set in parallel rows on beds of grass.
 q. Nursery.
 r. Chateau house and garden.
 s. Scroll of bridges.

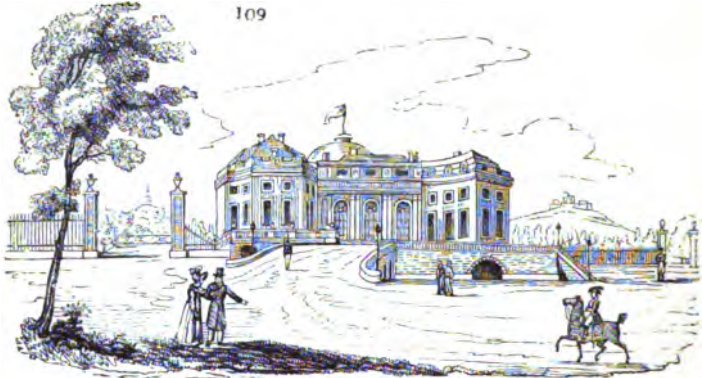
- t. Grand arcade or covered way of trellis-work and vegetation, for walking under during the mid-day sun in summer.
 u. Labyrinth.
 v. Garden theatre.
 w. Ponds.
 x. Avenue of orange trees.
 y. Mall and terraces.
 z. Artillery.

and may be described rather as a grass-field than as a portion of forest scenery. The cottage contains three sitting-rooms and a bedroom, which the king is said to have occupied sometimes for several weeks together. The timber used in the interior of the cottage is that of the silver fir, not painted. The roof is covered with shingles. The finest feature of the place is a high bank, seen across the park, beautifully varied by oak trees, and which, in 1828, reminded us of Norbury Park in Surrey.

573. *Bärenschlösschen* is a small rustic hunting-lodge, about a mile from Solitude, in the same forest. The building is on the model of Solitude and Mon Repos, surrounded by a raised terrace, containing a circular saloon in the centre, with apartments to the right and left. It is placed on a green knoll, surrounded on three sides by a little valley; but the natural beauty and character of the situation is destroyed by two approach roads carried across the valley on high mounds of earth. One of these mounds dams up a rivulet, and forms a lake; the margin of which is very well varied by birches and poplars, which have sprung up accidentally on the water line. The lodge is coated outside with bark of trees, and the interstices are stuffed with moss. The roof is thatched with heath. In various parts of the walls birches and Scotch pine have rooted themselves, and attained a considerable size. In the interior, the furniture is all of the

rustic kind, and even the timepieces are cased with bark. On firing a gun, the surrounding woods send forth deer, wild sheep, and wild swine, which are fed or shot from an adjoining shed.

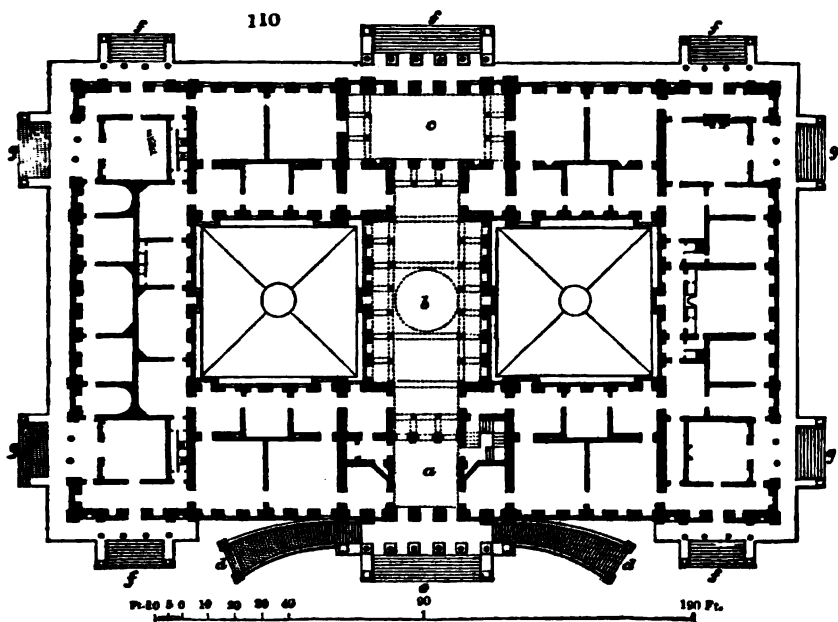
574. *Mon Repos* (fig. 109.) is a highly finished retreat belonging to the king, in the



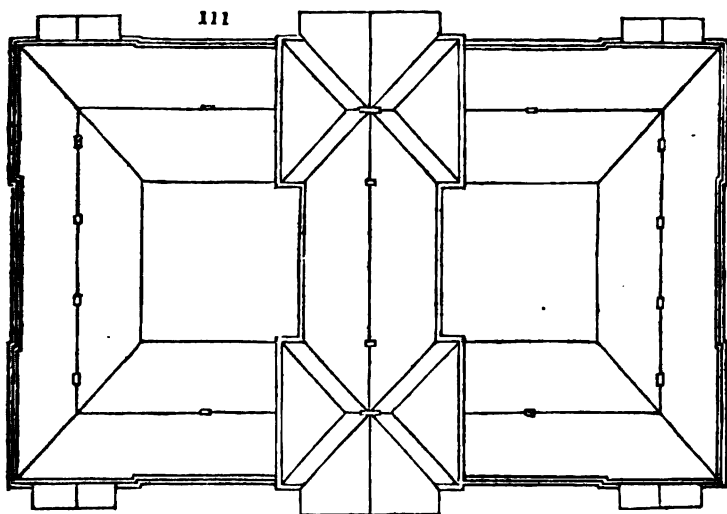
neighbourhood of Ludwigsberg. The pavilion is small, but in regular Roman architecture, surrounded by an arcade, over which is a broad terrace on a level with the first floor. The apartments are full of curiosities; china, mirrors, sculptures, timepieces, &c. Some of the largest mirrors are composed of several plates, joined together at the angles, in a manner considered new in this country some years ago (*Gard. Mag.*, vol. iv. p. 178.), but which is evidently old enough here. The situation of the house is on the margin of a large artificial lake, irregular in shape, and yet not natural in appearance. The house, on the garden front, contains several terraces, ornamented vases, statues, and other sculptures; and these, in November, 1828, were covered with cases of boards, with far-projecting mushroom-like tops to throw off the rain, which had an exceedingly good effect. The boundary fence to the grounds is composed of stone piers, with intermediate pannels of wood. After being shown the house, strangers are taken in a boat to an island in the lake. Here they ascend some bold artificial rockwork, and, by a circuitous route, shaded by Scotch pines and other evergreens, arrive at a spacious cave, containing a number of grotesque figures, modelled in wax, as large as life, and sitting round a table, which we were told were representations of the ancient judges of the country. The president was pointed out to us, with a book under his hand, and his secretary standing beside him. From this cave we ascended still through rockwork, and under the shade of pines, to a small Catholic chapel, at one end of which is a low building thatched with heath, about the size of a cottager's pigsty, containing a mechanical hermit, whose interior machinery, by the opening of the door, lifts up his hand, stretches it out, and shakes his head. Our attendant informed us that the late king took pleasure in frightening women with this gewgaw.

575. *The palace, or landhaus* (country-house), as it is called, of Rosenstein, is beautifully situated on rising grounds in the neighbourhood of Stuttgart, with the royal palace in which it communicates, by a straight road, three miles in length, through a mixed style of landscape. The palace (figs. 112. to 116.) is from the designs of Salucci, and is characterised by an elegant simplicity of style. In the ground-plan (fig. 110.) there is little peculiarity of arrangement; from the entrance hall (a) one room succeeds another to the right and left, each having a servant's entrance from a similar succession of smaller rooms behind. In the centre is a grand hall (b) for extraordinary occasions, lighted from the sides and from the roof. At one end of this hall is the principal saloon (c). There is an ascent for carriages (d d) to the entrance portico, which they drive under; and also a broad flight of steps in front (e). There are five other porticoes (f f f f f), and four loggias (g g g g), which have each flights of steps. The vertical profile of the roof (fig. 111.) is beautifully simple.

576. *The entrance front elevation* (fig. 112.) is of very great beauty, and may well challenge comparison with any country-house in Britain. The circumstance of there being only one range of windows, conveys the idea of lofty apartments within; and the height and width of the centre portico gives some idea of the spacious dimensions of the entrance hall, and of the banqueting chamber, which forms the main body of the building. The height and finishing of this banqueting chamber will be understood from the cross section (fig. 113.); in which also will be seen the under-ground passages (h h), which connect the cellars, and lead to the kitchen; the latter, as will be seen in the plan of the



grounds (*fig. 119.*), is at some distance from the house. The sides of the banqueting room, have two ranges of windows (as seen in the section and elevation *fig. 114.*), in conformity



with the Grecian style, and to harmonise with the double tier under the entrance portico; otherwise, as they give light to the same apartment, reason would dictate that the height

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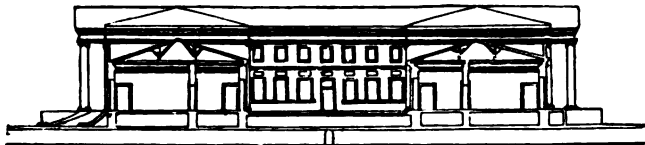


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of the upper windows should have been added to the lower ones, and that we should have had one range only, instead of two. To such architects as are the slaves of precedent

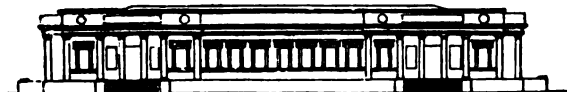
114



this would be an intolerable innovation; to us, who think we are guided by utility and effect, a single range of lofty windows in both sides of this banqueting room, and under the two porticoes, would be a decided improvement on Salucci's design.

577. *The east and west elevations (fig. 115.) are the same; and the elevation of the garden*

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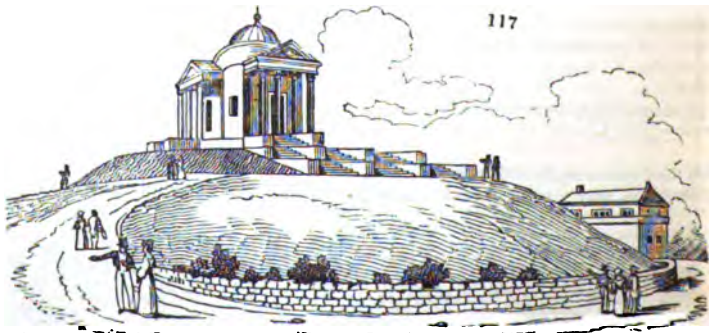
front only differs from that of the entrance front (fig. 113.) in being without the carriage ramp. The effect of both fronts is seen to advantage in the two views (figs. 116. and 118.) In the view of the entrance front (fig. 116.), the chapel of Rothenberg is seen from the

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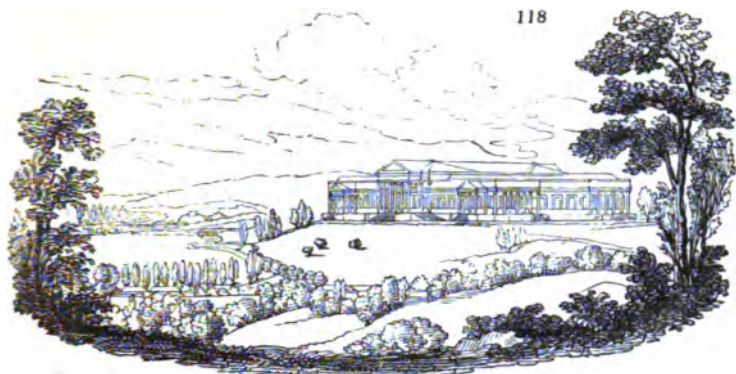


summit of the hill of that name. This chapel (fig. 117.) was built by the present king, at the request of his first wife, as a burial-place for her remains. In the view of the

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garden front (fig. 118.) will be seen, to the left, the valley of the Neckar; in the foreground, orchards; and in the distance, hills covered with vines. It is utterly impossible to



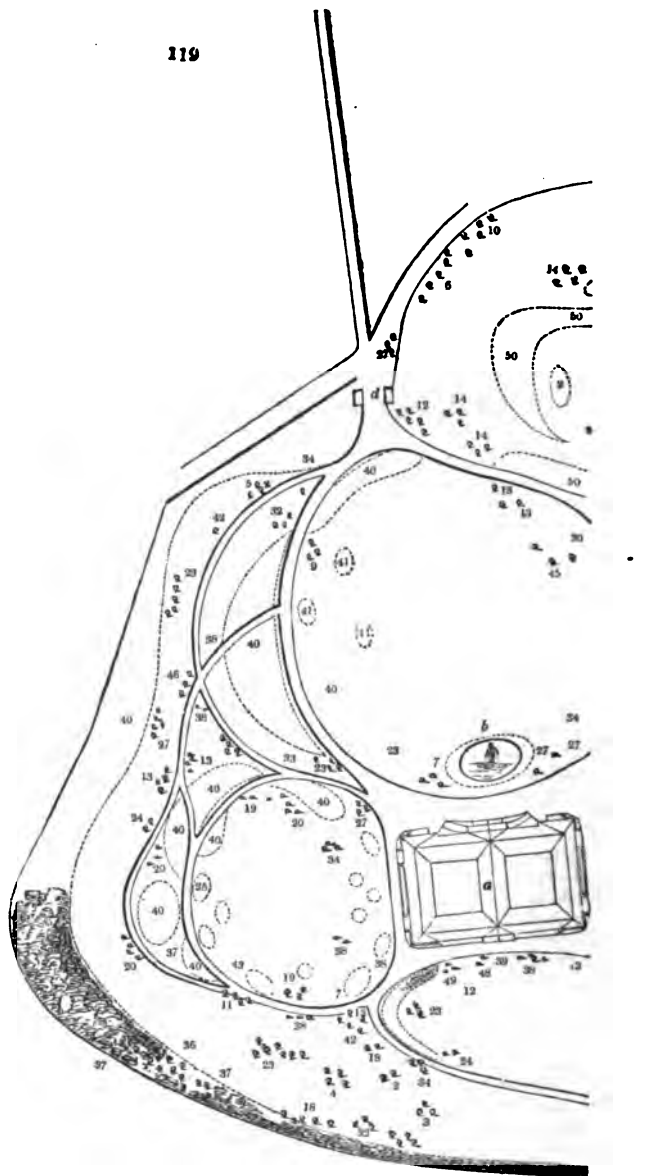
give an idea of the great beauty of the situation of the palace of Rosenstein otherwise than by very large views. The hills and mountains which every where surround it, all of the most varied and beautiful forms, and at the most suitable distances for effect; the lower ranges covered with fruit trees, cottages, and vineyards; and the higher summits bare or clothed with forests; that noble river the Neckar, at the bottom of a steep bank, immediately under the eye; its fertile valley, with the ancient village of Constadt on one side of the palace; on the other, at some distance, the city of Stuttgart; and in every direction the parklike style of the country, form altogether one of the noblest situations for a princely residence which we have any where seen. So admirably do the orchards, vineyards, and plantations of adjoining proprietors harmonise with the park, that it seemed to us, in 1828, as if the whole kingdom of Wirtemberg had joined together in forming a park and palace for their king. This seeming effect, however, we found to be very different from the reality; for, on conversing with persons of different ranks, we found, that though the beauty of the situation, and the merits of Signor Salucci, the architect, and M. Bosch, the landscape-gardener, were fully allowed, yet that the palace was considered altogether unnecessary for a king who had already so many, and as much too costly a fabric for the ruler of so small a kingdom.

578. *As compared with an English palace*, that of Rosenstein has considerable defects in the windows and in the interior finishings. The windows are in the French manner; but, instead of opening from the bottom to the top, they have a cross mullion at about two thirds of their height, all the glass above which is fixed. In winter, the only mode of giving air, without filling the rooms with the external atmosphere, is by opening single panes; and even in summer, the rooms can never be so thoroughly ventilated as if the windows opened from the top. The timber-work, and the hinges and fastenings of these windows, would be reckoned very clumsy in Britain, and the glass is wavy, blistered, and not clear. In such a palace, in England, two large panes of plate-glass would have filled each window; and the two sashes would have been hung, instead of opening inwards. The mode of heating by stoves ought not to be objected to in Germany; nevertheless in a king's palace, a system of flues in the floors and walls might have been advantageously substituted for it. The plaster-work is so very inferior to that of an ordinary house in England, that to an Englishman it gives the idea of poverty and meanness; but the floors, some of which are inlaid, are good. We say nothing of the furnishing of this palace, because that, when we saw it, was not completed.

579. *The grounds round the palace of Rosenstein* contain between 200 and 300 acres, and the surface may be described as that of a flattish hemispherical table-land, laid out in imitation of the English manner; it is more formal than would have been the case in England, but, at the same time, not without elegance in the lines, as may be seen by the map (fig. 120.). The planting is done in the manner of Sckell, and Linné of Berlin; combining forest trees with fruit trees, and shrubs with flowers; and always having one sort prevailing in one place.

580. *It will be observed* that, in the list, there are no Scotch pines, spruce fir, or birches: the reason is, as we were informed, that the king, when in Russia, and courting his first wife, was so disgusted with the prevalence of these trees, in the neighbourhood of Petersburg, and the absence of almost every other kind, that he positively forbade their introduction at Rosenstein.

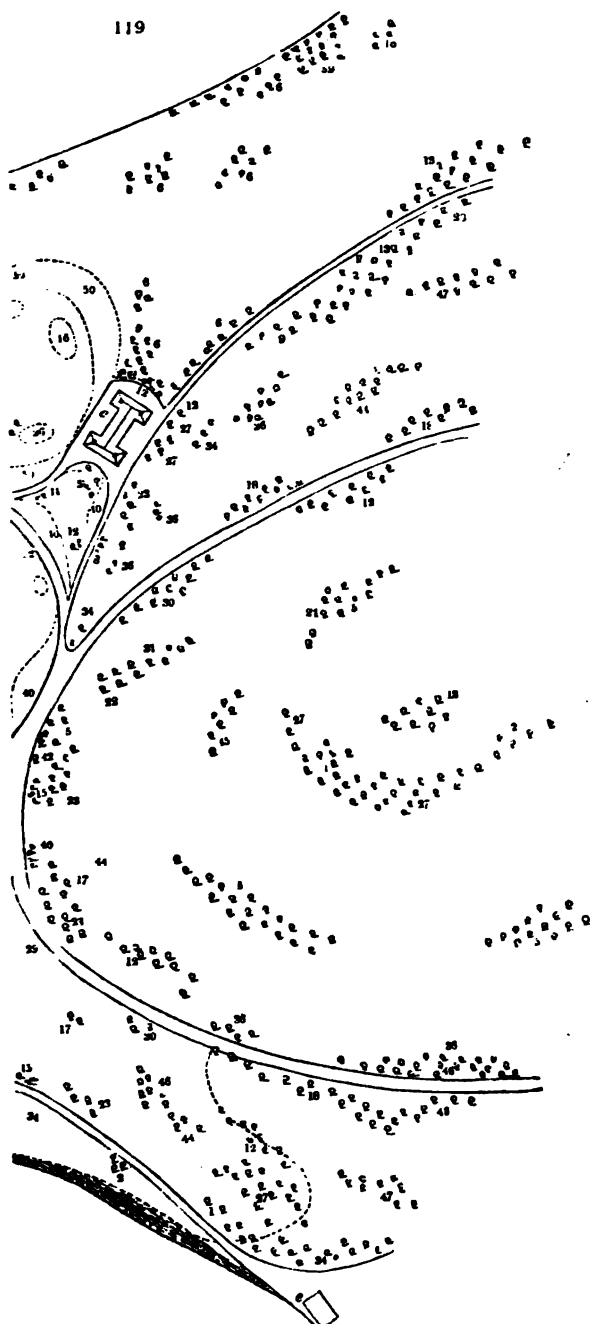
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1. Palace.
2. Pond and fountain.
3. Kitchen.
4. Entrance from the avenue leading to Stitzard.
5. Entrance from Constat.
6. *Acer dasycarpum*.
7. *Nerandium fraxinifolium*.
8. *Acer platanoides*.
9. *Acer tataricum*.
10. *Prunus Hippodamum*.
11. *Forsythia*.
12. *Prunus rubra*.
13. *Amelanchier pumila*.
14. *Apple, sorts*.
15. *Apple and pear, different sorts*.

16. *Apricot*.
17. *Cedrus syriaca*.
18. *Calycanthus floridus*.
19. *Cercis Siliquastrum*.
20. *Cherry*.
21. *Crataegus Oxyacantha s. rubra*.
22. *Schubertia dactyla*.
23. *Rosa sylvestris*.
24. *Prunus exocaulis*.
25. *Gleditsia triacanthos*.
26. *Hippophae rhamnoides*.
27. *Opuntia nigra*.
28. *Phlox regia*.
29. *Liriodendron Tulipifera*.
30. *Lonicera tatarica*.
31. *Mirabilis, red and yellow*.

32. *Peach*.
33. *Platanus orientalis*.
34. *Platanus occidentalis*.
35. *Populus alba*.
36. *Quercus Cerris*.
37. *Quercus rubra, alba, and other species*.
38. *Quercus tinctoria*.
39. *Rhamnus, sorts*.
40. *Rubus, diverse species and varieties*.
41. *Rubus idaeus*.
42. *Rubus Psudo-Acheia*.
43. *Rubus violaceus*.
44. *Rosa, many sorts*.
45. *Rosa centifolia*.
46. *Shrub*.



- 41, Shrubs and flowers.
42, *Sophora japonica*, with vines twining round it.
43, *Syringa vulgaris*, *piraeica*, and *chinensis*.

- 44, *Tilia americana*.
45, *Tilia europaea*.
46, *Tilia*, various species.
47, *Ulmus campestris*.

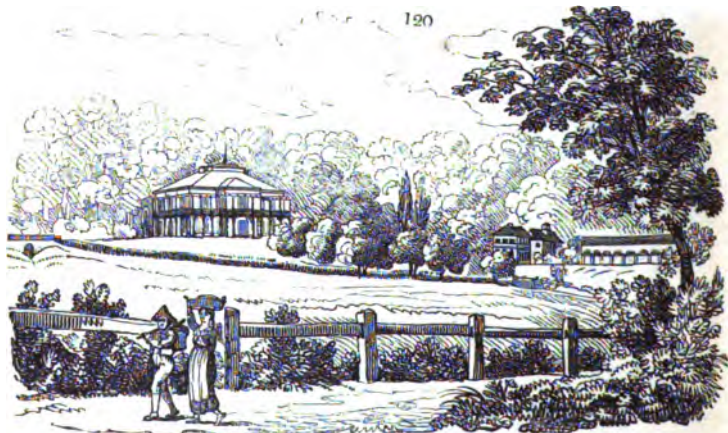
- 48, *Filadelfus racemosa*.
49, *Vitis rotundifolia*.
50, Vineyard.

581. *Our objections to the mode of planting here* are various. The timber trees placed near the palace are too numerous, because in a few years they will obscure it by their height; and the shrubs and flowers we think ought to have been more concentrated, and confined to the immediate neighbourhood of the palace. The shapes of the dry masses of shrubs and flowers are much too formal. There is a want of evergreens; partly owing to the severity of the climate, and partly because the art of protecting them by deciduous timber trees is not understood in either Germany or France. The last objection which we shall make is, that, for an imitation of nature, there are by far too many single trees. When we consider, however, that there are no good models of this style of gardening in Wirtemberg, the wonder is more that things are generally done so well, than that some errors should have been committed. The circular and oval clumps of flowers are not only too formal in themselves for this style, but they bear no relation to the surrounding forms and lines; they do not form a whole.

582. *The roads in the park at Rosenstein* are formed with extraordinary care; by first causewaying them like a street, and afterwards coating them over with stones broken very small, in imitation of gravel. We disapprove of this mode, both on account of the expense, and of the want of durability and firmness in the upper coating. A macadamised road, powerfully rolled, so as to give a pressure on every part three or four times greater than could ever come upon it by common use, would have been cheaper and more durable.

583. *The surface of the park* has been materially altered by excavations in some places, and by filling up in others. The expense of changes of this sort is enormous; and, after they have been made, it very seldom happens that there is much to show for them. As far as we were able to form an opinion on the spot, they might have been in a great measure dispensed with at Rosenstein. We should have preferred the same sums laid out in raising the house, and forming round it a broad architectural terrace, from which the surface might have sloped in every direction; not uniformly, but as nature directed. Even without a terrace, the house would have had a better effect if placed on a higher platform; and the removal of earth, to effect this, would, in our opinion, have been more justifiable, than for smoothing and taming down inequalities, which, by planting, might have been converted into beauties. The prevailing idea of subjecting every thing to rule in this park, instead of acting on the principle of imitating beautiful nature, is the fundamental cause of this error, and of all its other defects.

584. *Weil* (fig. 120.) is a small pavilion in a rich valley, erected from designs by



Salucci, in 1818, as a summer lodge. The grounds around are intended to assume the character of an English farm. They are chiefly under meadow and pasture, with little artificial planting or ornament. The chief interest of the place is created by the river Neckar, and by the surrounding hills: the latter are covered by vineyards on one side, and by natural forest on the other. Some scars of rock appear in the declivities, partially shaded by Scotch pines, which add to the interest of the natural character; but this is powerfully counteracted, and, indeed, in point of taste, the place totally destroyed, by the recent introduction of straight avenues of lime trees. Whoever directed this, can have had no idea of unity of character. The kitchen and other servants' offices are at some distance from the house, and may be seen to the right of the picture (fig. 120.). This would be an inconvenience in England, but in Wirtemberg it is customary to carry

the dinners of the royal family in a close iron box over a fire of charcoal; the whole surrounded by a wooden box, and borne along by two men like a hand-barrow. The house contains numerous apartments communicating with a staircase in the centre, lighted from the roof; the rooms have scarcely any distinction of character, and are neither well finished nor well furnished. The cow-houses here are as clean as those of Holland, and might afford a useful lesson to gentlemen's farm bailiffs in England.

585. *The public gardens of Stuttgart* are neither numerous nor extensive; because, as the guide-book observes, the whole surrounding country is a garden, and all the public roads afford means of enjoying it. Besides, the royal gardens are at all times open to the public, and these royal parks and gardens may be reckoned by dozens. A stranger at first wonders how a people with a very limited territory, and without foreign commerce, can support so many princely establishments; but the wonder in some degree ceases when he is informed that most of the king's estates are hereditary property.

586. *As a garden of festivity, that of Silberburg (fig. 121.) is worthy of notice, as one of*



the handsomest tea gardens in Germany. It is in the neighbourhood of Constadt and Rosenstein; and the scene of the discovery of all the remarkable organic remains by means of which the celebrated Cuvier threw so much light on the science of geology.

587. *The general cemetery of Stuttgart* is situated in the suburbs, and occupies three or four acres. It is not handsomely laid out, but it abounds with new and beautiful monuments, of a few of which we had sketches taken in 1828. Though there is only one main walk through the centre of the grounds to display these monuments, yet numbers of them, both near and at a distance from the walk, are surrounded by shrubs and flowers enclosed in wire fencing. A general feature on the tombstones is an extinguished torch, surmounted by an ascending butterfly.

Division vii. *Gardening, as an Art of Design and Taste, in Saxe-Weimar.*

588. "*The park of Saxe-Weimar*," says Granville, "belongs to the Grand Duke of Weimar, and is of considerable extent. The gardens, arranged in the English style, and rich in parterres, &c., of flowers; in numerous and large shrubberies, intersected with pleasing and shaded walks, which are much frequented by the inhabitants; and in sylvan and woody parts, in which occur, with pleasing variety, opening glens, rocks, hills, and footpaths, winding through the extended scenery, leading to a number of striking points, where a cascade or a statue, a monument or a ruin, a grotto or a hermitage, arrests the attention of the pedestrian. On the borders of the park, and placed so as almost to form a part of, as well as a picturesque appendage to it, stands the summer cottage of Goethe, one of the last of the many heroes of literature, poets, philosophers, and historians, who, for more than fifty years, shed a lustre on the court of Weimar. There is in one part of the garden, surrounded by plantations pleasingly arranged, a very handsome building, called the Römischhaus, in the best style of architecture, fronted by an Ionic portico, and containing some beautiful arabesque paintings, and a portrait of the mother of the Grand Duchess, by Angelica Kauffmann. An excellent band of musicians assemble in some part of the park once a week; and I listened with great delight to their performances, which are of a very superior description. The whole establishment is kept in the highest order, and the principal walks in it are daily frequented by the fashionables after dinner; while many well-dressed, happy-looking,

and merry-faced people of the industrious classes may be seen on a Sunday sauntering up and down its groves, wandering through the woods, or taking refreshment in front of the *Schlesshaus*, where formerly the men used to practise shooting and archery. To an observer placed in the centre of the valley of the Ilm, which forms a great portion of the park, the country residence of the hereditary Grand Duke, called the Belvedere, forms a most pleasing as well as a striking object. The intervening ground, planted in every possible variety, rises very gradually, until it forms the lofty terrace on which that building stands. The spot commands a magnificent view of the surrounding country. A royal residence thus situated does not need to borrow any adventitious interest from private pleasure-grounds, when Nature has embellished it on every side with such beautiful and picturesque scenery. The building itself does not call for much commendation. It is small, and rather in a *baroque* style of architecture. In each of the wings there is a wide and open gateway, which would give to the house the appearance of a large farm, did not the main body of the edifice, with its great flight of steps in front, its pilasters, and the surmounting cupola, forbid such an impression. The centre of the lawn opposite the house is occupied by a piece of water with a handsome fountain. The grounds are very tastefully laid out; and the orangery and hot-house for tropical plants are richly and prettily arranged. A good and broad road leads from Weimar to this agreeable summer residence of the ducal family." (*Travels*, &c., p. 218.)

589. *The gardens of Bessungen*, belonging also to the Grand Duke of Weimar, about a mile from Darmstadt, are small, and rather prettily laid out, with a summer-house in the middle, and an orangery, in which dinner parties are given when there is a *fête champêtre* held in the gardens. (*An Autumn near the Rhine*, p. 31.)

Division viii. *Gardening, as an Art of Design and Taste, in the State of Sigmaringen.*

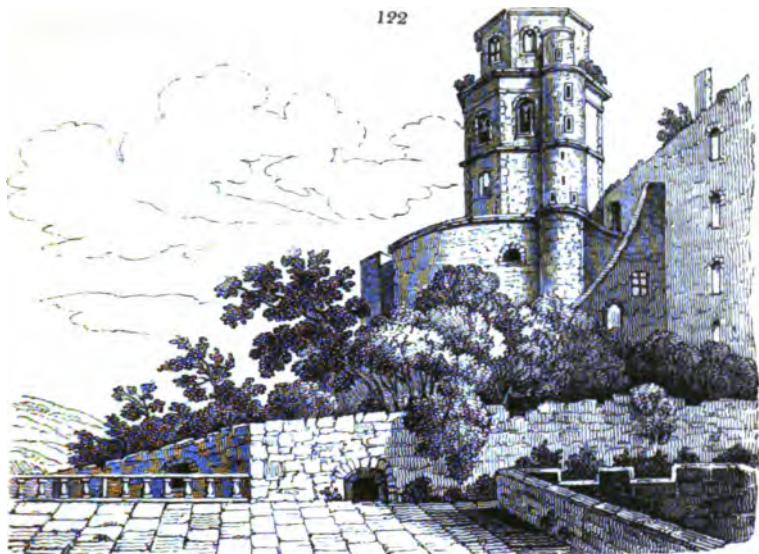
590. *The gardens of Prince Hohenzoll-Sigmaringen* are laid out in the English manner of Scell, and possess considerable beauty. In October, 1828, we found the lawns green and smooth, and the walks not too numerous, and brim-full of a sandy gravel. The groups of trees on the low grounds were composed each of a prevailing species, and so were the larger masses, with a thin sprinkling of other and contrasted kinds, which served admirably to give effect to the prevailing expression, and which, it must be confessed, are often wanting in some of M. Scell's other productions; for example, in the English park at Munich. There is a steep, irregular bank here, planted in what the gardener called the Swiss manner; that is, in successive zones of different species; beginning with the broad-leaved trees of plains, and ending with the needle-leaved trees of mountains; for example, the larch. Along the walks, one tree of each species is distinctly named on wooden tallies about two feet high, for the benefit, as we were informed, of the Prince's children. The house is an Italian building, lately erected, but spoiled in effect by the inattention paid to the chimney-tops. The whole, when we saw it, was in excellent order.

Division ix. *Gardening, as an Art of Design and Taste, in Baden.*

591. *The higher departments of gardening* have long been patronised by the Grand Dukes of Baden; and, as far as avowed art is concerned, Baden may be said to contain some of the finest gardens in the south of Germany. We shall notice them in the order of their creation.

592. *The castle of Heidelberg* is celebrated for the beauty of its situation, on a hill rising almost abruptly from the Neckar; and, in gardening, for the orangeries and other garden structures that were created here, in the beginning of the seventeenth century, by the celebrated Solomon de Caus, architect and engineer to the Elector Palatine, and author of *Hortus Palatinus Heidelbergæ extractus*, Franc., 1620. The greater part of the ruins is in a mongrel Roman style, only interesting from its antiquity and from its situation: some other parts, and especially what is called the octagon tower (fig. 122.), are better. The walks through the grounds and among the ruins, though of very limited extent, are romantic, and display varied and extensive prospects of the vale of the Neckar and its bordering hills, covered with vineyards or woods along the principal walks, which are open to the public at all times. There is a collection of hardy trees and shrubs, named after Linnæus, and in German; and, in a space, called the agricultural ground, there is a collection of European Cerealia, made by the distinguished botanist and curator of the botanic garden, (Metzger, the author of *Europäische Cerealien*, 1824, Heidelberg, folio,) who lives in a habitable part of the ruins.

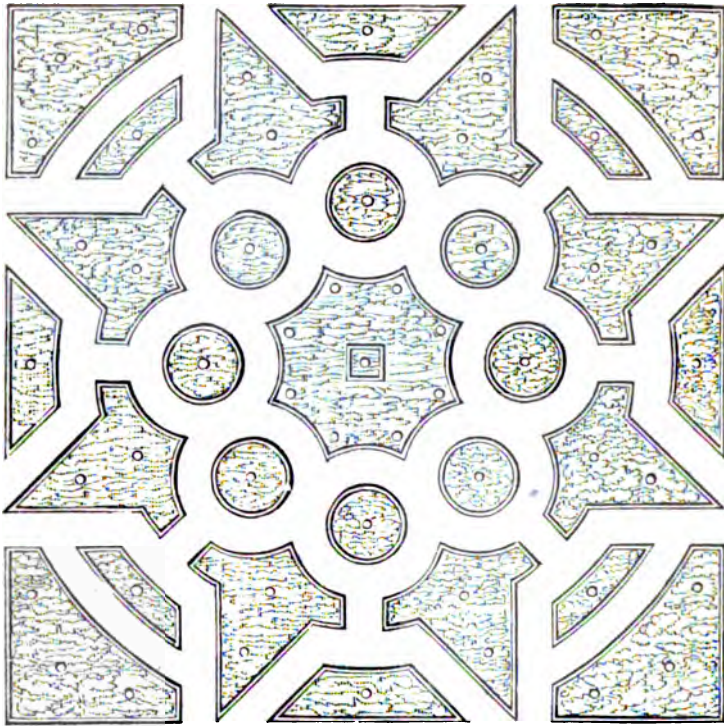
593. *The gardens of Heidelberg in 1619*. As a curiosity in the history of gardening, we shall here give a translation of the whole of the letterpress of the work of Caus above referred to and illustrate it with a few of the thirty figures given in the



original: — "At the return of his majesty from England, from whence he brought his queen, it was his pleasure to have all the parts of his castle of Heidelberg put in order (intending to make it his usual abode), as well as a garden adorned with every possible variety. But as all things are subject to change, it has pleased God to raise this prince to the sovereignty of Bohemia, which has caused a delay in the works of the said garden. However, this has not prevented me from publishing the drawings of the said garden; those that are finished, as well as those that are still to be done. Now, this said castle is situated about 300 feet perpendicular above the city; and, on account of the mountains, which ascend much higher still, a plain of only 200 feet square can be found near to the said castle: for this reason, the preceding electors had had their garden made below, in the suburb of the city, which was very inconvenient. His majesty, then, having resolved to have some place levelled, fit for making a new and spacious garden, it was his pleasure to do me the honour of giving me the charge of it. I began with the little plain already there (which may still be recognised in the ichnography, in which are the covered arbours, otherwise called leafy), and making the said garden on different stages, according to the declivity of the mountain. But what is much to be observed in this work, is the great difficulty of removing the rocks, of which the greater part of the mountain is composed; and the said rocks are so solid, that scarcely any fissures are to be found to facilitate the breaking of them, as are seen in freestone. But his majesty would not give up his design for these difficulties; therefore, with expense and labour, we have arrived, in the present month of November, 1619, very near the accomplishment of all the work; and if it had not been for the present wars, the whole might have been done in about six months."

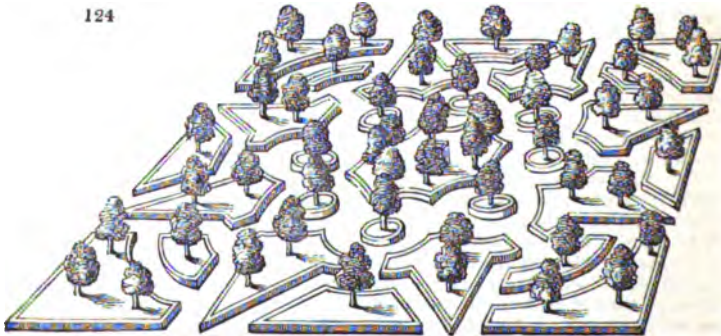
594. *Description.* "Therefore, to begin to make a description of all that is most exquisite, and of what is to be when the whole shall be finished, I shall begin with the two great plans: — the one, of all the gardens; the other, of the scenography, or perspective, of the said garden, with part of the city and the surrounding country: and as these two plans may not be sufficient to show all the particulars of the whole work, I have made individual plans, from the first of which may be seen one of the parterres of the garden, in which is situated the fountain de la Colonne, which was the first done. A valley passed through the said parterre, which was 62 feet deep at the place of the pillar, so that it was necessary to fill it (as was the case with the greater part of the rest,) with the rock which was cut from the higher sides. The said pillar throws the water all round, falling in drops on the surrounding masses of rocks. Near to the said parterre there is another of similar size, in embroidery patterns, round which are eight Muses, and one, in the middle, called Urania. The latter shows the hour with a rod, by means of the shadow of the end of the said rod, when the sun shines. The other parterre following, is a compartment, the borders of which are of freestone, raised two feet, and filled with earth within." (Fig. 123. is the plan

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of this garden, and fig. 124., a perspective view of it, both from Caus's work.) "This parterre serves to put a part of the moveable orange trees in, when they are taken out

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of the stove; and between these orange trees melons may be sown. Then comes a parterre d'eau quite near, in which there are five figures as large as life; viz. one in the middle (fig. 125.), who holds a kind of parasol over his head, whence issues a quantity of water; two figures of women, one of whom wrings her hair (fig. 127.), and the other her chemise (fig. 128.), the water issues from the hair and from the chemise. The two others are two children upon sea monsters, which throw out water from their nostrils." (figs. 126. and 129.)

595. "The orangery follows, in which there are thirty large orange trees, each about 25 feet high, and about 400 others, both middling-sized and small. These

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orange trees are about sixty years old; they were brought of this size from the garden below, and carried up the mountain with great labour, and the earth around them, the roots preserved in the cases made on purpose; a thing which was thought impossible by most people. This orangery is 280 feet long and 92 wide; and it is made of wood (as may be seen in fig. 130.), which is put up every year about Michaelmas, and the orange trees are warmed by means of four furnaces all the winter; so that, in the time of the great frosts, one can walk in this orangery without feeling any cold, on account of the heat which proceeds from the furnaces. At Easter the framework is taken away, to leave the trees uncovered all the summer. On account of the difficulty of putting up this frame, and of the expense of keeping it in repair, I advised his majesty to have the orangery covered with a construction of freestone, so that in winter, the roof being already covered, it was only necessary to close the windows, and thus much wooden-work might be spared, which often requires repair and keeping in order. The holes that are drawn in the four pilasters are for the escape of the water when it rains. The pillars should be all in the shape of trunks of trees, with ivy round them.

596. "The flower-garden is 460 feet long and 200 broad. The round parterre in the middle is divided into four parts, for the four seasons of the year; and each of these parts contains nine double beds, which, divided into three parts, will be, each month of the year, three double beds of flowers, which flower in the month; for it is certain

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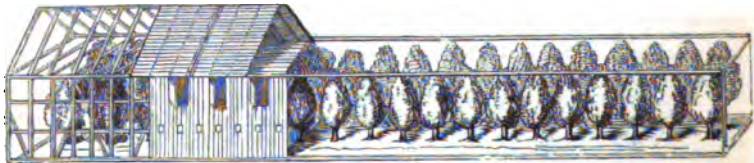
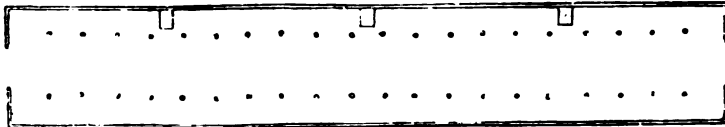
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that flowers may be had all times of the year. I have represented, in drawing, the fountain which is in the middle of this parterre, which should be ornamented with rocks and other rustic things. At the bottom of this garden there is a large summer-



house, 88 feet long and 70 broad. It is still unfinished, on account of the Bohemian wars. There is, besides, the garden on the lowest stage, different from all the others; the parterres of which are all in embroidery patterns, and the walks raised two feet, by means of a border of freestone all round: at the angles of these parterres are put, in summer, orange trees and other portable shrubs. In the middle of this garden there is a small fish-pond, which receives generally all the water of the gardens; and two large figures, representing the two rivers, viz., the Main and the Neckar, exactly opposite each other, and the water issues from the rock which is near them. To return to the higher stage: there is, besides, a fountain in the flower-garden similar to that of the pillar which is at the entrance of the garden, which is to be ornamented with rocks and some compartment of shells, with four spouts of metal in the form of shells. In the higher stage, above the large door, there are several covered arbours; but the four

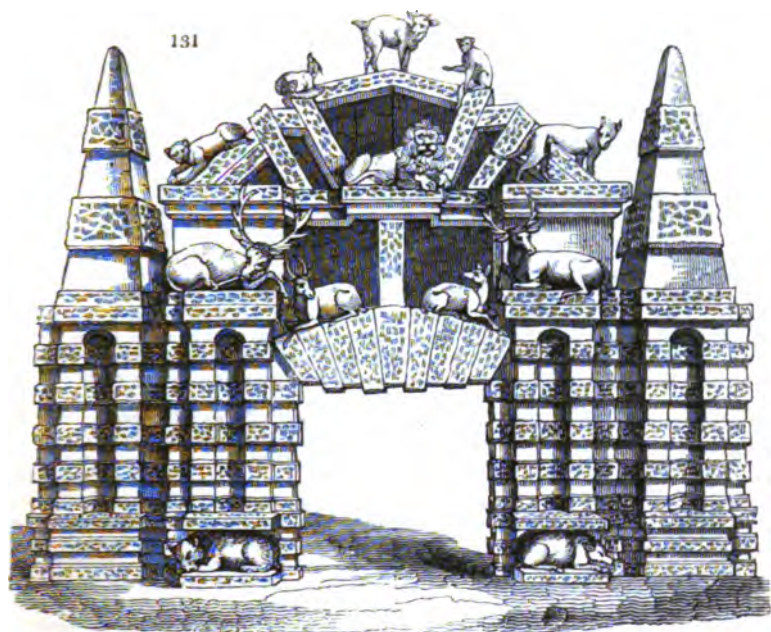
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in which are the twisted columns are seen above the others, by being placed in a situation from whence can be seen almost all the garden. In these arbours are also fountains, the water of which runs into a stair of an extraordinary form, in which there are pedestals on both sides, where the water descends from one to the other, and then runs off to the small fish-pond above the grottoes: in the middle of this there is a Venus, borne by four dolphins, which throw the water from their nostrils. This fish-pond serves for a reservoir of water for the grotto which is below. Near to this, there is a large niche, at the end of one of the alleys of the pale-mall (pall mall), in which there is a fountain and a Neptune; and quite at the top, the figure of his majesty, 15 feet high.

597. "The large grotto is 70 feet long within, and 32 broad: it is as if half divided into two; viz. one part of which, the ceiling, is composed of several compartments and figures of shells; the other part is rustic. In these grottoes there are many varieties of

inventions in water, which require an hour to see them all. The door of this grotto is composed of twelve figures of animals (*fig. 131.*), with many rustic stones.



598. "Near to this grotto there is a small fish-pond, where there is a figure 18 feet long, representing the Rhine; and from the surrounding rock the water issues by several small pipes, most of which play to the height of 20 feet.

599. "At the other end of the garden is seen a gallery of rustic pillars, in which are several fountains, which serve as reservoirs to put the fish of the court in; and at one of the ends of this gallery there is a grotto, not so large as the other, but richer in rocks, shells, corals, &c. There is also great abundance of water, which flows down the rocks, made like pieces of ice. There are also two figures of stone as large as life; one representing a young man, who is pouring out water to wash the hands, when they intend eating in this grotto; and the other is like a flat basket to put glasses in. There is also a table in the middle, from whence proceeds several inventions in water; and on the two sides, and over the door on the inside, there are three rivers, which throw the water from pitchers, and which falls over rocks below. These figures are to be covered with shells and little rocks, in the manner of mosaics. There remains now to be mentioned a vault, 30 feet wide and 275 feet long, which is divided into three parts. One serves for trees and shrubs, such as orange trees, pomegranates, rosemary, &c., which could not all be put into the other orangery. His majesty had also the intention in time to have made a hydraulic machine, to represent, by means of water, the three sorts of ancient music; viz., the diatonic, enharmonic, and chromatic: but this design has been frustrated on account of the wars of Bohemia. The other part would have served to put the movements for making a satyr play on the flageolet, which was to have been at one of the ends, which would have been a bath fit for bathing in at all times of the year, by means of two furnaces, which would have heated the water in the place of the bath. At the other end of this would have been a rustic fountain, with a Narcissus near it. In this manner, courteous reader, his majesty would have wished to have his garden ornamented with all these rare pieces, of which a great part is finished; and, I hope, the rest will be finished, when God by his divine goodness shall give him grace to live in peace, for which all his subjects and faithful servants pray, and ought to pray, eternally to God to do."

600. The grand ducal garden of Durlach is worth notice for its antiquity. In 1689, the town of Durlach, with many other towns and villages, was burned to the ground by the French; but, notwithstanding this, the margrave, Frederick Magnus, rebuilt it, and renewed the garden. A red and white spruce fir, an avenue of chestnuts, and an

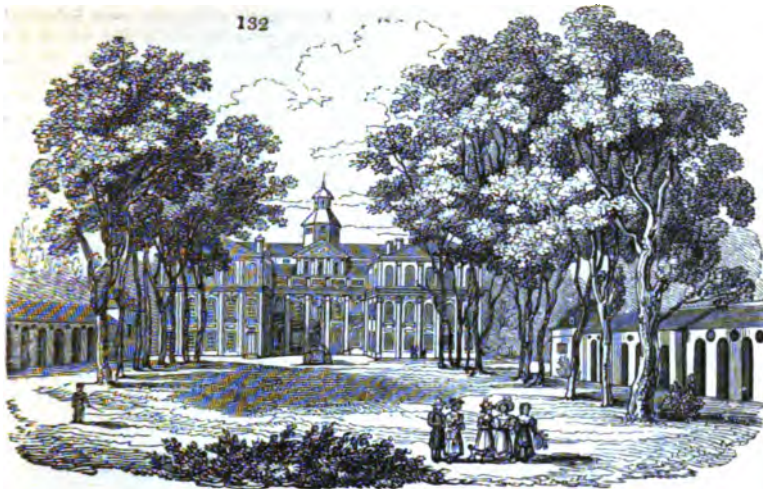
ash tree, planted, it is supposed, when the garden was originally formed, in the sixteenth century, still remain, and are of great size. The ash, which is 140 German feet high, and the trunk 19 feet in circumference, displays a label of tinned iron, with an inscription, signifying that, in 1802, it had stood three centuries. The avenue of horse-chestnuts is supposed to be the oldest either in France or Germany. Some of them exceed 120 Rhenish feet in height, and 15 in circumference. M. Hartweg considers them larger than those in the Augarten at Vienna, which are said to be trees of the first generation, from plants raised from the seeds brought from the north of Asia to Constantinople, in 1550; and thence to Vienna in 1588, to Paris in 1615, and to London in 1629. Since 1809, nothing has been done to the Durlach garden. Throughout these gardens a considerable number of Roman antiquities are scattered. This château (into the hall of which carriages appear to have driven up an inclined plane), like the garden, is in ruins; and the impression of the antiquity and desolation of both is rendered stronger by the contrast of some gaudy summer-houses, which have been erected, by the person who in 1828 rented the ground as a tea-garden.

601. *The ancient castle of the margraves of Baden* is in a commanding situation, surrounded by terraced gardens. The walls of the palace and of the terraces are of immense thickness. The doors to the cellars are each formed of an enormous flagstone, weighing from 1200 to 2000 lbs.; but so nicely poised on pivots, as to be as easily opened and shut as doors of wood. There are some very old trees in the garden, especially seven lime trees, two of which have trunks from two feet to eight feet in diameter.

602. *The palace of Rastadt* is a handsome architectural pile, on an elevated platform, overlooking the town. It forms three sides of a quadrangle, and the court of honour is entered through a triumphal archway in the centre, joined to the wings by an open colonnade. The exterior part of these wings forms a chapel and theatre on one side, and the stables and riding-house on the other. The central building consists of two stories; the lower, with an elevation in arcade, and the upper with pilasters. The stone is of a brownish red colour. The centre has a handsome Ionic portico; the roof is flat, and, with the chimneys, is concealed by a handsome balustrade. Rastadt was built by Sybilline Augusta, wife to Louis the last prince of Baden, the same who built Favorite (§ 604.). The architecture of the palace of Rastadt is of a very superior description, and might vie with that of various modern buildings, both in Germany and England. The interior of the palace is neglected, and is fast going to decay; the extensive kitchen-gardens, hot-houses, and pleasure-grounds have been for half a century let out to farmers and market-gardeners. The gardens were, in 1828, rented by Mr. Jacob Anslie, the Jacques of Pouqueville, who was gardener to the Sultan when the French traveller was at Constantinople. This gardener had worked in the Jardin des Plantes at Paris, and in Lee's Nursery at Hammersmith; and passed three years at Vienna before he went to Constantinople. He speaks German, French, Italian, English, Turkish, and Romsic. He was in 1828 but very indifferently off, the productions of the hot-houses which he rented being little in demand, and selling at very low prices. Anslie informed us of several curious particulars of the life of Sybilline Augusta, who, according to him, was a rich heiress and a very handsome woman, as, indeed, her portrait in the palace bears witness, who had lived rather freely when she was young, and in her latter years resorted to devotion, the philosophy of the time in which she lived. She desired to be buried without pomp, and, for greater humility, in the floor of the church. Her epitaph will be found in § 605.

603. *The gardens of Prince Fürstenburg at Donaueschingen, in Baden*, are chiefly remarkable for their hot-houses (which contain a good collection of heaths and other Cape plants), and a very complete forcing establishment, by pits, in the Dutch manner. A part of the grounds is laid out in the English style, but not with that success which one would be led to expect from the variety of the surface, and the abundance of wood and water.

604. *Favorite, between Ettlingen and Rastadt*, was another residence of Sybilline Augusta. It was built about 1780, at a great expense, from the design of a French architect. The situation is flat, and the views towards the Rhine are tame and monotonous; but those towards the Black Forest are very fine. The grounds were laid out in the natural manner by Anslie, before he became gardener to the Sultan at Constantinople; and, though tame and without much character, are nevertheless verdant and pleasing. They contain some large spruce firs, catalpas, American oaks, walnuts, acacias, camellias, poplars clothed with mistletoe, and weeping willows. The house (*fig. 132.*) consists of a centre, and two long extended detached wings. One of these wings, about 150 feet in length, and one story high, is nothing more than a roofed arcade, open on all sides, apparently for the purpose of walking in during rainy or very hot weather. The effect of this wing is simple and grand; for though, as may be seen by the view, it is nothing more than a long, low building, with a commonplace roof, yet the open



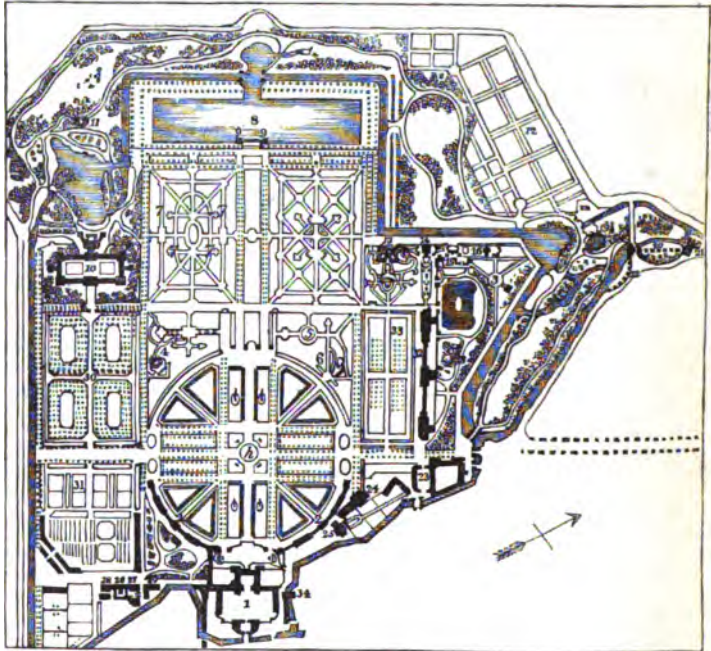
arcade, and the want of application to any ordinary purpose, takes away from it all idea of vulgarity. What would be called in England the pleasure-ground attached to this house, is entered through a boundary bar, or *schlagbaum*, at one extremity; and, after seeing the whole place, the exit is by another *schlagbaum* at the other extremity. Close to both, it is announced on boards, that the fine for passing through the grounds and leaving a *schlagbaum* open, is three florins. This precision in the adjustment of punishments to offences is common to the laws of Baden, Wirtemberg, and Bavaria.

605. *The interior of the house at Favorite* is amusing to a stranger, from the multiplicity and whimsicality of the objects which it contains. On the external walls, the pilasters are painted yellow, and the interstices stuck over with gravel from the Rhine. The Chinese taste prevails in the furniture and furnishing; and, from the quantity of carving, gilding, and curvilinear work, it must have been done at enormous expense. Two of the rooms have their ceilings almost entirely of looking-glass, and their floors so richly inlaid with coloured woods, disposed in the form of flowers, as to be almost mistaken for a carpet. The fireplaces are generally placed in the corners of the rooms, and the breastwork over the chimney-piece is carried up receding, with small shelves, till it reaches the ceiling: these small shelves are covered with Chinese figures, like pots of plants on a green-house stage. In the kitchen, opposite the fireplace, there is a painting on linen, about three feet by four feet, on which, on a black ground, are painted, in four columns, all the different descriptions of animals and vegetables which are usually employed in cookery. The first column contains nine small squares, each displaying, in the space of about four inches by three inches, some article produced by the butcher, the poulterer, or the fishmonger; the second column, containing the same number of the same sized squares as the first, displays several sorts of fish, some specimens of meal and seeds, and four different kinds of mushrooms and truffles; the third column is devoted to culinary vegetables and salads; and the fourth to fruits and confectionaries. The intention of this table was, no doubt, to remind the cook of her resources. There is a curious collection of Bohemian glass, and German and Chinese porcelain. There is a curious Chinese porcelain crouching figure of a man, in which the feet, hands, nose, and other parts, serve as handles to pull out drawers, so that every part of the interior of the figure may be as completely filled as a rectangular chest of drawers. There is also a figure of wood, covered with composition, and stuck over with glass-beads, of different colours, representing the different parts of dress; each of these parts lifts up and displays a shelf for table-napkins. There is a porcelain figure of a child, sitting on a dolphin; the child's head lifts up by the nose, thereby showing an opening for putting in tea and water; and a cock lower down, being raised by the point of the finger, lets out the tea by the dolphin's mouth. A dinner-service, made in Holland, consists of a number of imitations of natural objects used in cookery, as dishes: thus, the centre dish is in the form of a boar's-head, which forms a soup-tureen; a ham and a turtle form two side dishes; a large cabbage and a savory form the plates for sauer kraut and salad. Turkeys, pheasants, asparagus, artichokes, apples, melons, lemons, pine-apples, &c., all figure in the form of some dish or other. We here

declined seeing a chapel, thinking all chapels very much alike, and were informed afterwards, at Rastadt, that we had missed seeing the cat-o'-nine-tails with which the princess flogged herself, as well as a wooden board studded with pins, on which she slept when doing penance in her declining years. She is buried in the chapel of the palace of Rastadt, and over her grave in the floor, is a plain broad stone, with this inscription, "*Bette für die grosse sünderin Augusta, 1733.*" (Pray for the great sinner Augusta, 1733.)

606. *The gardens at Schwesingen* (fig. 133.), between the Rhine and the Main, belonging to the Grand Duke, are considered by Kraft as the most delightful in Ger-

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many. They cover a surface of about 300 acres, and contain the ancient castle of the Marquises of Baden (1). "The marquise of Baden," says Kraft, "having progressively and considerably increased by means of a numerous family, wings were obliged to be built on each side, divided into apartments. The hot-houses, which form the wings (2, 2), have been much increased. In front, and more advanced, is the garden, in the French style, executed on a circular plan. In the middle of the avenue are four grass-plots, bordered and enamelled with flowers. In the middle are little basins with fountains, one of which (3) throws the water sixty-seven feet high. On the right and left are plantations of orange trees and odoriferous shrubs, interspersed with statues and vases of the finest marble. Farther on are discovered the gardens, called the groves, situated on the right and left, laid out in different forms, and embellished with a number of sculptures, vases, statues, the temple of Minerva (4), the great rock, surmounted by a figure of Pan (5), and Venus bathing (6). Higher up is the garden of the large grove, ornamented with numerous figures (7 7 7 7), altars, tombs, urns, &c. Shady walks lead to the great basin (8), the gates leading to which have groups of figures on the pedestals (9, 9). The Grand Duke reserves the grand basin for the amusement of his family *pour des petites navigations*. A very magnificent Turkish mosque (10) is erected on the left. Here begins the picturesque garden, with artificial hills, vales, and slopes; many different sorts of trees; a temple of Mercury in ruins (11); and various walks, leading through shrubberies to the right, till you arrive at the nursery garden (12). From thence, crossing the canal, you arrive at the temple of Apollo (13), built of costly marble. In the garden behind are rocks with allegorical figures, subterraneous caves and caverns; at one side a family bath of marble (14), aviaries (15), cabinets, pleasure-garden, and basin for aquatic fowls

(16 and 17); small buildings, in the form of monuments (18), serving as cabinets of natural history, museums, a laboratory, &c.; a picturesque garden and temple (19); a Roman aqueduct (20), supplied by a water-engine (21); a ruined aqueduct (22); the office for the administration of the garden, with its appurtenances (23); a large theatre (24); residence of the director-general (25); of the inspectors of the garden (26); of the inspectors of the forest (27); of the huntsmen (28); of the foresters (29). Besides all these things, and many more, there is a fruit garden (30); kitchen-garden (31); private orangery (32); area for green-house plants in summer (33); and lofty water-engine for conveying water to the castle (34).

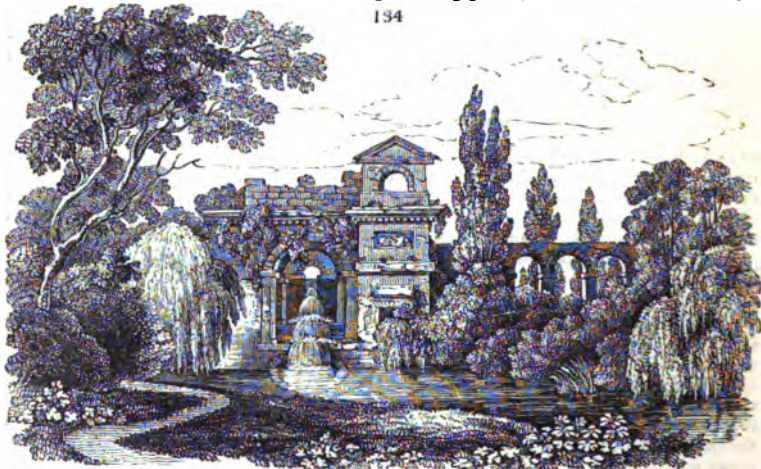
607. *The gardens of Schwesingen* the author of *An Autumn near the Rhine* agrees with Kraft in considering the most splendid in Germany. "The palace is a desolate building, without any traces of magnificence. The entry into the gardens, through the archway of the palace, is very striking. The stately alleys of times long past; the broad gravel terraces, the parterres, the fountains, and the statues, present an array of pompous formality, without destroying its magnificence. In their peculiar style, which is French, and formal, it would be difficult to suggest any improvements on the good taste and splendour of these gardens. Every thing is upon a grand scale. The classical temples, and the fine marble statues, have nothing trumpery or *maquisin* in their appearance, but are really such as one might imagine adorning a sequestered grove near the Tiber, instead of the Rhine. Even the Pan playing his syrinx (a flute with seven reeds) on a dripping rock, at the end of a cool grassy alley, is so well executed and placed, that an Arcadian dream could not be better embodied. You only wish the —

'Satyrs and sylvan boys were seen,
Peeping from out their alleys green.'

to make it complete. The temple of Apollo is the most beautiful of the many ornaments of these grounds. In following one of the walks in the thick wilderness, which covers the sides of the garden, and happily conceals its limits, you come to an open grassy space enclosed by thick shrubs. In the middle is a large turf basin, adorned with sphinxes; on the other side of which you are struck by a light, graceful, open temple, on a rocky elevation, with the statue of the god in the middle, and the clear sky and the grove beyond appearing through it. The effect is classical and beautiful. Against the rock, under the temple, two naiads of white Carrara marble recline, pouring from an urn a stream which flows down a cascade of steps into a basin. On each side of the cascade, steps lead up to the temple, the round dome of which is supported by simple Ionic pillars. From the temple you look on all sides, into the thick green wilderness. On the last visit of the Emperor of Russia and the King of Prussia to the Grand Duke of Baden, a play was represented on this spot in the open air: the great basin, now empty, was converted into the pit, with benches for the illustrious guests, and a stage was erected in front of the temple. The whole grove was brilliantly illuminated, and the effect was described as highly beautiful. It is unnecessary to particularise the many other temples, baths, ruins, fountains, obelisks, &c., which embellish the gardens. One of the most curious is the Turkish mosque; an elaborate imitation of an oriental edifice, the tall minarets of which, rising above the trees of the garden, form a striking object in the neighbourhood. The mosque stands in an oblong square court, surrounded by a low Arabian colonnade. The main building is an eastern temple, crowned by a cupola, with a lofty, thin, minaret tower on each wing. Over the entrance, as well as on the portal of the court, are inscribed, in German, a variety of wise apophthegms from the Koran. The interior is rich in arabesque ornaments, inscriptions, and oriental wise-saws; and the keeping of the whole structure on which much expense and labour have been lavished, is perfect, as far as any one can judge who has never set foot in a Turkish capital. The splendid 'Karl Theodore' was the main author of the beauties of Schwesingen; and the old ragged gardeners, whose huge rusty cocked hats are the only remaining vestige of their quondam consequence, recall his name and his golden days with affectionate regret. Then 66,000 florins were allowed annually for the support of the gardens; not a third part of which sum is now spent on them. The consequence is, the gaping tritons look thirsty, the naiads doubly desponding; and the Apollos and Bacchuses almost as dirty and yellow as real antiques." (*An Autumn near the Rhine* in 1818.) Dr. Beattie, in speaking of these gardens, mentions, in addition to the objects above enumerated, the five fountains in a circus formed in the long entrance avenue. The stonework represents Arion and the dolphin, the water being thrown from the nostril of the dolphin to the height of fifty feet. The basin is ornamented by swans mounted by Cupid, and contains a shoal of goldfish. Dr. Beattie describes several other fountains adorned by sculptures, among which are, the Galatea, the statue of the nymph executed by Crepelio; the rock-fountain; a wild boar attacked by two dogs, one thrown on his back and wounded; and the bird *jets-d'eau*, representing an owl pursued by a flock of other birds of different

species, from whose beaks streams of water pour in every direction on the unfortunate owl. Dr. Beattie also mentions a marble bath, in which two serpents, richly gilt, supply hot and cold water; and nymphs, vases, alabaster columns, and a magnificent pier-glass, adorn the walls. "Near this bath," continues the doctor, "surrounded by groups of children with kids, there was a huge basin, excavated from a single block. It is enlivened by a sheaf of crystal water. A short way farther there suddenly opened upon us a beautiful landscape, enriched with every object that could attract and fix the attention. Every one was struck with the unexpected and mysterious change. On approaching a few steps nearer, it was found to be, what we could scarcely believe, a deception! a mere fresco on a dead wall, but with the light so modified and regulated, as to give it all the appearance of reality. I never witnessed a more complete illusion." (*Journal of a Residence in Germany*, vol. i. p. 134.)

608. *The gardens at Schwetzingen* were visited by us in 1828. The surface is perfectly flat, and the soil a light sand. When in high order, in the summer season, and filled with company, they may, no doubt, produce considerable splendour of effect; but it must be confessed that they look infinitely better upon paper than they do in reality. Some of the ornamental buildings are substantial and picturesque: the one that pleased us most was the artificial ruins of a Roman aqueduct (*fig. 134*). The ruins of the temple



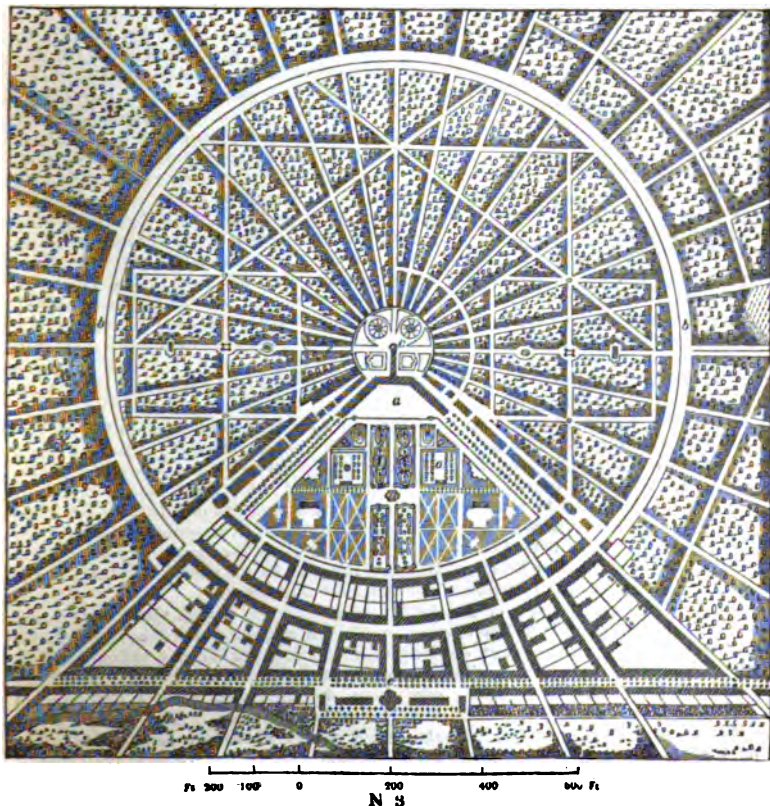
of Mercury (*fig. 135*.) are also very well managed. So completely are these gardens open to the public, that travellers desirous of seeing them, drive, without asking leave, through the lodges, and under an archway in the château, and set down at once in the centre of the garden, where the guide quickly makes his appearance, and shows and



explains every part in detail. It is clear that a great part of the enjoyment of the proprietor must consist in seeing the pleasure which his garden gives to strangers. In the spacious orangery here, there are 465 large orange trees, between 200 and 300 years old; myrtles having trunks six inches in diameter, pomegranates, sweet bays, common laurels, laurustinus, and arbutus trained like orange trees. In the arboretum, which contains a considerable number of species, each genus forms an irregular group on turf, and each species is named. In the pits belonging to this garden, thousands of China roses are struck from cuttings annually, and given away to whoever promises to take care of them. In consequence of this, the China rose, as well as other ornamental plants, may be seen in almost every cottage garden in Baden. There is a very large collection of green-house plants at Schwesingen, including 140 species of *Erica*. Most of the hot-houses are constructed with opaque roofs, or with span roofs, having the northern half opaque; but there are one or two newer ones with sloping glass, in the English manner. Pine-apples are grown, but not with much success. There is a good kitchen-garden; but, as the grand duke resides here only during summer, winter forcing is not carried on. This garden contains some handsome standard pear trees, trained in the pyramid manner; but we were informed that they produced a great deal of wood, and very little fruit. Of these grounds, taken altogether, a perfect idea may be formed from the ground-plan and description; because they are flat, without exterior prospect, and every where the work of art. We were neither surprised nor disappointed, but walked through them with a feeling of having been there before. This must be always more or less the case with gardens, or parks on flat surfaces, of which correct plans and views have been published. A great defect in this garden is the want of evergreens. (*Schwesingen und seine Garten Anlagen*, 8vo, Mannheim, 1828.)

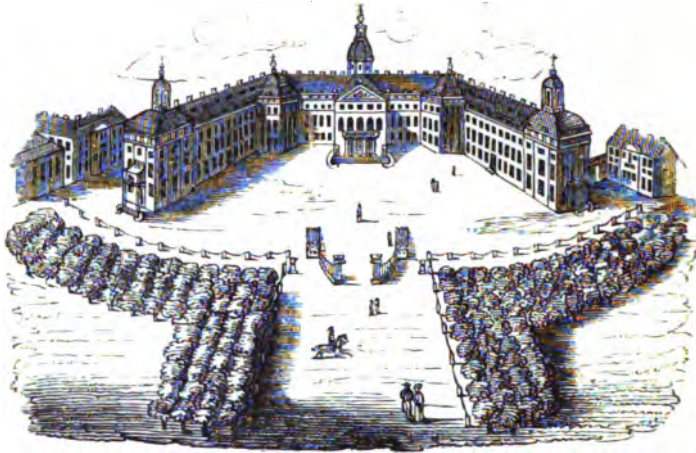
609. The park and gardens at *Carlsruhe* are situated on a level surface; and may be perfectly comprehended from the published plans and views. The park (fig. 136., taken from a plan published when it was first laid out, and before the town had attained any thing like its present size) is a natural forest of oaks and pines, pierced with thirty-

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two avenues, all radiating from the central tower of the château or palace (*fig. 137.*). The palace is a heavy, hospital-looking building, dull and dreary without, and ill furnished and

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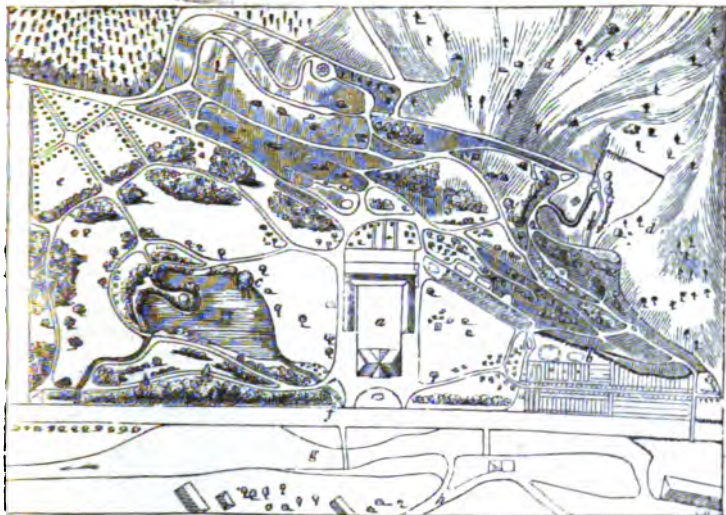


neglected within. It is however noticed by Sulzer (*Theorie des Beaux Arts, &c.*), and by Hirschfeld as one of the finest in Germany; and, as remarkable in that country, for having the wings at an oblique angle with the main body of the building. Behind, exactly in the centre of a circle, the circumference of which forms the promenade, *b*, is a tower, *c*, which commands a bird's eye view of the whole park, pleasure, and kitchen gardens, *d*, the town and church, *e*, greatly increased in size since this place was made, and of the surrounding country, far into France on one side, and to the mountains of the Black Forest on the other. The park and gardens, together with the palace, were laid out by Berceau, a French architect, in 1715. In the parterres were curious patterns strewn with different-coloured sands, broken glass, porcelain, shells, &c.; the main walks were bordered with box, and yew and hornbeam hedges. These have been since destroyed, and an open lawn, varied by groups in the natural manner, forms now the main feature from the garden front of the palace. The natural forest scenery is increased in interest by the introduction of exotics, and especially evergreens, along the margins of the alleys and walks. Here the hemlock spruce, Norway spruce, silver fir, Weymouth pine, and arbor vitæ have an admirable effect. Except in front of the palace, there are scarcely any glades of turf; and there being in consequence very little mowing, and no clipping of hedges, the pleasure-ground part of Carlsruhe garden is kept up at very little expense. Exclusively of what is seen in the plan (*fig. 138.*) there is a park for deer of 400 acres.

610. *All the gardens and park scenery at Carlsruhe* are at all times open to the public; and they are rendered the more agreeable, during the summer season, by a band of music which perambulates the grounds, and is heard, at short intervals, from morning till night. The gardener who showed us through the grounds in 1828, M. Napoléon Vernier, a Frenchman, a poet, and an enthusiast, informed us that it was delightful to work in them, because the nightingale sang from the evening till the morning; the military band began to practise before breakfast; the rehearsal at the opera house, which is close to the garden, succeeded; and this was followed by the ambulating band in the woods, which continued to play during the remainder of the day.

611. *The villa and gardens of Walthalden, near Ettlingen*, contain about sixty acres, and were laid out, in the English manner, by M. Hartweg, of Carlsruhe, about 1820. They are situated on the irregular declivity of a hill, and display very extensive views over a flat country to the Rhine. The disposition of the plantations in groups is good; and the mixture of cultivated spots, corn crops, and vineyards, gives a character of usefulness which is agreeable, because it is humble and universal. The upper part of the hill is covered with natural woods, which stretch along the summits of other hills, till they join the Black Forest. The house (*fig. 139.*) is in no respect remarkable, but it is commodious. The following are the details of the garden plan:—

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a. House and offices.

b. Kitchen-garden.

c. Garden-manser-house, from which a very extensive prospect is obtained.

d. Vineyard.

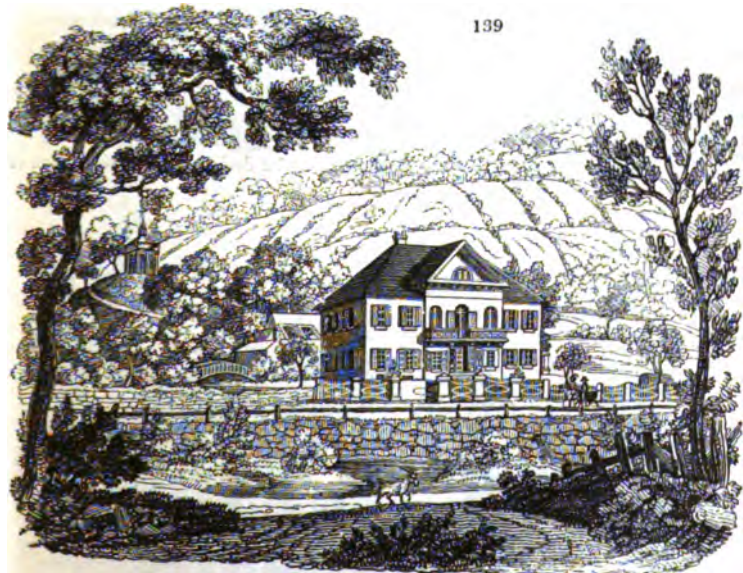
e. Cornfields, vines, and fruit trees.

f. Road from Karlsruhe to Ettlingen.

g. The river Alb.

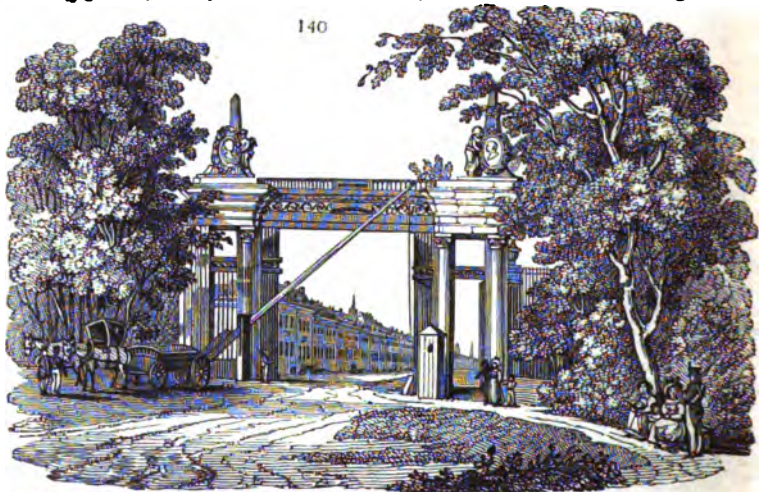
This garden is open to the public under the following conditions, which are printed in large characters, and placarded on a board at the entrance gate: —“Whenever the gates are opened, every one that chooses may enter in, on the following conditions: 1st, Not straying out of the paths. 2d, Neither gathering leaves, flowers, seeds, or fruits, nor

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breaking off shoots of trees 3d, Not letting children go without attendants. 4th, Not bringing in dogs. 5th, Neither writing on statues, walls, or other objects, nor cutting letters in the bark of trees; and 6th, Not smoking.” The proprietor of this villa, in 1828, was Bersted, the prime minister of the Grand Duke of Baden.

619. *Public gardens at Carlsruhe.* Several of the streets and squares are planted with rows of trees. In one of them is a fine avenue of *Plátanus*; in another, one of *catalpa*; several of *acacia*, and the trees in front of the barracks are *Æsculus cárne* and *rubicúnda*. In the open space in front of the palace are triple and quadruple lines of trees of a variety of sorts; and among these are placed, during the summer season, some hundreds of large orange trees in tubs, covered with blossoms and fruits. The fragrance thus diffused through the town in the beginning of summer, with the music of the birds in the surrounding woods, is said to be delightful, and altogether unequalled in Germany. All the public have the enjoyment, not only of these orange groves, and of the public English garden, but of the park and gardens of the grand duke. Indeed, a prince in Germany enjoys nothing in the open air that is not partaken by all his people; and from this circumstance we in part account for the continued existence, at so advanced a period of society, of so many petty princes, each with immense palaces and extensive gardens. The people are highly taxed to keep up these gardens; but they have almost as much enjoyment of them as if they were their own. One of the finest circumstances in Carlsruhe is, that in two directions the forest of Hartwald comes up to the gates of the city. These gates are very handsome; one of them, the Durlacher Thor (fig. 140.), is by the architect Müller; and the other, the Ettlinger Thor

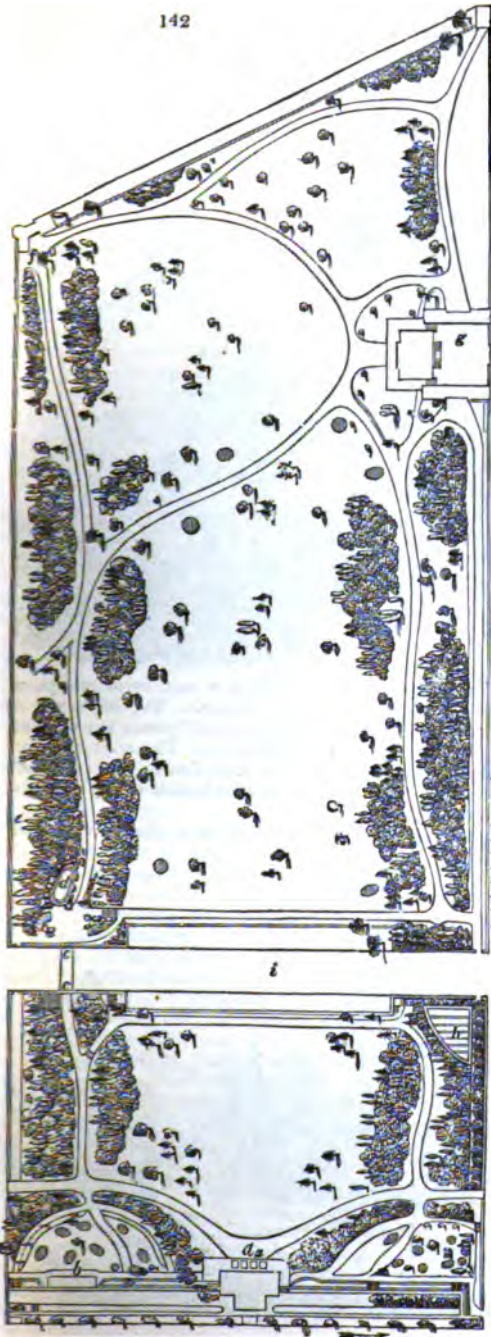


(fig. 141.), is by the celebrated Weinbrenner, who may be designated the Nicholson of Germany.



613. The public English garden at Carlsruhe contains about sixty acres of a perfectly flat surface, and a piece of water. It is surrounded and crossed in all directions by

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winding roads, which give it that degree of sameness, as a natural garden, which the Bois de Boulogne, near Paris, has as an artificial one. The conspicuous defect in the plantations, at Carlsruhe, is the want of evergreens.

614. The garden of the Margravine Amelia (fig. 142.) is situated in the suburbs of Carlsruhe. It lies on both sides of a street. It contains about a dozen acres, laid out in 1809, in the natural style, by Hartweg. There are some handsome garden buildings, and some artificial inequalities of surface, very well managed. An archway under the public road connects the one garden with the other. The road is concealed from the house and the grounds by raised mounds, sloping gently backwards from the road; and the carriages and horsemen passing, are pointed to as apparently in the garden, seeming to be considered as objects of interest rather than of dislike. This, indeed, is generally the case in Germany. The following are details:—

- a. Villa.
- b. Orangery with flower-garden in front.
- c. Rockwork which forms the entrance to a tunnel under the road.
- d. Water.
- e. Place for refuse.
- f. Summer house.
- g. Villa and offices for a friend.
- h. Garden-garden.
- i. Public road.

615. The villa of Christina, Queen of Sweden, at Baden, is one of the handsomest in the duchy, as far as respects the grounds. The surface is the irregular side of a hill, beautifully varied in itself, and containing finely diversified and picturesque views of the vale of Baden, and the finely wooded hills which form its boundary. The grounds were laid out, in 1821, from a design of M. Hartweg, by M. Arnold, who was the gardener when we visited it, in 1828. The trees and shrubs are planted in masses, each containing only one kind, in Scell's manner; and a most judicious use is made of spruce firs, bird-cherries, *Hippophae rham-*

nöides, *Amórpha fruticósa*, yellow-barked ash, bladder-nut acacia, golden willow, fly honeysuckle, red dogwood, privet, lilac, *Spiræa*, &c., all of which present irregular masses of distinct colours from their bark, even in the winter season. The only want here, like every where else in Germany, is evergreens. The walks are laid with good gravel of a grey colour, from a stream which passes through the grounds; and (what we found rare in Germany in 1828) they are filled to the brim. The great defect of walks in Germany is the same as that which is so common in Britain, viz., that they are sunken into the ground, instead of seeming to be formed upon it.

616. *The principal cemetery at Carlsruhe (fig. 143.)* is at a short distance from the

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town. There are some straight and winding walks through it, a number of groups of trees, and a great many monuments, mostly, however, in bad taste. The monument of the poet Stilling is a large block of rough stone, cracked in several places, but with an inscription across the principal rent as shown in the foreground. The most common shrub in this burial-ground we found to be the *Hypéricum Kalmianum*; the principal trees, the weeping birch and weeping willow: there is a considerable variety of herbaceous plants, both annuals and perennials.

617. *The burial-ground at Baden (fig. 144.)* is remarkable for a piece of rockwork

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called the Oehlberg Mount of Olives; on this are three clothed figures, larger than life, representing three of the disciples worshipping a figure of Jesus Christ, which is placed on the summit of the rock. In this burial-ground, as in most others in catholic countries, is a large and conspicuous crucifix in stone, the sculpture of which is considered to be remarkably well executed. There is a plain chapel for the usual purposes, and a number of trees and bushes are sprinkled among the tombs, but no flowers; the situation being low, and the soil clayey and moist. Here the children are buried in a place by themselves, to economise space, as at Kinsigthal. Their little graves are distinguished by crosses and crowns of white satin, ornamented with everlasting of different colours, and with artificial roses, wall-flowers, &c., made of paper.

Division x. Gardening, as an Art of Design and Taste, in the Electorate of Hesse.

618. *The gardens of Wilhelms Höhe*, near Cassel, have long been celebrated. We shall take our notice of them from Hodgskin. "I strolled alone," says he, "to the Wilhelms Höhe. This is the place which every stranger is most desirous to see. On Mondays, Wednesdays, and Fridays, all the fountains, cascades, and other rattles of this monarch's bauble, are made to spout and tumble for the amusement of the infant, or, as the Germans more pompously call it, 'the great public.' It is only on one of these days that this royal plaything can be seen to advantage, and then it is visited by many parties, who come to Cassel for no other purpose than to see and admire it. There is nothing in the north of Germany more praised than Wilhelms Höhe. It is thought to do honour to the taste and genius of the whole country. Every German appears to be enraptured with it; and when I sometimes attempted to laugh at the trifles they described, I was assured I should change my opinion when I saw them. Perhaps I should, had I visited it in company with many other persons, and had I had a cicerone to marshal my thoughts into common order. But I was alone, and rather prejudiced against the place, because I knew the price of many of its beauties had been paid with the blood of Hessians. It is certainly one of the handsomest palaces of Germany, its situation, about three miles from Cassel, at a considerable elevation on the same hill, at the foot of which the town itself stands, and commanding a view of it and of all the surrounding country, is noble and grand. Near the palace, the hill, which is covered with fine woods, begins to rise more abruptly. It was made a charming spot by nature, and needed nothing from the labour of man but a few scattered flowers, tasteful bushes, and winding walks, easy of ascent, to render it a fit place either for the residence of a prince, for the retirement of a philosopher, for the haunts of a poet, or for the exercise and health of the population of the neighbouring city. The sovereign and his architects, measuring the taste of mankind by their own, have converted this noble hill into a large museum of monstrosities; and the attention of the people who go there is constantly turned from the admiration of nature to worship the petty wonders of mimic and useless art. Some places are levelled into gardens, and others hollowed into ponds; cascades tumble from artificial rocks, and fountains spout up in a wilderness. Old castles, newly built, to imitate ruins, in which all the arms and ornaments in the days of chivalry are collected, to make up a goodly show, tower on the heights; and grottoes of yesterday, to imitate the eternal caverns of the world, have been dug under every brow. Homer's hell, all on fire, with Pluto and Proserpine, and the grim judges, with Cerberus, threatened by Hercules, all as large as life, and as natural as they were ever seen in a penny show, ornament one spot. Not far from it are the Fates and the Furies, with Orpheus and Eurydice, and all the gods, goddesses, thieves, and jades of the ancient mythology. Giants are buried under rocks, and spout scorn and defiance against the heavens; water is made to turn organs, blow flutes, and sound trumpets, and to give forth all the sweet sounds which are supposed to be heard in Elysium. The grotto of Neptune, in imitation of that of Tivoli, and Virgil's tomb; a Chinese village and a Swiss cow-house; the Devil's Bridge, from St. Gothard's, and aqueducts from Rome; superb palaces, and numerous hermitages, are all crowded on this spot. In short, there is nothing, either of fancy or of reality, either of ancient or modern art and poetry, of which a counterpart, or imitation, does not deform some part of this beautiful hill. Taste looks at these disfigurements of nature with disdain; good sense deprecates such a waste of labour for so perfectly childish an object; and philosophy execrates the whole, because it influences a trifling people to admire a magnificence that is purchased with their own degradation. Most of these playthings were made by sovereigns who lent their armies to Great Britain. They were, in fact, paid for by the bones and the blood of those Hessians who were sold by their fathers (for so the German sovereigns call themselves), as soldiers, to put down freedom in America. It is left to nice casuists to determine, whether there be more guilt in buying or in selling men; but surely nothing but an utter forgetfulness of the fact, could save any man from the reproaches of his own conscience, who could look on this blood-bought splendour with any feeling but horror. Yet men do look on it with rapture, and our modern Iscariots are prevented

from hanging themselves, because they find a world to flatter, to imitate, and to worship them. Some of the ornaments of the Wilhelms Höhe, particularly the waterworks, were made in the beginning of the last century; but the new palace and the new old castle were built, and many of the other wonders were made, by the present sovereign, who began to reign in the year 1785." (*Travels in Germany*, vol. ii. p. 468.) Mr. Hodgskin concludes with this reflection:—"With fine palaces, in a land without commerce, there may be much poverty and many beggars; and I saw more of the latter in Cassel than I had seen for some time." (p. 475.)

Division xi. *Gardening, as an Art of Design and Taste, in Anhalt.*

619. *The gardens of Wörlitz, near Dessau*, were considered by the Prince de Ligne as the first in Germany; they are situated in a plain, in the neighbourhood of extensive woods; and their boundary is in one part formed naturally by the Lake of Wörlitz, and in others by artificial canals, embankments, avenues, and palisades. The effect is fine, as the gardens thus seem to blend with the surrounding scenery, without a stranger being able to ascertain their exact extent. The lake, with two other pieces of water, communicating by canals, supplies a great variety of water-scenery, and affords the advantage of visiting all the remarkable objects of the gardens in a boat. These grounds are divided into five gardens, of which the following are the details:—

620. *The palace garden* lies between the lake and the town; from which last it is partially concealed by a belt of evergreens and other shrubs, beyond which is a low wall of stone, rough from the quarry. This garden has two entrances, both of which are open; at a short distance from one of them a full view is obtained of the palace. In front of the building is a large, irregular lawn, on two sides of which are broad gravel-walks, bordered by tall lime-trees and rose-bushes; while the third side, directly in front of the palace, is adorned with large cast-iron vases, in which orange trees are usually placed during the summer.

621. *The principal edifices in this garden* are the Princess's house, stables, and other structures, built in the Gothic style, on account of their proximity to an old church, the yard of which was formerly the village burying-ground, but which is now a part of the garden; a summer-saloon, in front of which is a pump in the form of an altar, resembling some antique fountains at Rome and Herculaneum; a Gothic fountain; a large stone sarcophagus, eleven feet long, five and half feet broad, and six feet high, having the angles adorned with Corinthian pilasters, and inscription-tablets on each side, supported by winged genii. One of the inscriptions consists of some verses taken from Klopstock's *Messiah*; another, facing the church, said to be written by the Prince, is as follows:—"Here are deposited the remains of those who departed before us, and who, in our mortal dwellings have made room for us, as we shall make room for others." There is also an Ionic arcade, adorned by numerous statues.

622. *The Cedar Hill* is so called, because it is chiefly planted with Virginian, Carolina, and red cedars. The summit, where the trees incline backwards in a semicircular form, commands a view of the church and churchyard. Half way down the hill, is a seat shaded with cedars, from which, through a vista of ivy-encircled pines, is a distant view of a funeral urn on the other side of the water. At the foot of the hill is a wilderness, and beyond, a sloping lawn washed by the lake. On the right is a small drawbridge over a deep creek, called the Swan Pond, and near this is a stone seat, commanding a fine perspective view of the palace.

623. *Neumark's Garden*. This garden, named after the gardener who laid it out, consists of a large island, formed by two arms of the lake, which embrace it on three sides, and are united by a canal on the fourth. There are four other islands considered as belonging to this garden; but three of them are inhabited only by the swans which build their nests on them. The fourth is cultivated, and, on account of the great number of roses spread over it, is called Rose Island. On this island is a stone balcony with a balustrade of vine branches, and a beautiful arbour of honeysuckle and jasmine.

624. *A mound or embankment* planted with evergreens and fruit trees, and provided with seats at favourable points of view, is carried round the whole of the large island; and a bridge, thrown across the canal, unites it with the main land. The side of the mound, next the lake, is not planted; so that a stranger, who mounts to the summit, passes at once from the most perfect seclusion to a view of scenes of bustling activity on the opposite bank of the lake, where the village damsels bleach their linen, and may be seen, in their tucked-up petticoats, like the Danaïdes of old, performing a labour which never ends. The garden is divided obliquely by a belt of evergreens; from which a green alley, formed by cherry and plane trees, leads to an arcaded avenue, intended to afford shade during the heat of the day in summer.

625. *The chief buildings and garden ornaments in Neumark's Garden* are two pavilions: one, on the summit of a well-planted hill, contains curiosities brought from the

South Sea Islands and South America; and the other is appropriated to casts from antique statues, and a library, consisting chiefly of journals and travels. A fine copy of the *Dying Gladiator*, by Erlich, is placed on a small elevation, and surrounded by Virginian cedars. At the end of a short avenue of plane trees, a monument to the memory of Jean Jacques Rousseau is discovered on a small island planted with poplars, on the lake. In the middle of this island, as at Ermenonville, an altar with a stone urn is elevated upon steps, within a circle of Italian poplars. In front of the altar is an inscription to the memory of Rousseau, written by the prince; on the back is a half-length bas-relief of the philosopher, and on the sides are a lyre and a wreath of oak.

626. *An allegorical labyrinth*, intended to typify human life, is, however, one of the most curious objects in this garden. This labyrinth has the appearance of a deep valley of wood and rock, through which wind narrow uneven paths, to which the light of day can only penetrate at intervals. In some parts the soil is sterile, and bears only the gloomy pine; in others, solitary flowers blossom. Here we behold a barren rock: there a glowing prospect opens to our view. In the centre of the labyrinth is a place shaded by a circular row of acacias, within black walls, divided by three inlets. The same number of sandstone niches, ornamented with Corinthian pilasters, rest against the walls. One of these niches is vacant. In the other two are placed the busts of Gellert and Lavater: both busts are sculptured out of a grey stone found in the Weimar territory. The opening between the vacant niche and the one which contains the bust of Lavater suddenly leads, by an abrupt turning out of the labyrinth, into a broad grass path, to intimate how abruptly the path of life may sometimes be cut short. Those who wish to pursue the allegory, however, must leave the circle by the inlet between the two busts, which leads deeper into the wilderness. This path winds along darkly through the wood, is hemmed in on each side by rocks, and gradually contracted, until it forms a deep hollow way, over which passes one of the arches of a bridge thrown across the valley. This arch has a balustrade made of dry boughs, and on a white tablet is the following inscription:—"Traveller! choose thy way with judgment." The wanderer now walks circumspectly under the arch;—the alarms increase;—the sharp-pointed rocks grow more formidable and impending, the foot-path more rough and steep. The hollow soon becomes contracted to a point, affording only, through a hole, the distant prospect of a funereal monument. Here, however, the path turns to the left. Some steps lead up a narrow passage, overshadowed with honeysuckle and ivy, and provided with seats placed without any regular order. The passage widens and opens into a deep black cavity, over which appear, inscribed on a white tablet, the following words:—"Here the choice becomes difficult, and must be decisive." If the adventurer decides upon entering, he will find the cave thirty-five paces long; and at first, nothing dismaying will appear, for it is still wide, and light penetrates by a lateral aperture, through which a statue of Leda with her swan is seen. On advancing towards the statue, the following words, on the wall by the side of the opening, catch the eye:—"Turn back quickly!" If the curious stranger should still venture to step forward, and pass through the opening, he shudders to find himself on the precipitous brink of a broad canal, and loses no time in obeying the injunction. On turning back, a narrow, dismal, and terror-striking path is perceived to run off obliquely to the right. The ground is uneven, the walls on each side dirty, and the overhanging rocks of the roof threaten danger. This horror overcome, and the path entered, it soon leads into a dark, gloomy thicket, on issuing from which, the undaunted explorer unexpectedly finds himself transported at once into Elysium. This Elysium is an exquisitely laid out piece of ground in an oval form. The interior is a beautiful lawn of the same shape, carpeted with a velvet turf of the richest green, and studded on the margin with circular beds of flowers, and groups of lovely trees, among which are the tulip tree, the orange, the red-flowering acacia, the almond, the cherry, and the thorn. A broad gravel-walk surrounds the lawn. On the right, beside the path which leads into Elysium, white flowering acacias, planted in semicircles, form two recesses or arbours, within which are seats. The farthest is considered to produce the crowning effect of the whole; from this seat through a high vaulted arch, washed at its base by the waters of the lake, the mausoleum of the princely family is seen rising in the distance, thus uniting the ideas of death and Elysium.

627. *The Ladies' Green* presents nothing remarkable. It has obtained its name from the circumstance of the trees which surround it having been all planted by ladies. Some interesting prospects are obtained from the neighbouring walks.

628. *Schock's Garden* also derives its name from its designer. It is situated on the north of the lake, and consists partly of an island and partly of the main land, the walks being carried on by a variety of picturesque bridges. One of these is ornamented with black flower vases, and is thrown across the mouth of a canal, over which the branches of a thick plantation of high alder, birch, oak, and other trees, unite in

forming a vaulted shade. Another bridge is formed of an oak sawn asunder lengthwise; planks being laid across the two halves of the tree, and the balustrade being composed of crooked boughs. The Bridge of Stairs is so called, because, in consequence of the high spring of the arch, it is ascended from each end, to nearly the middle, by steps. The Turn Bridge has a very curious appearance. It turns on a pillar fixed in the bank, and, as the equilibrium is well distributed, it is easily set in motion; its length is about ten ells (30 feet), and its breadth three feet. The balustrade is made of light wood, and the whole structure is painted white.

629. *A swinging aerial bridge*, which the Prince de Ligne has described as making the passengers appear like rope-dancers, is suspended by chains from the bare sides of two opposite rocks, which seem to have been rent asunder by some convulsion of nature. A little stream of clear sparkling water runs along the bottom of the abyss. This perilous-looking bridge is, however, perfectly secure. Four strong iron chains are drawn from the one side of the rock to the other, and firmly soldered into stones, concealed within the rock as counterpoises. Planks are placed diagonally, and so well secured by cramps, that they cannot possibly give way. Two other chains, carried along the bridge on each side, supply the want of balustrades.

630. *Schoch's Island*. Near the banks of the lake is a plot of flowers growing in the form of a pyramid, and encircled by six plane trees. A gravel walk runs between the flowers and the planes. Diana's wood is an irregular oval thicket, planted with silver poplars, plane, ash, elm, and other trees, with some clumps of yew. In the centre of the wood is a statue of the goddess, about four feet high, elevated on a pedestal, with a hound at her side. A remarkable illusion is produced in one part of this island. The stranger appears to be in a long deep valley. He sees neither bridges nor buildings, except the roof of the pavilion, where the curiosities from the South Sea Islands are kept, which is observed rising above some trees near the horizon. The lake cannot be said to be seen: we have only an obscure impression of its situation. But by what enchantment is the place so mysteriously changed? A few plantations and elevations of the soil alone transform the whole prospect. Thickets seem grown up by chance; here, a solitary tree, there a few, and sometimes a cluster of trees, give not only variety to the scene, but, also, in appearance, remove near objects to a distance, connect those that are disjoined, bring the distance to the foreground, separate what is united, conceal what was before uncovered, and make visible what was concealed. There are but few buildings on this island.

631. *The Nymphæum* is a place sacred to the nymphs. It is a grotto constructed in a woody mountain, and is 21 feet deep and 26 feet long. The entrance is ornamented with two fluted stone pillars, without a base, between two pilasters. The order is the ancient Ionic. The pillars support an entablature with griffins in the frieze, between which project candelabra, ornamented with leafwork. In the interior, the walls are covered with polished white gypsum, and the floor paved with flag-stones.

632. *The tomb of the elder Schoch*, by whom this part of the garden was laid out, is at the foot of a little hill, planted with yews and firs, among which are placed numerous seats. Over the entrance to the tomb is the following inscription: — "Schoch's place of rest. The labour of his mind-directed hand adorned these fields."

633. *The Gothic House* is the next object of attraction. This interesting edifice has the form of a cloister, and stands on the summit of a verdant acclivity, not less soft to the eye than the feet, upon the sides of which are planted some slender poplars, which wave with every breath of wind. It is a large building, with more depth backward than breadth in front, surmounted with turrets, and embellished by numerous windows of painted glass. One readily perceives all that laborious intricacy, affectation, singularity, and rude grandeur, joined with an indescribable waste of labour, so peculiar to the Gothic taste. In short, we see here the emblem of that age of superstition, discord, violence, and gallantry, when every knight had a double duty to perform, namely, —

"Der kirche mit dem schwerdt zu nützen,
Der damen ehre zu beschützen!"

"His sword to draw, the church to serve,
And ladies' honour to preserve!"

We now quit the island to visit those portions of Schoch's Garden which are on the mainland.

634. *The orchard* has the form of a rectangular oblong, and is about 85 paces long and 75 broad. The wall which surrounds it is terraced and planted with ever-greens on the outside. The whole of this fruit-garden is surrounded by a wide ditch, with large gateways. There is also a walled kitchen-garden, and two flower-gardens, in the formation and arrangement of which, the imagination of the artist is admirably displayed, and which are enriched and studded with flowers of every kind in the greatest

profusion. The principal objects of attraction in this garden are the temples of Venus and Flora, and the romantic region of the grottoes.

635. *The Temple of Flora* is of the modern Doric order, and has in front four pillars, the intervals of which are closed at the base with iron trellises. The pillars support a gable, on the pediment of which is a bas-relief representing a sacrifice to Flora. The view from the portico of the temple is very fine, and strikingly resembles a scene in Lombardy.

636. *The large grotto* is lighted by vaulted window-like apertures. Around the wall are stone seats, in the centre there is a stone table, and in a niche a sepulchral urn. It is approached through a subterraneous passage, the entrance to which is by some steps roughly hewn out of the rock. At the further extremity of this passage, another of the same kind to the right is dimly seen by the glimmering light which alone penetrates through the obscurity. This leads to an open round space, shaded by planes and other trees, and surrounded by a black rocky wall, overtopped by a high dark evergreen thicket. On one side stand the ruins of an altar, composed, in a rude style, of quarry stones. Leaving this place, which is called the Hermit's Oratory, by a subterraneous passage on the left, we come to another, similar to the former, but larger, and enclosed by a circular wall of unheven quarry stone. Here another allegory begins.

637. *The mystic quarter of the Temple of Venus.* The stranger enters this region by the cell of initiation, which is formed of rough stone, rising on the left of the circular wall, and is shaded by various kinds of trees. Two paths lead from it. The one on the right indicates the frivolous, wearisome course of the man who is without knowledge and mental cultivation. He who proceeds by it ascends the rising ground by a rough, broken path, ceaselessly wandering to and fro, but still to no purpose, and always wanting the pleasure of agreeable variety. At last he reaches the height of the mound, where, looking sideways over some bushes, he obtains a glimpse of the dome of the Temple of Venus. The other path, to the left, is the mystic road to be pursued by the pupil of wisdom. This path soon turns into a cavern, which is, at first, quite dark; farther in, a glimmering light comes from above through the roof, and still farther, it is more brightly illumined by cavities high in the sides. In this migration we seem to hear the language of mysteries, to tread within Proserpine's threshold, and to stand upon the boundary which separates life from death. At length, issuing from the cavern, we enter a beautiful valley, whose rocky sides are adorned with a bright green verdure. The first object which here catches the eye is a round temple on a rock which directly faces the outlet. This is the mystic sanctum sanctorum of the celestial Venus, who, at the first origin of things, assisted by the mighty power of her son, communicated to all races of beings a fructifying impulse.

638. *Two grottoes* are perceived, on entering a high vaulted opening in the rock on which the temple stands. That to the right, like the temple under which it is situated, is round, and is dedicated to Vulcan, the god of fire, and husband of Venus. It contains, besides the flaming altar of the god of fire, which stands in the middle, several movable transparent pictures, on mythological subjects, serving for the walls and ceiling. These pictures represent emblematically the operation of the elements of fire and earth. The umbilical aperture in the vaulted ceiling is immediately under the hollow pedestal of the statue of Venus. This pedestal, which is provided with yellow coloured panes of glass, forms a kind of lantern, from which a soft light, as from the sun in an eclipse, falls into the grotto.

639. *The other grotto*, which is consecrated to Neptune and Æolus, is quadrangular. Opposite to the entrance, near the roof, there is a large semicircular opening, taking in the whole breadth of the grotto, and reached by ascending some steps. On looking through this aperture, there appears nothing, as far as the eye can reach, but meadows, which extend from the forest of Wörlitz to the embankment of the Elbe, upon which the pantheon rises to view in the distance. In spring and autumn, when the Elbe overflows its banks, these meadows are frequently inundated as high as the embankment; and the view presents only a large surface of water encircled by woodlands. The reflexion of this immense sheet of water in the mirrors placed in the walls forms an excellent image of the aqueous element; and the statue of the god of the sea in the middle of the grotto seems rising out of the waves. The magic tones of an Æolian lyre, which stands in a circular cavity, add to the charm. Touched only by the winged and airy fingers of the god of the winds, it announces to all, in divine melodies, the operation of the atmospheric element.

640. *The Temple of Venus* is a monopteron, that is, merely a circular colonnade without a cellar. It is of the Doric order, and is built entirely of sandstone. It stands upon an elevation which is ascended by a flight of steps. The pillars, which are fluted, are ten in number; they are two feet in diameter, and fourteen feet high. The entablature is two feet high; the dome seven feet high, and thirteen feet in diameter. Round the dome are circular gradations, like benches or steps, of unequal height, reaching nearly to

the top. The building has a brownish-yellow colour, owing to an oily tinge which has been given to the stone of which it is built, and also to its being roofed with copper. The statue in the centre of the temple is a cast from the Medicean Venus.

641. *The Weidenheger Garden.* This garden has a south-east aspect, and lies partly on the margin of the lake, behind the nymphæum, and partly on the tongue of land formed by the south arm of the lake and the long canal. It is bounded on the north by Schoch's garden, on the east by the embankment of the Elbe, on the south by fields tenanted by the prince's subjects, and on the west by the lake. It is separated from the grounds of the tenants principally by a thick plantation, and in many places, by a grass border only one foot and a half broad. There is a ferry-boat between this and the palace garden, a rope being extended from one bank to the other, by means of which any person may ferry himself across. That part of the garden which extends from Schoch's garden to the long canal, consists almost entirely of plantations, through which are winding paths, taking in distant prospects. Some of these paths lead to picturesque spots in the garden, others to the surrounding villages. The other part, situated on the tongue of land, contains both enclosed and open divisions; nevertheless, the general characteristic of this garden is privacy. An alley of poplars extends in a straight line from the lake to the embankment on the Elbe, at the end of which is seen the Spinarius.

642. *The long canal*, on each side of which Lombardy poplars are planted, extends in a straight line from the gulf formed by the lake behind the nymphæum, to the large piece of water near the pantheon. Over the mouth of the canal, in the lake, a pontoon bridge is laid; and over the other mouth, opening into the large piece of water, there is an iron arched bridge, which, having its balustrade gilded, and in the form of rays, is named the Bridge of the Sun. Near this is a large lawn, almost equal in size and similar in form to the tongue of land. It is enclosed all round by a thick plantation, except at one end, where it is open, and there a narrow stream enters from the lake. Amidst some clusters of trees, which constantly shed over this tranquil spot a kind of green twilight, this inlet forms a round basin, whose destination for a bath is obvious at first sight. The whole is surrounded by a road abounding in beautiful prospects. Behind a circle of rose bushes on the bank of the canal, there is a statue of a crouching Venus. To a poetic fancy it would seem that the goddess, scared from the bath by unexpected intruders, and stopped in her flight by the lake, had concealed herself behind the roses on its bank. This statue, which is above the natural size, is by Pfeifer. The original is in the Villa de' Medici. There is also at the further end of the large nursery a statue of the Spinarius extracting the thorn from his foot, by Pfeifer. It is a fine copy of the bronze original in the Capitol. It is made rather colossal, in order that it may be the better seen from a distance.

643. *The new pleasure-ground.* This recently laid out ground is bounded on the north by the Weidenheger garden; on the east by the embankment of the Elbe; on the south by the poplar avenue leading to the water-mill ferry; and on the west by the bank of the Elbe. Strictly speaking, it may be described rather as a piece of embellished land than as a garden; for the greater part of the ground within these boundaries is a level field. The chief peculiarity which distinguishes the formation of this park, is the excellent use made of the boundaries by taste and art, and the beauty of the principal objects at the two opposite extremities, namely, the pantheon, with a large piece of water below it, and the volcano at the point of the lake.

644. *The Pantheon*, which is destined for a museum, is of a round shape, and is erected on the embankment of the Elbe. It has a portico, with four pillars supporting a gable, and takes its name from its resembling in form the great Roman Pantheon. It is built of stone, and painted a dark red colour, except the portico, the balustrade on the cornice, and the pilasters on the second floor, which are all painted white. The roof, including the dome, is covered with copper. Three long wide steps lead up to the portico. The pillars, thirteen feet high, and two feet and a half in diameter, are of the Corinthian order, with Attic bases. The width between the two middle pillars is greater than between them and the remaining ones. The pediment is ornamented with sculpture, and the dome with paintings from the antique. Within is a circular room, occupying the middle of the building, lighted from the dome, and surrounded by an arcade. The arcade is lighted by windows. The floor of the middle room, as well as of the arcade, is composed of white gypsum, in which the attributes of Apollo and the Muses are represented in coloured gypsum. As yet the pantheon is empty; but statues and other works of art are expected for it from Rome. The views from the roof of the building are of the most rich and interesting kind.

645. *The Egyptian Cavern* is below the pantheon. It consists also of a central room, surrounded by an arcade. The roof is arched, and the floor is paved with flag-stones. The walls are without niches or ornament of any kind, and merely whitewashed. The light, which enters by a small window in the arcade, is communicated to the cen-

tral room through the side arches. This central room contains, at present, no other ornament than a Canopus of gypsum, painted to imitate green basalt, and modelled by Doel from that in the Villa Albani. On the other wall are bas-reliefs in gypsum, also painted like basalt, of the principal Egyptian deities. There are some few other objects of interest on the main land of this garden, which may be here briefly enumerated before proceeding to the islands.

646. *The iron bridge* is twenty-four feet long and six feet wide. Its height is ten feet, exclusive of the balustrade, which is one foot high. The George canal takes its name from the brother of the reigning prince. The Grotto of Egeria is at the terminating point of the lake, near a small wood of pine trees. It lies in a valley, shaded by old trees. The grotto is formed in imitation of that near Rome; and the statue of the nymph, in a reclining attitude, is by Pfeifer.

647. *The large and beautiful piece of water* already spoken of, spreads out from the foot of the Pantheon; and it is beautiful not only in extent, but in gracefulness of form, and in the effect produced by six fine islands which are scattered over its surface. These islands differ from each other as much in shape and internal appearance as in size and beauty. Two are larger than the rest. The first of these, which is opposite the ferry, is remarkable for the changes which it exhibits from hill to valley, and for the inequality of its soil, as well as for the solemn appearance of the shadows cast all over it by aspens, birches, and weeping willows, intermixed with larches, firs, cedars, and various kinds of shrubs. The idea that we are in a resting-place for the dead naturally arises, and is speedily confirmed by the sight of a stone cippus, which rises on a small hill near the bank. On the side near the water, a male and female, sculptured in relief, are shaking hands in the attitude of parting. An inscription is extended over the heads of the figures, to the following effect: "Mortal are we, and mortal all our wishes. Sorrows and joys are gone, and we pass away also." The second island lies near the red guard-house. It is larger than the former, and rounder, although it projects into the water a long point of land planted with tall alders, whose extended branches, hanging down to the surface of the water, conceal the entrance to a grotto.

648. *The Amelia Grotto* derives its name from the consort of the prince, and is constructed of large rough stones, forming high, bold arches on three of the sides. The back of the grotto is adorned with a marble statue of Venus, under the natural size, in a niche. On each side of the niche are two black frames, containing what appears at first sight to be two landscape paintings; on examination, however, they are found to be composed merely of stalactites, extracted from a cavern near Weimar, which, in consequence of their various colours and peculiar situation, incrustated as they are with moss, grass, &c., at a certain distance produce a complete illusion. From a seat placed under the Venus, the council-house and the palace, though really far removed from each other, appear to be contiguous; because the distant town, which extends in a semicircle between them, is covered by the pillar of the left angle of the grotto, so that the two objects seem to be separated only by its slender breadth. Within the angular pillar on the right, a spiral staircase is constructed, which leads to the roof, where there is a sort of arbour formed of ironwork, in imitation of vine branches. Fronting this arbour are busts of Anacreon and Sappho on posts, in the style of the statues of Hermes. The rest of the hill is covered with a plantation, through which a path, edged by various kinds of flowering shrubs, winds down the declivity to the beach. The character of this island is cheerful retirement.

649. *Stone Island and Volcano.* The former name has been obtained by this island from the rocky masses exhibited upon it, and the latter from the fire-vomiting mountain which is there represented. The leading idea which may be given of this island is, that the many extensive, and, in general, scattered objects of art and nature dispersed over Sicily and the coast of Campania, are here copied in miniature, and combined in one harmonised whole. Here we see represented, amidst the most luxuriant vegetation of southern climates, the ruins of an ancient gymnasium, adjoining a modern pavilion; there the sunken crater of an extinguished volcano, once used as a theatre, a considerable part of which yet remains overlooked by another complete conical crater, from which the boiling lava seems every moment ready to burst through the burnt-out abyss of the mountain; extensive subterraneous vaults wind in different directions, in imitation of those in the promontory of Misenum, which Marcus Agrippa converted into a naval arsenal; in the hollow side of the hill, a series of tasteful chambers are formed, and around the island are scattered basaltic columns, which resemble the Cyclopean fragments that surround the little harbour of La Triza, in Sicily.

650. *The first object* which attracts attention, on visiting this island, is a brick wall by the side of a rock, upon which a flat-roofed pavilion is built. In the brick wall there are nine large, and as many small, niches, above which an espalier is formed by vines trained up to iron bars: aloes, in pots, stand here and there on the top of the wall, as well as on the roof of the pavilion. The prototype of this wall is to be found in

the ruins of an ancient gymnasium at Taormina, in Sicily. From a terrace above the wall is a splendid view of the open country. Of the nine large niches in the wall, six are occupied by peach trees; the remaining three are open, and form doorways, one of which leads to a dark passage, which runs behind the theatre towards the orchestra.

651. *The theatre* is, of course, intended to appear in ruins. The orchestra, including the space appropriated for the stage, of which the front boundary (the *finitio proscenii*) is supposed no longer to exist, forms a beautiful oval spot of greenward, here and there shaded by trees, and measuring in diameter twenty-eight feet by thirty-one. All the remaining part of the stage, as far as to two small staircases, and the under part of the outer surrounding wall, has the appearance of having been decayed by time. The amphitheatre, properly so called, that is, the graduated elevation for the spectators, consists of eight rows of seats. The landing-place, or lobby (the *præcinctio*), occurs after the first five rows of seats, so that the two upper rows seem to be rendered waste. All that remains of the upper part of the external wall is a central niche. Three straight flights of steps leading up to the seats, one in the middle and one at each end of the semicircle, characterise this as a Roman theatre. The whole is built of stone; and, wherever we may seat ourselves, we are sure to enjoy a delightful prospect.

652. *The grotto* lies behind the theatre, and has the appearance of a double arcade. Three large arches open straight before us, and we are surprised by the views obtained through the two to the right. Opposite one of the latter, and on our left, there is, in a large deep niche, a gypsum cast of a Venus sitting and drying her feet, the original of which is at Florence. Water runs under the niche, from pipes, into a stone trough, upon which the oceanic birth of Venus is represented. The outermost arcade stands in the water; we pass through it by means of a gondola.

653. *The Cabinet of Night* forms part of this grotto. The Prince de Ligne, speaking of this singular effort of human ingenuity, says, "We ascend a little staircase; the gloom increases, and we are at last involved in complete darkness. On turning to the left, a sudden brightness strikes the eye; a magic ray beams forth. We proceed to the spot whence it issues; and, by an open door, enter a saloon, in the middle of which a beautiful statue, of dazzling whiteness, on a black pedestal, reflects the light streaming from a moon and stars set in the dark-vaulted roof of the cabinet. The effect is striking; but, when we recover from our first astonishment, we perceive that the stars are of yellow glass, sprinkled thickly over the roof; while the moon consists of one large pane, which closes an umbilical aperture in the centre. The cabinet is about twenty feet square, and the walls are covered with Etruscan entablatures, encased with black stones. Couches covered with black cloth are placed in recesses; and the statue, which is a cast from an antique vestal, holds an alabaster vase in her hand, in which at night is placed a wax candle. From the position of this taper, the only light then admitted into the cabinet is thrown strongly upon the figure; while the black pedestal on which it stands is no longer perceptible, and the vestal seems floating in air."

654. *The Cabinet of Day* is another part of the grotto, and is intended to be the counterpart and companion picture of the former; but it is not completed: it is, therefore, unnecessary to notice it further at present. There is also within the same mountain a funeral vault, with urns for ashes; and numerous repositories and cavities, which serve for different purposes: some are used for the preservation of plants in winter.

655. *The Volcano*. By some rough steps between rugged rocks, we reach a break in the side of the mountain, which serves as a landing-place, and from which there is a view to the right, over the ruins of the theatre. The funnel-formed and lava-covered crater of the volcano is seen above to the left. In the representation of eruptions, the hollow which surrounds the crater, and out of which it seems to rise, overflows with water, which is thrown up by a machine within the mountain, and which, like a magnificent cascade, rushes down, foaming and roaring, over the rocky ridge into the lake. A stone bridge, which is thrown up over this hollow, leads to the great caldron, where the fire-works, projected through the mouth of the crater, are prepared, and in which, when the volcano is working, all kinds of inflammable materials are burned; when an immense smoke issues from the numerous apertures, and covers the top of the mountain with heavy black clouds. At the same time millions of sparks, rising from the gulf, form columns of fire, and streams of melted lava appear to flow down the sides of the mountain.

656. *The pavilion* is an imitation of the villa built by Sir William Hamilton at Posilippo, near Naples. The Prince de Ligne describes this structure as most simple in its outward form, most magnificent within, and altogether in the Herculaneum style. It is thirty-eight feet long, sixteen broad, and twenty-two feet high.

657. *The kitchen* of the pavilion is fitted up in the antique style. The walls are painted with *renia*, or representations of chickens, eggs, fruit, and other articles for the table, which the Greeks used to give as visiting presents to their guests.

658. *The Jewish temple*, and several fountains, also deserve notice, though not of sufficient importance for a lengthened detail.

659. *Such are the gardens of Wörlitz*, the most celebrated in Germany. To us they seem more calculated to excite wonder at the multitude of contrivances, and the expense incurred, than pleasure at the beauty of the effects produced. Every one must feel that, after all that has been done at Wörlitz, it is but the toy of a man of wealth; there is no evidence, in any part of the above description, that the place contains much natural beauty, or that art has been employed in heightening what there might be. The whole garden seems to be an assemblage of costly buildings: but buildings that neither are nor ever were of any real use, be their architecture what it may, can never please a well-regulated mind. As some atonement for the multiplicity of useless edifices, and the absurdity of the allegorical scenes at Wörlitz, we may notice, that the grounds contain a number of fine American trees, some of which are described in the fourth and fifth volumes of the *Transactions of the Prussian Gardening Society*.

660. *The cemetery of Dessau* is said to be the finest in Germany, and one worthy of serving as a model for that of every other country.

Division xii. *Gardening, as an Art of Design and Taste, in Saxe-Coburg-Gotha.*

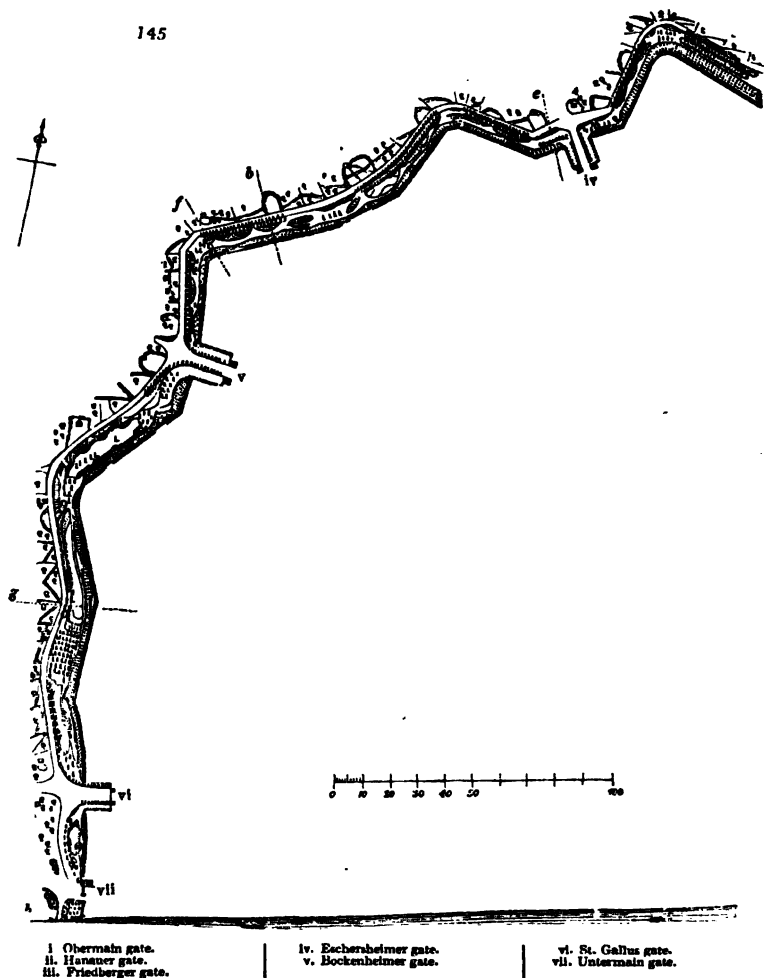
661. *The principality of Saxe-Coburg-Gotha* has been lately formed by the union of Saxe-Gotha and Saxe-Coburg. It comprehends a great part of the territory of Thuringia, and includes a considerable portion of the finest forest scenery of that extensive district. The gardens of Saxe-Coburg were of no great note in the time of Hirschfeld, since they are not noticed either in the *Théorie des Jardins*, or in *l'Almanach du Jardinage*, published towards the end of the last century. Soon after the general peace, however, the ducal gardens of Coburg received some botanical accessions from those of England; a part of the park, or public promenade, was planted in a more free or natural style, and the whole has been kept in better order. (*Encyc. of Geog.* § 2972.)

662. *The ducal gardens of Saxe-Gotha* are remarkable for their fine lawns, and for a ruined castle, which was first built complete, and then ruined *exprès*, by firing cannon against it.

Division xiii. *Gardening, as an Art of Design and Taste, in the Neighbourhood of the Free Towns of Frankfort, Hamburg, and Bremen.*

663. *The public garden at Frankfort* is one of the handsomest in Germany, though it does not possess the extent and parklike appearance of the English garden at Munich. Frankfort is surrounded, except on the side bounded by the Maine, with a pleasure-ground at least two miles in length, and occupying the breadth of the former ditch and ramparts; it is laid out in the English style, and affords great variety of shady walks and picturesque scenery, with the grand advantage of being accessible from every part of the city in a few minutes. One peculiar feature of this pleasure-ground is, that it is not confined to trees and shrubs, but contains a profusion of the choicest roses, georginas, chrysanthemums, &c., together with most of the showy annuals, such as balsams, stocks, China asters, &c. In 1827 even pelargoniums and *Tigridia Pavonia*, planted in large masses of each, and intermixed with vast beds of mignonette, were in a high state of luxuriance and beauty. Nothing could be more brilliant than the display of this garden in September in that year, when the georginas and the superb clumps of *Brugmansia suaveolens*, *Salvia coccinea*, &c., were in flower; and, as a proof of the scale on which it is managed, and the attention paid to it, it may be mentioned, that the gardeners were then preparing a bed of irregular figure, wholly for pinks, above sixty feet long, and from nine to fifteen feet broad, which they were trenching two feet deep, after laying manure at the bottom of each trench, and carefully picking out the stones. This garden affords a striking, and, to an Englishman, very mortifying, proof of the great superiority of the manners of the German lower classes over those of the English. Though merely separated from a public high road by a low hedge, which may be stridden across; though at all times accessible (there being no doors or gates of any kind to the entrances) to every individual of a population of 50,000 souls; and though constantly frequented by servants and children of all descriptions, not a flower, or even a leaf, of any one of the plants, from the earliest and most showy to the humblest, seems ever touched. Even the beds of mignonette looked as untrodden and unplucked as if in an English private garden. It is needless to say how utterly impossible it would be to have near any large English town a similar garden thus open to the public, and thus scrupulously kept from injury; and yet there were apparently no persons to watch; and, instead of threats of heavy penalties, a printed paper was affixed to a board at each entrance, expressing, in German, that, the public authorities having originally formed, and annually keeping up the garden for the gratification of the citizens, its trees, shrubs, and flowers are committed to the safeguard of their individual protection. This simple appeal is quite sufficient. (*Gard. Mag.*, vol. v. p. 209.) This garden was designed and chiefly laid out by M. Zeyer, of Schwezingen. It was planted by M. Rinz, nurseryman at Frankfort, whose son, M. Jacob Rinz, has furnished us with a general profile (*fig.* 145.),

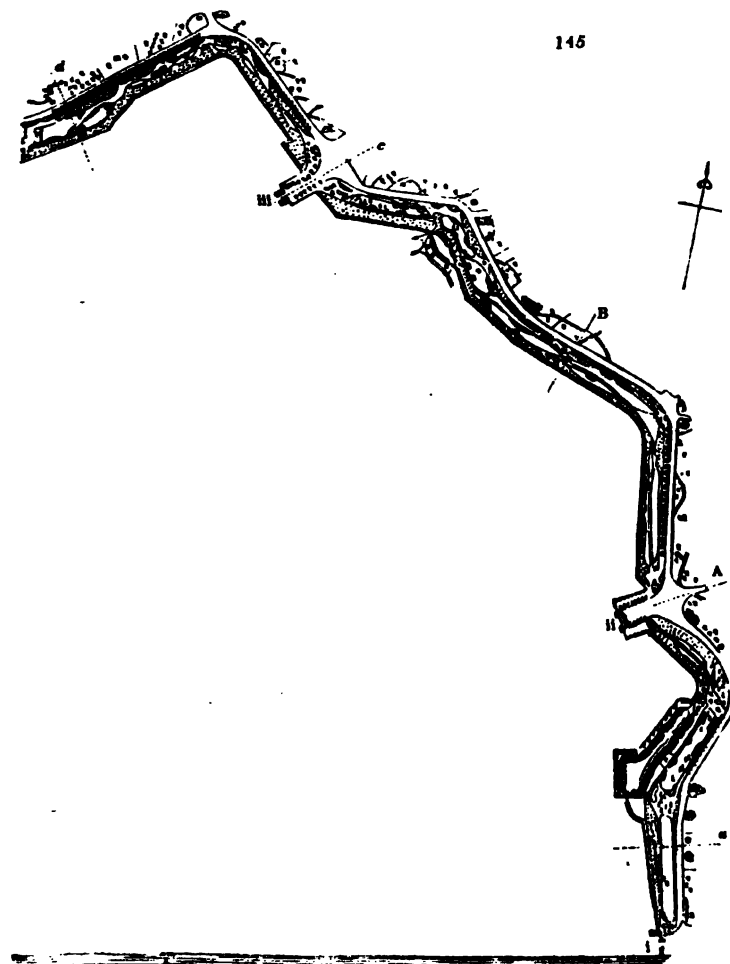
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and also a detailed working plan. The latter we shall give in treating on landscape-gardening, and we here only present the general features of the former.

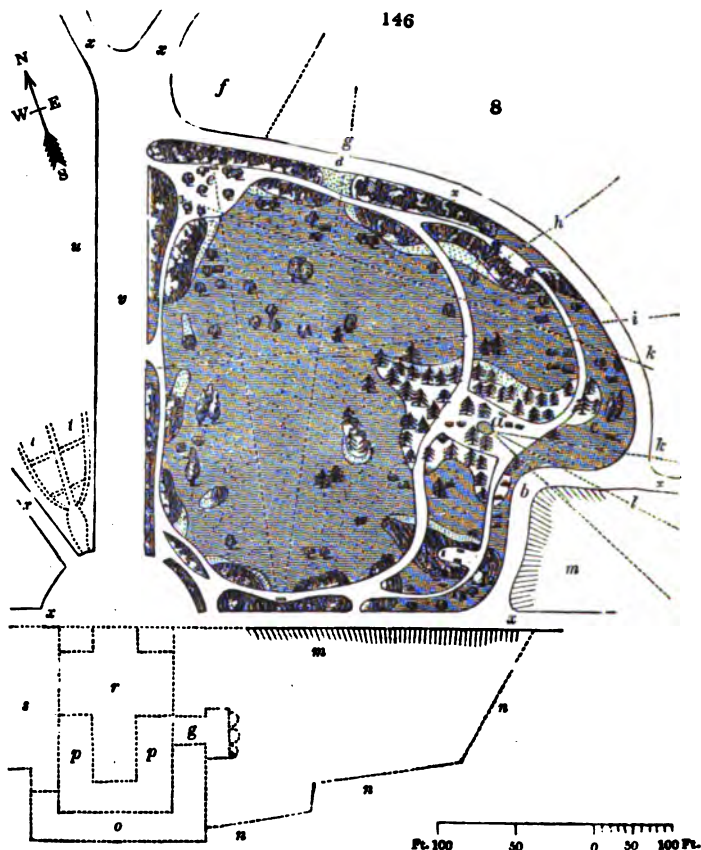
664. *Rainvillische Garden, near Hamburg*, in point of situation and neatness, according to Hodgskin, may vie with any garden in the world. It occupies the rising bank of the Elbe, and commands a view of the river and opposite coast. On the summit of the hill stands the house, which is elegantly furnished, and where every kind of refreshment may be procured. That never-failing accompaniment of such places in Germany, a band of music, fills the air; while the company partake of coffee, wine, &c., under the shade of fine trees, and enjoy a noble prospect over the wide and majestic Elbe. This garden is one of the favourite resorts of the best company in Hamburg, and does honour to their taste. The general calmness and gentleness of the people allow no noise and turbulence. They were like the place; still, and yet happy. (*Travels in Germany, &c.*, p. 204.)

665. *Bremen* is built on both banks of the Weser, and the two parts are united by a wooden bridge. The greater part of the town is, however, situated on the right bank; and it is round this part that the public walk has been made. Trees have been planted throughout the whole length of the ancient wall, and the outer part has been sloped



a, A, B, &c. Lines indicating the boundaries of the portions which are given on an enlarged scale, for the purpose of illustrating the details of execution, in the Third Part of this work.

away, and ornamented with jasmines, honeysuckles, and roses. Bowers, thickets, little forests, and tufts of sweet-smelling shrubs, are now the only sentinels. The bastions, which might once have frowned with cannon, are now smiling with beautiful flowers; the parapet has become a shady grove, and the former ditch is now a handsome little lake, the abode of stately swans. There are straight and serpentine walls, with walks on the top, on the sides, and at the bottom. At the lower end of the town the walk terminates in a high mound, also well laid out, and planted with trees. From it there is a charming view of the Weser, of the town, and of the whole adjoining country. To be situated on the borders of a large town, it is a most elegant public promenade. Nature did nothing for it, but it is indebted for its beauties to the old mound which was raised for defence, and to the good taste of the inhabitants. It is admirably calculated to promote both their health and their enjoyment; and is a proof that a sound mind and an elegant taste may be found in the small commercial cities of the north, as well as in the capitals of the south. In the flat country, immediately outside of the walk, are many of those houses of entertainment called *kegelbahns* (bowling-greens, or skittle-grounds), that must be dear to the Germans, for they pass there many calm and happy hours. (*Travels in Germany*, p. 268.)



666. *The gardens of Prince Metternich, at Johannisberg, on the Rhine, near Frankfurt, (fig. 146.)* were laid out for that prince in 1825, by M. Rinx, a nurseryman at Frankfurt. The situation is near the Rhine, elevated, varied, and containing extensive prospects. In a few years it is thought Johannisberg will be one of the finest places of its size in Germany. The following are details:—

- a, A projected temple on an elevated site, which is planted with various trees; as, *Pinus*, *Betula*, *Juniperus*, &c.
 b, Group of *Pinus canadensis*.
 c, Group of *Pinus Strobus*.
 d, Dotted parts indicating masses of flowers.
 e, Elevated site, planted with *Platanus orientalis*. Some cedars of Lebanon are also planted here; besides which the garden is very rich in most kinds of American and other fine shrubs and rare trees.
 f, An orchard of the best excellent varieties of *Fagus Castanea*.
 g, View toward the mountains and the forest.

- h, Meadows, over which are seen the mountains and the forest.
 i, View to the vineyards.
 k, View to the vineyards on the Rhine.
 l, View to the vineyards, to the Rhine, and for about 24 miles in the country.
 m, Vineyards.
 n, Terrace walls for vines.
 o, Flower-garden round the palace.
 p, Palace.
 q, Chapel.
 r, Court of the palace.
 s, Kitchen-garden.
 t, Orchard.
 u, Double avenue.
 v, v, Public roads.
 (Gard. Mag., vol. vi. p. 32.)

SUBJECT. 2. German Gardening, in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.

667. *Floriculture* was but little attended to in Germany previously to the introduction of botanic gardens; but, on the establishment of these, plants of ornament were eagerly sought after in most of them; and the taste gradually extended, and continues to spread, among wealthy individuals.

668. *Botany, in Germany*, has been considered an important part of the endowment of every university; whence the number of botanical gardens in that part of Europe is very numerous: they are generally rich in such plants as will live without any artificial protection, but poor in such as require a stove or green-house. The gardens of Berlin and Schönbrunn are, however, noble instances of perfection in all the departments of a useful and scientific botanical collection. The catalogue of the Berlin garden for

1825, enumerates 5791 species, many of which are new. At Schönbrunn, celebrated as the storehouse whence the Jacquins have for so long a time drawn their inexhaustible treasures of botany, great additions have been making since the peace of 1814, by the construction of new hot-houses, and the enclosure of a larger quantity of ground. The Emperor of Austria maintains botanical collectors in various distant countries. The late King of Bavaria, at whose private charge Drs. Spix and Martius were for a long time occupied in exploring the riches of Brazil, did not cease to extend his patronage to them after their return, but nobly provided the means of making the world acquainted with the result of their discoveries, in a manner equally worthy of the monarch and the man of science. The work on Brazilian palms, by Dr. Martius, is one of the most splendid and perfect botanical productions the world ever beheld. It is well known that the Prussian government, under the advice of Count Altenstein, has also long maintained collectors not only in Brazil, which seems to be a favourite country with the German princes, but also at the Cape of Good Hope and in the Isle of France.

669. *The first public botanic garden in Germany*, according to Deleuze (*Annales du Muséum*, tom. viii.), was established by the Elector of Saxony, at Leipsig, in 1580; this magistrate having undertaken the reform of public instruction throughout his dominions. Those of Giessen, Altorf, Rintel, Ratisbon, Ulm, and Jena soon followed. In 1605, Jungermann, a celebrated botanist, obtained one for the university which the landgrave had just founded at Giessen. After having disposed of it, he went to Altorf, and solicited the same favour for this city. The senate of Nuremberg agreed to his wishes in 1630, although the country was then a prey to the disasters of war. Jungermann, named professor, gloried in the prosperity of a university which he looked upon as his work, and in 1635 he published the catalogue of the plants he had collected. Ten years afterwards, they constructed a green-house, and the garden of Altorf (pref. to the *Nuremberg Hesperides*) was then the most beautiful of Germany. That which Ernest count of Schauenburg established in 1621, at Rintel in Westphalia, also acquired much celebrity. Those of Ratisbon and Ulm are of the same epoch. From 1555, when the university of Jena was founded, the professors of botany, during the summer season, took the students to the country to herbalise. They soon found it would be much more advantageous to collect in one place the plants they wished them to be acquainted with, and the government constructed a garden in 1629. The direction of it was given to Rolinck, who has left a curious work on plants; containing a history of the principal gardens of Europe of his time.

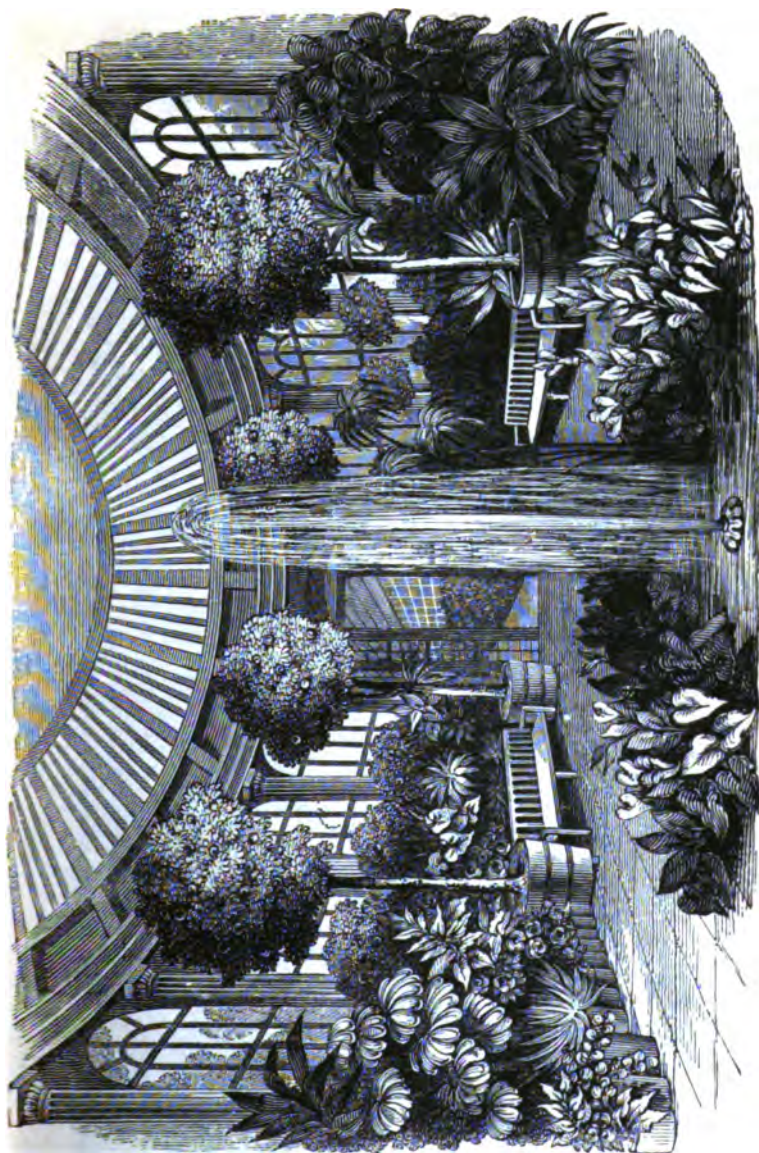
670. *In Austria and Hungary* the principal botanic gardens are those of Schönbrunn and Pesth. There are also near Vienna those of Rennwegg (a private garden of the emperor), Laxenburg, Hetzenden, the Burg-garten, and the Belvidere; the last containing a complete collection of Austrian plants. There is also the garden of the university, which is considered next in rank to the imperial botanic gardens, and which has been lately greatly enlarged and enriched by the addition of many new plants.

671. *The Schönbrunn botanic garden* was begun with the palace, in 1753, by the Emperor Francis I. He desired that that establishment should be worthy of the imperial magnificence, and that it should extend the domain of botany, in bringing together vegetables then unknown in Europe. By the advice of Van Swieten, he procured two celebrated florists, the one from Leyden and the other from Delft. The first, Adrian Steckhoven, directed the construction of the hot-houses; and the second, Van der Schott, brought all the plants which he could collect in the gardens and nurseries of Holland. Thus the first year they were in possession of many curious species; but this was only a step towards the end they had in view. The Emperor proposed to the celebrated Jacquin to go to the Antilles. This botanist departed in 1754, accompanied by Van der Schott, and two Italian zoologists, employed to procure animals for the menagerie and the museum. These travellers visited Martinique, Grenada, St. Vincent, St. Eustatia, St. Christopher, Jamaica, Cuba, Curaçao, and other places. In 1755, they sent home their first packages, and in 1756 Van der Schott arrived with a collection of trees and shrubs, almost all in good condition. The trees were five or six feet high, and many had already borne fruit: they were taken up with balls, and the earth enveloped with leaves of bananas, tied by shreds of under-bark. Thus packed, the average weight of each was about 100 lbs. These plants, and the water necessary for them, formed the greater part of the cargo of a vessel which had been forwarded from Martinique to Leghorn. From Leghorn the plants were transported on the backs of mules, and placed in the plain ground in the hot-houses built to receive them. The third and the fourth quantities came in the same manner. The fifth and sixth arrived from Caraccas, by Amsterdam. At last Jacquin left Havannah, and conducted to Schönbrunn the last collection in 1759. During this time presents and purchases were received from other countries; and, in proportion as the plants increased, they built hot-houses and orangeries of a grandeur suitable to the plants destined to grow in them. One range is 270 feet long, and 30 feet high within; another above 500 feet long, and about the same height;

and there are three more ranges, each about 240 feet long. An accident, in 1780, caused the loss of most of the plants of the great hot-house. Van der Schott being sick, the gardener who supplied his place forgot, during a very cold night, to light the stoves. Perceiving it in the morning, he thought to remedy the evil by making a very brisk fire. This sudden change of temperature caused many of the trees to perish, the trunks of some of which were of the thickness of the arm. To repair this loss, Joseph II. engaged the naturalists to undertake a new voyage. Professor Mæster was named chief of the expedition, with Dr. Stupiez for a companion; the gardeners Bose and Bredemeyer, and the draftsman Moll. They went direct to Philadelphia, visited the United States, Florida, and New Providence, sent home a large collection, and Bose afterwards got charge of the garden of Schönbrunn. (*Townson's Travels, &c.*) Of late years this collection has been greatly increased by the present director, Bredemeyer, who has brought together all the principal species and varieties of the genus *Citrus*, and many Cape and Australian plants not before in the garden.

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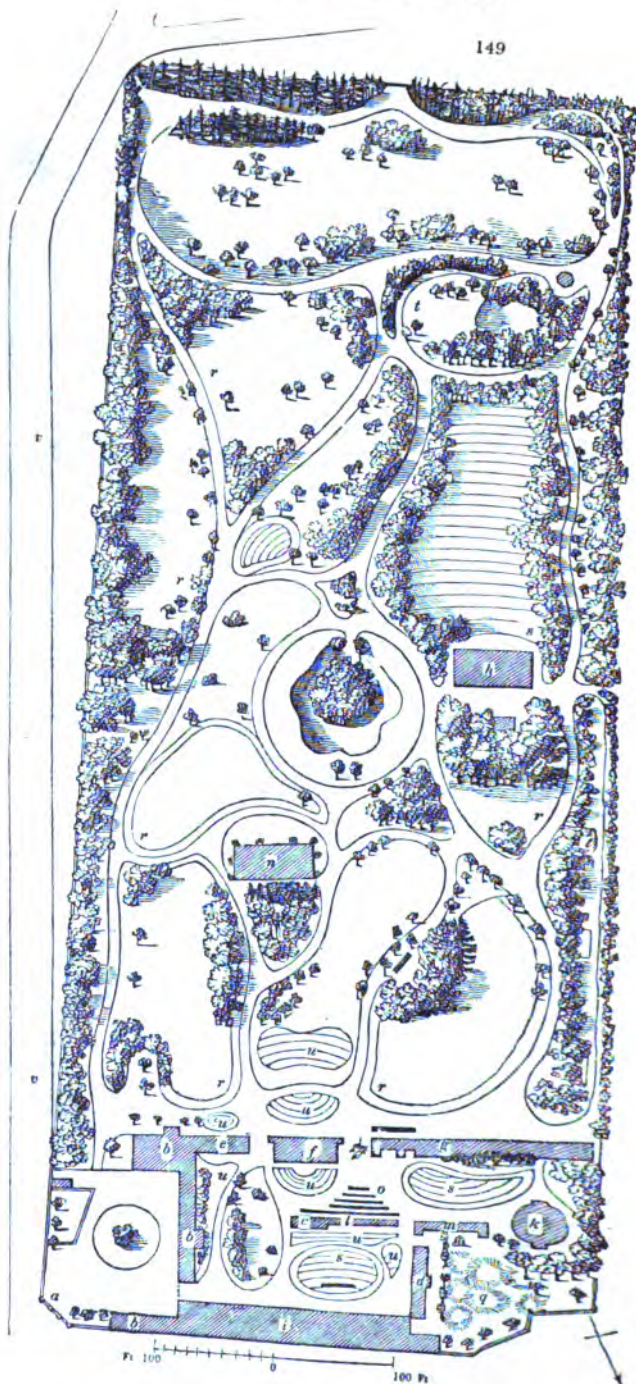
672. *The hot-houses of Schönbrunn*, Townson observes, about the end of the last century, "are the most spacious that have yet been constructed in Europe; the trees of the tropics there develop their branches in full liberty, and bear flowers and fruits. The most rare palms, the *Cocos nucifera*, the *Caryota urens*, the *Elæis guineensis*, grow there with vigour. The *Corypha umbraculifera* extends its large leaves for twelve feet round, and birds of Africa and America there fly from branch to branch among the trees of their country. Jacquin published successively three great works, illustrating the plants of these gardens, viz., *Icones Plantarum rariorum Hortus Schœnbrunensis*, and *Fragmenta Botanica*.

673. *The botanic garden at Rennwegg* is chiefly remarkable for its palm-house (fig. 147.); in which not only palms, but scitamineous plants, grow with a luxuriance rarely to be met with on the Continent.

674. *The winter-garden of Prince Lichtenstein* (fig. 148.) is devoted to plants of show



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rather than of botanical interest, and is justly considered one of the most luxurious covered promenades in Germany.

675. *The burg-garten* (castle garden) is a large collection of rare New Holland plants, in a range of magnificent hot-houses, finished in the year 1818. Attached to these hot-houses is a large room, which, in winter, is filled with forced flowers; and, by means of a covered walk, this range is connected with another, which contains one of the best collections of succulent plants in Germany. (*Gard. Mag.*, vol. iv. p. 372.)

676. *The botanic garden of Pesth* was established in 1812, and enlarged in 1815: it was placed under the direction of Professor Kitaibel, known in the scientific world as one of the authors of *Planta rariores Hungaria*; Waldstein being the other.

677. In Prussia there are several botanic gardens; but the principal are those of Berlin, Königsberg, and Aix la Chapelle.

678. *The botanic garden of Berlin* is justly considered the first in Germany. It contains a plant of the fan palm, *Chamærops humilis*, supposed to be 171 years of age, which is eighteen feet high, and has ripened fruit from which plants have been raised. Its height is remarkable, as, in its native situations in Spain and Portugal, it forms a bush seldom higher than two feet. The most interesting circumstance connected with this palm, however, is, that it was the subject of the experiment cited by Linnaeus as a proof of the sexual system of botany. In the account given of the experiment, this palm is said to be the *Phoenix dactylifera*; but this mistake was corrected by Peter Collinson, who travelled in Germany during the seven years' war; and, when he was in Berlin, saw the palm, wrote the true name on a slip of paper, and stuck it on the tree. (*Gard. Mag.*, vol. ii. p. 446.) A plan of this garden (fig. 149.) was furnished us in 1832, by the director, M. Otto, and the following are details:—

- a. Entrance and drive court.
- b. Lodgings for workmen and various offices.
- c. Hot-house No. 1, for small and young plants.
- d. Hot-house No. 2, for monocotyledonous plants.
- e. Hot-house No. 3, for ferns and palms.
- f. Hot-house No. 4 and 5, in two divisions.
- g. Hot-house Nos. 6 and 7, in two divisions, together with the two green-houses, 4 and 5, for Cape and New Holland plants.
- h. Hot-house No. 8, for large palms.
- i. Hot-house No. 9, for large specimens of tropical plants, together with the two green-houses Nos. 6 and 7, for orangey plants.
- Hot-house No. 10, for large specimens of *Pandanus*, *Drosera*, *Delonix*, *Miconia*, &c.

- l. Green-house No. 1, for Cape, New Holland, and Mexican plants.
- m. Green-houses Nos. 2 and 3, for heaths and succulent plants.
- n. Conservatory No. 4, for large specimens of New Holland and other plants.
- o. Dung-beds for raising seeds.
- p. Structure with props for twisting plants.
- q. Compost ground.
- r. Place for under-shrubs, hardy perennials, and biennials.
- s. Place for annuals.
- t. Place for water and bog plants.
- u. Place for setting out the green-house plants, &c. during summer.
- v. Road from Berlin to Potsdam.

679. *The botanic garden of Königsberg* was enlarged and re-arranged in 1812, and deserves notice for its singularly varied surface and agreeable retired walks.

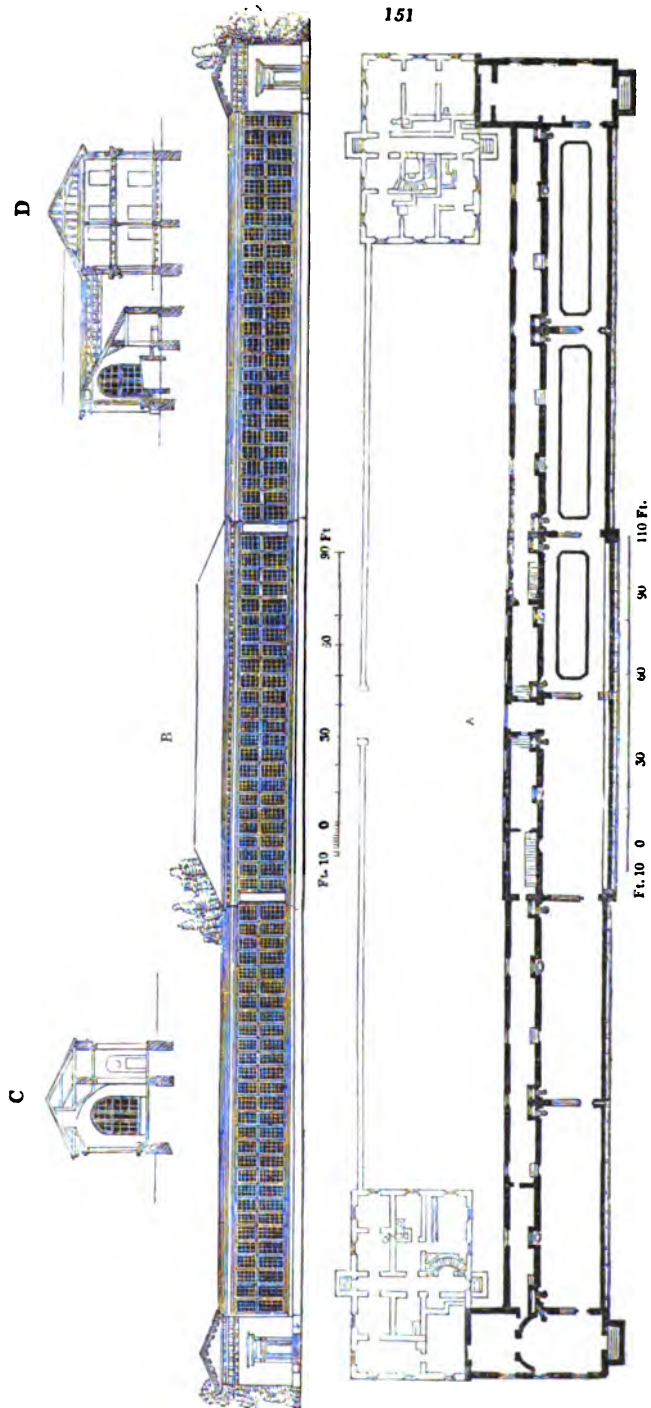
680. In Bavaria, the principal botanic garden is that of Munich. There are also botanic gardens at Nymphenburg, Ratisbon, and a few other places.

681. *The botanic garden at Munich* is rich in Brazilian plants, of which it contains a greater number of species than the garden at Kew. It is under the direction of the celebrated Dr. Martius, well known for his *Travels in Brazil*, and for various other works on natural history. The garden was laid out by the late M. Schell: it contains a handsome entrance (fig. 150.); twenty-four compartments for the twenty-



four Linnæan classes of herbaceous plants, and a marginal arboretum, arranged with a joint view to the natural orders and to picturesque beauty. The number of species is not numerous, because the great severity of the winter admits of none but natives of very cold climates. Hollies, which grow in the mountainous districts of Bavaria, will not endure the winter at Munich; neither will the box nor the furze: pines, firs, and junipers are almost the only hardy evergreens. The soil of the garden being, in common with that of the table-land on which Munich stands, formed of the débris of magnesium limestone, is unfavourable to vegetation, and requires to be mixed with a good deal of surface mould or turf. There is black bog earth near the town, but it is found injurious to heath and other hair-rooted plants, and sandy peat is brought from a great distance. The range of hot-houses (fig. 151.) is handsome of

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its kind: it contains a numerous collection of palms and succulents, but not many heaths or Australian plants. A new catalogue of this garden is now (1832) in course of publication by Dr. Martius.

682. *In the green-house of the botanic garden at Nymphenburg* (see fig. 100. § 538.) is an *Araucaria excelsa* raised from a lateral frond. After this plant had been rooted for several years, the gardener cut it down to the ground, when it sent up three upright shoots, one of which he reserved as a leader; the plant, now a handsome tree, was presented by the king to the botanic garden of Erlangen. In the palm-house (*a*, in fig. 100.), is a large specimen of *Cycas circinalis*, which was brought by the French from Vienna to Malmaison, bought at the sale which took place there in 1827, for 600 francs, and carried to Munich. *Nephelium Litchi* has here ripened fruit. *Phoenix paludosa* and *farinifera*, *Chamaerops arborescens*, and *Latania borbonica*, have here attained a large size. *Mimosa aquatica*, from Senegal, the leaves of which are as sensitive as those of *M. pudica*, thrives in the green-house (*b*, in fig. 100.). *Jacquinia arborea* is here propagated from leaves, which must be slipped off the plant, and planted in sandy leaf-mould round the edge of a pot, and made very firm; in six or eight months they send up a shoot from the base of the footstalk. *Pitheas acutis* is raised from seed; which must be sown immediately when it drops from the plant, otherwise it will not come up. *Desmodium adacendens* flowers freely all the winter. All the plants in the green-house here are distinctly named on wooden tallies, stamped with printers' types, set into a small case, screwed up tight, and supplied with printers' ink in the usual manner. The rhododendrons and laurustinuses are here kept in the green-house. The latter are trained with stems, six feet high, with thick bushy heads, five feet in diameter, which are covered with flowers all the winter. Fig. 151., *A*, is the ground plan of the three hot-houses and the green-house, *a*, the elevation, *c*, a section through the central green-house, which has the attendant's house behind; and *d* is a section through the palm-house.

683. *The botanic garden of Ratisbon* contains about an acre, and has a moderate collection of plants, chiefly herbaceous, and natives of the north of Europe, arranged according to the Linnæan system. There is a green-house, with an opaque roof, containing a few Cape and Australian plants, with some which are natives of the south of Europe, and which stand the open air in England. Among these are the common and Portugal laurels, the laurustinus, the arbutus, &c.

684. *The garden of Michael August Stöttner, at Nuremberg*, is celebrated for its collection of pelargoniums, said to be the most extensive on the Continent. In 1829 the catalogue contained 430 names, with their authorities. M. Stöttner, who is a wealthy amateur, has, with the assistance of M. Reider, a well known gardening author at Nuremberg, commenced a *Geraniodea* there, like that of Mr. Sweet.

685. *Floriculture, in the neighbourhood of Munich*, is carried to a far greater extent than will readily be imagined, when the elevated situation and consequent severity of the climate are taken into consideration. The ranunculus, the violet, the hyacinth, and the narcissus are in bloom in the hot-houses of the royal gardens throughout the winter; and roses, honeysuckles, lilacs, azaleas, rhododendrons, pinks, tulips, and other shrubs and flowers, are forced as successfully, and come as early into bloom, as in London. *Chrysanthemums*, in small pots, and only a few inches high, are cultivated, and forced, so as to be in bloom all the year.

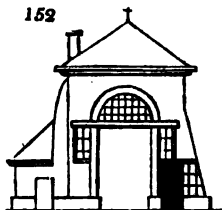
686. *In Saxony* the principal botanic garden is that of Dresden. It is small, but is rich in exotics, and is carefully managed by Traugott Seidel. Dr. Granville says its situation is one of the prettiest in Europe, and that it contains nearly 10,000 species of plants. He also mentions the garden of Dr. Kresig, in the neighbourhood of Dresden, which he says contains a large collection of flowers, its possessor being very much attached to botany and floriculture.

687. *In Württemberg* the only botanic garden of any importance is that at Stuttgart; which forms an episode to the garden of the new palace. It has been much altered and improved by the present director, M. Bosch. The herbaceous plants are arranged after Linnæus; and the trees and shrubs, in ornamental groups and masses, after the manner of Jussieu. There are very few evergreens which stand the open air in this part of Germany, notwithstanding the numerous vineyards that cover the hills; and the endless lines of fruit trees which enrich and adorn the public roads. *Juniperus virginiana* and *Sabina*, *Thuja occidentalis* and *orientalis*, various species of pines and firs, the yew tree, the spurge laurel, the privet, the pyracantha, and the horsetail, comprise almost the whole of the evergreens of a Württemberg shrubbery. In the hot-house in this garden we saw, in 1828, *Cárica monoca* with a good many scarlet fruit, about the size of quetch plums; plants of *Testudinaria elephántipes*, raised from seeds, ripened on the spot; *Pasiflora racemosa*, with ripe fruit, and some other fine specimens. Orchideous epiphytes seem to grow remarkably well in these hot-houses. In the green-houses we found a few heaths, a good many pelargoniums, and *Primula prænitens*, which was introduced in 1824. In a large orangery connected with the garden, we found 175

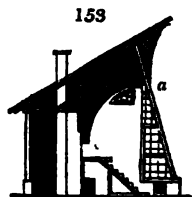
large orange trees, with trunks twelve feet high, and large round heads, covered with fruit and flowers. The boxes in which they grew were four and a half feet every way, and most of the trees, we were told, were between 400 and 500 years old. Their trunks were generally about a foot in diameter; but we measured one of them, and found it about 18 inches. The common laurel is here grown in tubs, like the orange tree, and forms an object of great beauty. We found some of them with large round heads and stems twelve feet high; and, if they had been stuck over with artificial oranges, we should probably never have thought of doubting that they were trees of the genus *Citrus*.

688. *A botanical travelling union*, for the purpose of collecting specimens of plants in different parts of Europe, and of distributing them equally among the different members of the society, has been established at Stuttgart. The members pay a small annual subscription (15 florins), and with this sum the union sends out travelling collectors to every part of Europe, or purchases specimens from travellers. (*Gard. Mag.*, vol. iii. p. 44.)

689. *The botanic garden at Carlsruhe* was founded in 1715, and contains several hot-houses, most on the old Dutch plan; the green-houses having steep glass fronts (fig. 152.)

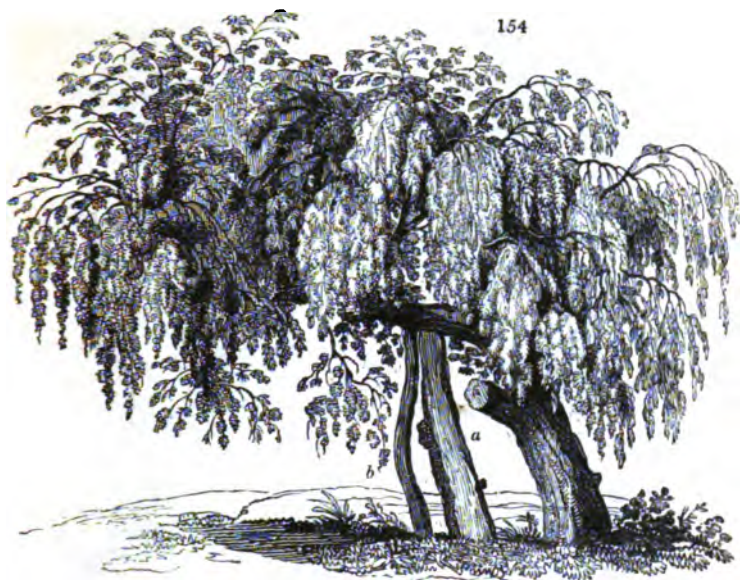


and the hot-houses having bonnet-roofs (fig. 153.) The bonnet-roofs are a great protection both from the cold and from hail; and they admit of having wooden shutters hinged at the upper ends of the sashes (a), which can be let down during nights. The bonnet-roof also powerfully reflects the sun's rays down on the glass in winter and early



spring, when they impinge on it at nearly a right angle. In 1731, Professor Hebenstreit of Leipsic, and the Carlsruhe gardener, Thran, were sent to Africa for plants. Thran returned successful in 1733, and soon afterwards the first Carlsruhe Catalogue was printed. (*Haller, Bibl. Bot.*, tom. ii. p. 266.) It contained about 2000 species, besides an immense collection of florists' bulbs of the finest varieties. From both about 200 drawings were made by Trew, and described by Ehret. In 1763, Dr. Kölreuter was appointed botanist to this garden. In 1787, Schweyckert, who had studied gardening in England, was made inspector; and through him the garden was so increased, that in 1795 the *Hortus Carlsruhanus* contained 5000 species. In 1796, the French invasion of this part of Germany caused the garden to be neglected; and in 1806, when the garden inspector Schweyckert died, the number of species had declined to 300, chiefly ligneous plants and annuals. M. Hartweg, the present inspector, was then appointed to the situation, and began by introducing, from Paris, a great many New Holland plants, then rare in Germany. The number of hot-houses was increased, and the hardy plants better arranged in the Linnæan manner. In 1811, Gmelin published *Hortus Magni Ducis Badensis et Carlsruhanus*, &c., which contained upwards of 6000 species. In this year the grand duke died, and *Agave lûrida*, which had flowered for the first time in Europe the year he assumed the government (65 years before), again flowered. Various alterations were made; hot-houses were built; an additional supply of water was obtained, and fountains were added; and in 1823 and 1824 the garden was ornamented with a great many urns and statues. Hartweg published his *Hortus Carlsruhanus* in 1825, enumerating above 6000 species. He died in 1830. (*Gard. Mag.*, vol. iii. p. 205.) We visited this garden in November, 1828, and found it exceedingly well stocked and well kept. Among the fine specimens which it contained were, *Wistaria Consequena*, covering the end of a house, and ripening annually a great number of seeds; *Andr  meda arborea*, twelve feet high, also ripening seeds; *Magnolia macrophylla*, ten feet high, flowering freely. In the stove, *Cham  rops b  miliis*, with fruit, from which, as at Berlin, young plants had been raised; *Curtisia faginea*, very large; *Passiflora maliformis*, ripening abundance of fruit every year; *Vallisneria spiralis*; *Phormium t  nax*, which has ripened seed; and *T  coma radicans*, which has attained a large size, and is probably as hardy as the native shrubs; *Soph  ra japonica*, very large, *T  marix gallica*, twelve feet high; and *Salisb  ria* male and female. *Rhodod  ndron ponticum* is here protected during winter with fern; while *R. maximum* requires no protection. All the American plants in this garden, and also in the pleasure-ground, are grown in rotten wood and leaves. There is a very large orangery, which was formerly a theatre. The *Scarab  us nasicornis* is hatched from eggs inserted in the bark beds, and the perfect insect flies about in the open air; and, while it excites attention by its singular form, does harm to nothing. But the greatest curiosity in this garden is a weeping willow,

planted in 1787, which was nearly thrown down by a storm in 1816. One branch was cut off, and an oaken prop was put under the other (fig. 154. a). The willow



sent down a root under the decayed bark of this oak prop, which, in 1829, being increased to about the thickness of a man's arm (b), burst from the bark; and it is supposed that, in a few years, it will render the oaken prop superfluous. In a building in this garden is a very complete collection of seeds, of sections of wood, and an herbarium. The different seeds are enclosed in broad flat glass phials, named, and placed on narrow shelves, in the order of the Linnæan system. There is a separate set of specimens of culinary seeds, named, and covered with a glass case; and also a set of forest tree seeds. The different sorts of kidney beans are placed on a board divided into small squares, like a draught-board.

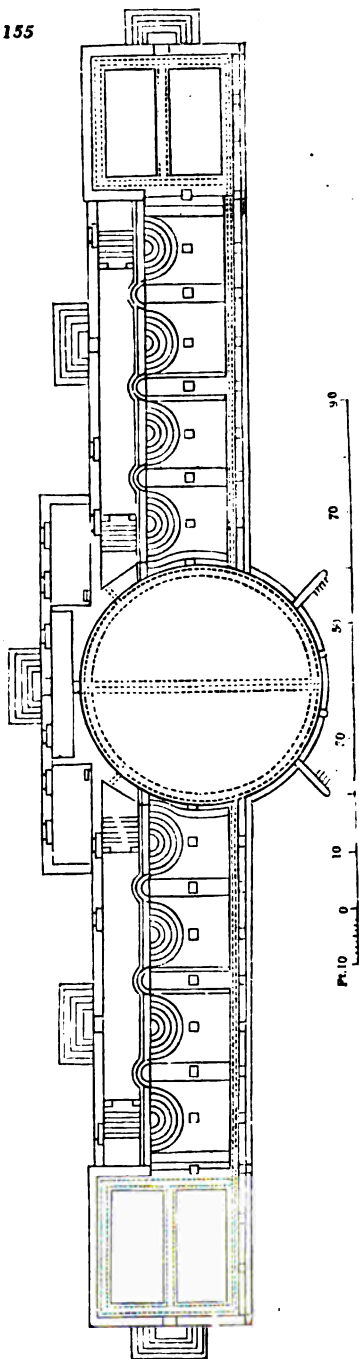
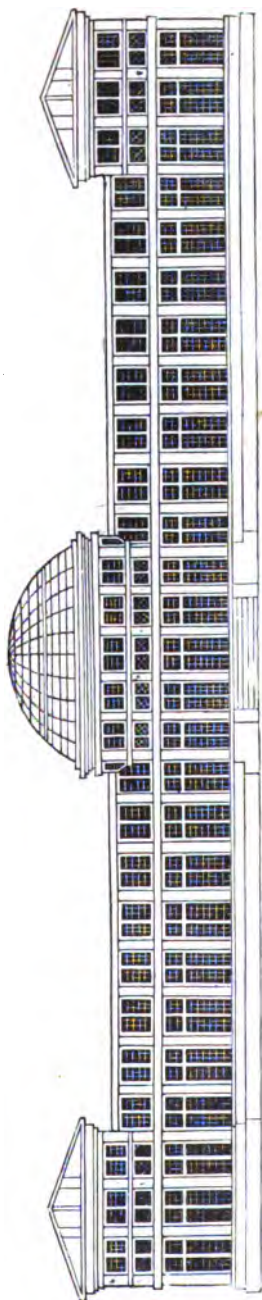
690. *The botanic garden of Schwetzingen* has been already noticed (§ 606.).

691. *The botanic garden of Heidelberg* is small, having formerly been the burial-ground of a convent; this building being metamorphosed into a museum. The garden is fully stocked with plants, arranged according to the system of Linnæus. There is a green-house and a hot-house, with sloping glass roofs somewhat in the English manner. These are covered at night, and during severe weather, by wooden shutters, hinged at the top, and raised and lowered by cords and pulleys communicating with weights in the back sheds. In the green-house we found *Vallisneria spiralis*; in the open ground, rhododendrons have survived three winters, with only a slight covering at their roots. In the summer-time the green-house plants are taken out, and plunged in borders of sand, where they grow vigorously, and flower beautifully.

692. *There are many other botanic gardens in Germany*, both in the smaller states and in the free towns. That at *Hamburg* has lately been enlarged in extent, and the number of plants increased. That at *Erlangen*, of which Fischer is the director, has long been celebrated. The *Leipzig* garden is known for its collection of *Umbellifere*; that of *Frankfort*, for its orange trees; and that at *Wilhelm's Höhe*, for its splendid range of conservatories. (fig. 155.) In the botanic garden of M. Wild, at *Cassel*, a collection of alpine is formed on an artificial hill, 100 feet high, and covered with rock-work.

693. *The taste for plants in Germany is very considerable among the higher classes*; and not only public bodies, but private gentlemen, and princes of every degree, spend a much greater proportion of their income in the encouragement of this branch of gardening, than is done by the wealthy of England. Since the restoration of tranquillity, this taste has received a new stimulus by the opportunity afforded of procuring plants from England.

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SUBJECT. 3. German Gardening, in respect to Horticultural Productions.

694. *In all probability horticulture was first introduced into Germany by the Romans, and afterwards revived by the religious houses.* The native fruits and culinary plants of Germany are the same as those of France, already enumerated. In the museum of the arsenal, in Dresden, are still preserved, and shown to strangers, the gardening tools with which Augustus II., Elector of Saxony, worked with his own hands. This sovereign died in 1566. He is said to have planted the first vineyard in Saxony, and to have greatly increased the varieties of the hardy fruits.

695. *The more common fruits of Germany, the cherry, the pear, the plum, and the apple, are natives, or naturalised in the woods.* Good varieties would, no doubt, be brought from Italy by the monks, who established themselves in Germany in the dark ages, and from the convents be introduced to the gardens of the nobles, as the latter became somewhat civilised. This would more especially be the case with those provinces situated on the Rhine, where the genial soil and climate would bring fruits to greater perfection, and, in time, render them more common, than in the northern districts. Dr. Diel, however, a native of the best part of this tract of country (Nassau-Deits), complains (*Obst Orangerie in Scherben*, 1ster band), so late as 1804, that apples, pears, and cherries were most commonly raised from seeds, and planted in orchards, without being grafted.

696. *The finer fruits only thrive in the south of Germany.* The apricot appears to have been some time introduced in Austria and Hungary, and produces well as a standard in the neighbourhood of Vienna. The peach is most commonly grown against walls. The mulberry produces leaves for the silkworm as far north as Frankfort on the Oder, but ripens its fruit with difficulty, unless planted against walls. The vine is cultivated as far north as the fifty-second degree of latitude, in vineyards, and somewhat farther in gardens; the fig, to nearly the same extent, against walls, its branches being every where protected in winter: it is, however, a rare fruit in Germany. At Vienna it is kept in large tubs and boxes, and housed during winter in the wine-cellars. Fruit trees in Germany are very common along the roads: Suabia was the first country to adopt this practice, about the middle of the eighteenth century. About the beginning of the present century, fruit trees began to be planted along the roadsides by the government of Baden, and the laws respecting them were drawn up with the assistance of Zeyer, the garden director of Schwetzingen.

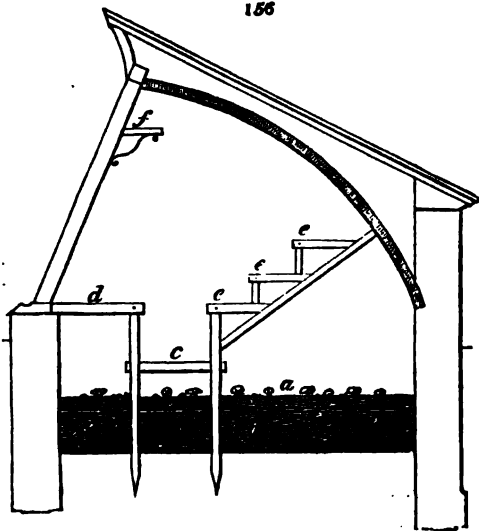
697. *The pine-apple, Beckmann informs us, was first brought to maturity by Baron Munchausen, at Schwobber, near Hamelin.* The large buildings erected by the Baron for this fruit are described in the *Nuremberg Hesperides*, 1713-14. It was ripened also by Dr. Kaltschmidt, at Breslau, in 1702, who sent some fruit to the imperial court. At present there are pineries to be found in all the court gardens of the empire.

698. *In Austria the best varieties of hardy fruit trees are said (Bright's Travels) to have been introduced from Holland, by Van der Schott, about the middle of the seventeenth century; but many of them must have been in the imperial gardens long before this period, from the connection of Austria with the Netherlands; yet Mayer, in 1776, speaking of fruits, says, that "the age of Schönbrunn will be for Franconia what that of Louis the Fourteenth was for France."* The Rev. J. V. Sickler, in Saxe-Gotha, counsellor Diel, at Nassau-Deits, and counsellor Ransleben, at Berlin, have established, within the last fifty years, fruit-tree nurseries, where all the best Dutch, French, and English varieties may be purchased. Diel and Ransleben prove the sorts, by fruiting the original specimens in pots in a green-house. Sickler has fruited an immense number of sorts in the open air, and published descriptions of them in *Der Teutsche Obst Gartner*; a work of which forty-eight volumes have already appeared. Since the peace of 1814, a society *Der Landwirthschaftliches Vereins*, &c., has been established for the promotion of agriculture and gardening at Vienna; and one of the imperial gardeners, M. Rauch, a young man of great talent and industry, has been sent to England, where he has spent several years in the study of the various departments of his art.

699. *Mushrooms are grown, in the neighbourhood of Vienna, in a simple and economical manner.* The practice will be understood at once by a glance at the accompanying sketch (*Fig. 156.*) kindly sent us by our friend, M. Napoleon Baumann, jun. of Bollwyller. In this section, the mushrooms are represented rising through a stratum of earth (*a*), which, with a substratum of dung (*b*), occupies the entire floor of the house. The pathway (*c*) is supported from the floor by the posts, which are rendered necessary at any rate for supporting the front shelf (*d*), and the shelves of the stage (*eee*). Vines may be trained up the rafters; there may or may not be a small shelf, or a bracket, here and there, for drooping plants (*f*). About Vienna, houses in which mushrooms are grown in this way are chiefly employed for prolonging the bloom of forced flowers and shrubs, such as roses, lilacs, bulbs, &c. The pots are set in saucers, to prevent any water from

dropping on the mushrooms, and six inches of hay are spread over the latter, to keep them clean, and prevent the escape of heat. There is no flue; but at each end is a small

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brick German stove, which is lighted as often as may be necessary, to maintain a temperature during the night of from 45° to 50° . The glass is covered by shutters every night, and the floor of the house is from three to four feet under the external surface; which, with the covering of hay, is a great protection to the bed in which the mushrooms are grown. The bed is made of fresh horse-droppings, strongly pressed, and, after it has lain eight days, it is covered with an inch of good earth, beaten to a fine state, and the spawn is planted in it in little bits about nine inches apart every way. (*Gard. Mag.*, vol. ii. p. 408.)

700. In Hungary horticulture has been much

neglected; but fruit-tree nurseries were established there by government in 1808, and subsequently by private gentlemen. Plums, Dr. Bright informs us, are cultivated, in order to make damson brandy. The Tokay wine is made from the variety of grape figured and described by Sickler, in his *Garden Magazine* of 1804, as the *Hungarian blue*. The soil of the Tokay vineyards is a red brown clay, mixed with sand, incumbent on a clay slate rock; and it is observed by a Hungarian writer quoted by Dr. Bright, that, "in proportion as the soil is poor and stony, and the vine feeble, the fruit and wine, though small in quantity, become more excellent in their quality." Tokay wine is made in the submontane district which extends over a space about twenty miles round the town of that name. The grapes are left on the plants till they become dry and sweet; they are then gathered one by one, put in a cask with a perforated bottom, and allowed to remain till that portion of the juice escape which will run from them without any pressure. This, which is called Tokay essence, is generally in very small quantity. The grapes are then put into a vat, and trampled with the bare feet; to the squeezed mass is next added an equal quantity of good wine, which is allowed to stand for twenty-four hours, and is then strained. The juice, without further preparation, becomes the far-famed wine of Tokay, which is difficult to be obtained, and sells in Vienna at the rate of 12*l.* per dozen. The Tokay vineyards are chiefly the property of the emperor.

701. In Prussia the best fruits were introduced by Frederick II., who was passionately fond of them. In one of his letters to Voltaire, while he was crown prince, he speaks of his "dear garden at Rupin." "I burn with impatience," he says, "to see again my vineyards, my cherries, my melons." (*Dobner's Life of Fred. II.*, p. 304.) After he became king, he cultivated, at Potsdam, all the best Dutch varieties, on walls, espaliers, under glass, and in the open garden. He was particularly fond of pine-apples, of which he grew a great number in pits; and is censured by an English traveller (Burnett), because, on his death-bed, he made enquiries after the ripening of one of them, of which he expected to make a last *bonne bouche*. Potsdam and Schwobber were the only parts of Germany where forcing was at that time practised to any extent. There are now in the royal gardens of Prussia excellent pine-apples reared under the care of gardeners of very superior merit, who have visited England. At Potsdam, since the peace of 1814, the department for forcing fruits (*obst treiberey*) has been greatly enlarged, and various kinds of fruits brought forward at a very early period of the season, more particularly cherries. (*Gard. Mag.*, vol. iii. p. 94.)

702. In Bavaria, horticulture has been practised from a very early period. Beans, peas, lentils, and turnips were cultivated by the ancients chiefly in enclosed places (*Aortis*), which were denominated *fabaria*, *pisaria*, *lenticularia*, and *napina*, according to the things cultivated. Whoever committed theft in these places, or in any other garden, was punished with a fine of fifteen schillings, which was, however, diminished to three

under Charles the Great. Garlic, the cucumber, and the chick pea were also known. The rearing of fruit trees was also encouraged, and laws were enacted against damaging trees. Whoever is so malicious, says the ancient Bavarian law, as to injure another person's garden, is fined the sum of forty schillings, twenty of which go to the possessor of the garden, and the other twenty are taken as a public forfeiture of the violated law: the offender shall, moreover, replant there the same number of trees, of the same varieties, and shall every year pay down a schilling for each tree, until they bear fruit (i. 20.). Of fruit trees there were the apple, the pear, and the cherry (*chirsiboum*, *Cerasus*): these were improved by grafting; and whoever maliciously broke off a scion was fined the sum of three schillings, which, if the tree stood in a garden, was increased to fifteen schillings. The preparation of cider seems also not to have been unknown at that time, for Tacian, an ancient German author, says, "Isti uvin nob cidiri trinkit" (c. 2.); that is, "They drink both wine and cider." That Bavaria was indebted to the Romans for the cherry, plum, and pear, may be considered probable, from the circumstance of these trees bearing Roman names. The apple, on the contrary, is from the native woods. Charlemagne, A. D. 800, considerably advanced gardening and the rearing of fruit trees. In every century of the history of this country are found notices respecting horticulture and the cultivation of fruits. Two sorts of leeks (*poree*) were known in the beginning of the fourteenth century, *Pórrus pórritus* and *P. mājor*. Sage, rue, *yffen*, pennyroyal, *kaps*, *cappus*, the poppy, and the horseradish, were called *oleres*, to distinguish them from legumes. In 1209 culinary plants and tree fruits were not subject to tithes; and, in Augsburg, thieving in gardens was severely punished. From this time forward gardening in Bavaria has gradually advanced from its degraded state, till now there is not a village or parish can be found which does not possess fruit trees, sometimes even of the rarest kinds. Würzburg, Bamberg, and Nuremberg have long been famous for the high degree of civilisation which they have attained. Munich and Nymphenburg possess good forcing establishments, and excellent fruit and legumes. In the advancement of gardening, and the rearing of fruit trees, considerable merit is due to Maximilian III., and his successor, Charles Theodore. Maximilian I. was the founder of a new and splendid epoch in theoretical horticulture and landscape-gardening; but the present king, Louis I., perhaps exceeds all his predecessors in his fondness for the art, and in the encouragement he bestows on it, particularly on the cultivation of fruit trees. The royal nurseries at Munich and Weyhenstephan are principally directed towards this end, and are intended not only to supply the whole country with trees at a moderate expense, but with skilful gardeners to take charge of them (*Gard. Mag.*, vol. v. p. 385.): in short, in Bavaria, gardening, as an art of culture, is now in some respects in advance of the art in England. The preservation of ornamental plants and culinary vegetables through the winter is effected with wonderful success in the higher parts of the country, and particularly about Munich. The principal means made use of are, cellars deeply sunk in the ground, for the preservation of culinary vegetables, which are there planted on shelves of earth; coverings of straw mats, and of thick boards, for pits and frames; and opaque roofs with coverings of straw mats for the front glass of hot-houses of every description. It is astonishing in how few minutes a range of hot-houses of 200 or 300 feet in length may be covered with straw mats, or uncovered. Messrs. Loddiges' immense palm-houses would not occupy more than ten minutes. (*Ibid.*, vol. iv. p. 496.)

703. *The royal kitchen-garden at Munich* contains extensive hot-houses and pits for forcing; and on the walls are vines for the purpose of laying down the shoots to root into pots, and afterwards to ripen their fruit under glass frames, as in Holland and Denmark. Asparagus is here grown in the open air in double rows, with a space between, which is dug out and filled with hot dung, while the plants are covered with a wooden frame. An immense quantity of asparagus is used by the royal family from December to February. All the varieties of the cabbage tribe are here taken up on the first approach of winter, and planted close together, in sheds with glass fronts, the air within being kept at a moderate temperature by stoves. One of the vegetables forced during the winter is *kohl-rabi*: it is sown in October, transplanted in November, and begun to be gathered at Christmas, continuing from that time till March, when the bulbosities are about the size of turnip radishes. Kidneybeans and mushrooms are produced here during the whole winter, and also alpine strawberries. The latter are grown in pots in a house, the glass of which in front is nearly perpendicular: the pots are placed on shelves close to the glass, those having the fruit ripe being always on the upper shelves, where the air is necessarily warmest; and those last brought in being placed on the lower shelves, where the air is colder. As the fruit on the upper shelves is ripened off, and the pots removed, those on the lower shelves are brought up to supply their places, and pots from the frames in the open garden are substituted in their stead. This succession is carried on from October to June, when strawberries ripen in pits in the garden, and, in the first week in July, in the open ground. It thus appears that the

horticultural luxuries of the kings of Bavaria are greater than those of the kings of either France or Britain.

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706. *At Ulm*, asparagus attains a larger size than any where else in Bavaria, owing to some peculiarity in the soil; as, at two miles' distance, it is found impossible to bring it to the same degree of perfection. Different gardeners with whom we conversed on the subject, attribute its excellence to the deep dry sand, which is trenched between four and five feet, and made up with strata of manure. Two years' seedling plants are transplanted in rows, one foot in width between, and the plants two feet apart in the row; the plants in one row alternating with those in the other. By this method there is a space of two feet between plant and plant; though, on a given number of square feet, there is a greater number of plants than one to each foot. The object of the space is to admit of stirring the soil in spring; and, in order that this may be done without injuring the crowns of the roots, a strong stake, standing a foot above the soil, is fixed at each plant. Very little covering is put on the plants in the winter season. The stalks produced are said to be near an inch in diameter, and the beds last from twelve to fifteen years. (*Gard. Mag.*, vol. iv. p. 493.)

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709. *Erftath* has been celebrated for its horticulture from the earliest ages. It was

selected by Charlemagne as a staple town for one of the great roads of Germany, and, in succeeding centuries, ranked among the first trading cities of the interior. The excellence of the soil and the favourableness of the situation seem to have induced the inhabitants to betake themselves to horticulture; and they soon supplied so extensive a portion of Germany, as to acquire the title of Gardeners of the Holy Roman Empire. At the commencement of the sixteenth century, the district of Dreienbrünnen, which is well watered, began to assume a superiority in culture. The water was conducted in channels over the surface, as practised in Italy, and was found not only to produce larger but earlier crops. About the middle of the seventeenth century the artificial cultivation of the water-cress commenced in this district, where it may be said to have been first invented by Nicolas Meissner. It was grown in broad ditches of running water, and used extensively both as a salad and for culinary purposes, especially during winter. The great demand for this vegetable at Dreienbrünnen rendered certain marshy parts of the district, till then of little or no value, more productive than the best sound land.

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712. *The culture of fruit trees and vines* dates as early as that of culinary vegetables and seeds; and as the history of this part of Erfurth horticulture is somewhat curious, we shall give it chiefly in Völker's own words, copied or abridged from the volume of the *Prussian Transactions* before mentioned:—

713. *The cultivation of fruit trees around Erfurth* "was not so sedulously prosecuted as the other branches of gardening, in the more early period of our history, and it appears, indeed, to have been neglected, when compared with the attention paid to vines. This may be accounted for from the unsettled state of the times; for, the people of Erfurth being almost constantly in a state of hostility with the neighbouring principalities and sovereignties, the nearest vineyards and gardens of their enemies were frequently ravaged and laid waste. But under such circumstances vineyards are more easily restored to a productive state than orchards; and it was natural that the cultivators should make the vine the chief object of their care. Fruit cultivation on a large scale is, therefore, of more recent date, and much of its success must be attributed to the encouragement and protection afforded by the electoral government of Mentz. In 1705 a proclamation was published, recommending to every subject the planting of fruit and other useful trees; and the rigid observance of a previous ordinance, by which every landed proprietor was required to plant at least twelve trees on his grounds. However, this ordinance had not all the good effect which was expected from it, as the regulation subsequently ceased to be strictly observed. Even in Reichart's time the orchards in these districts were by no means very extensive; and it was only in the city gardens, and in some detached villages, that fruit cultivation was carried to a great height. This branch of gardening does not appear to have obtained a great superiority until towards the end of the last century, and its rapid improvement followed the establishment of a premium-fund, out of which rewards were granted to the planters of fruit and other useful trees. So completely did this institution attain its object, that fruit cultivation made a most extraordinary progress throughout the whole of the Erfurth territory; and during many years from 30,000 to 40,000 fruit trees were regularly planted. After this extension of cultivation, the robbing of orchards became a frequent offence. To repress such depredations, ordinances were issued in the years 1795 and 1799, which not only inflicted severe punishment, but provided that, in case of the robber not being discovered, the district in which the offence might be committed should be obliged to make compensation for the damage sustained. This made every individual interested in preventing depredations on his neighbour's property; and the consequence has been, such an improvement in orchard-gardening, that the state of cultivation in Reichart's time can by no means be compared with the present. Our fruit cultivation would have

risen to a still higher point of prosperity, had not its progress been checked by some unfortunate circumstances. Among the most disastrous were those connected with the measures taken for fortifying the town, and its siege in 1813. Many thousands of fruit trees were then cut down, and our cherry plantations which lay near the city sustained an extent of damage which was not easily repaired. Much mischief has also been done by caterpillars, and in particular by the caterpillar of the frost moth, which is in Erfurt usually called the *spaniol*. Through a long series of years, from the beginning of this century to 1818, the ravages of this caterpillar were so great, that many proprietors of gardens began to lose all hope of future success. But the very wet year, which occasioned the last great rise in the price of corn, had also the effect of nearly banishing this ravenous caterpillar, and we have since had several highly favourable fruit harvests. Unfortunately, however, this moth reappeared in several places in the spring of 1828.

714. *Cherry plantations at Erfurt.* "Four of the neighbouring villages have very extensive cherry plantations. It is there common, in the fruit season, for the people to assemble, and have a holiday, which they call 'The Cherry Festival,' and which they celebrate with rural sports. The village of Kirschheim is noted for a particular kind of cherry, which is valued on account of its size, delicacy, flavour, and abundance; and which is well known under the name 'the Kirschheimer cherry.' It is, however, far inferior to the much esteemed Augustus cherry of Erfurt.

715. *Other fruits.* "In the environs of Erfurt, cherries and plums, particularly damsons, are rather more abundant than apples and pears. Nut trees are scarce; and peaches and apricots are only to be found in gardens in favourable situations. It is a fault in our cultivation that the more productive kinds of trees are preferred, particularly in the villages, to the superior sorts. This may be owing to there being at Erfurt no good nurseries, so that we are obliged to draw our supplies of the nobler species of fruit trees chiefly from other states. They are frequently obtained from Tottlestadt, a village in the Gotha territory, where there is a considerable nursery. Another disadvantage is, that the various useful applications of fruits are as yet made to only a small extent. In very abundant years there is want of a demand for the surplus, and much fruit is given to the hogs.

716. *The progress of the cultivation of the vine,* "which was probably introduced into Erfurt by the monks, seems to have been very rapid; for it appears, from authentic documents, that as early as the twelfth century the vineyards were in a flourishing state. We find it remarked, in reference to the year 1186, that the commencement of the vintage then took place in the beginning of August. The planting of the vine became more and more extensive in proportion as the population and prosperity of Erfurt increased. In the fifteenth and sixteenth centuries, and even in the seventeenth, almost all the heights round Erfurt were covered with vines, and the vineyards extended to the distance of several leagues below the town; so that more than a thousand Magdeburgh acres must then have been occupied by vineyards. Hence we perceive the possibility of those great quantities of wine, of which particular accounts are given in old chronicles and other documents, being obtained in favourable years.

717. *The decline of vine-planting* "appears, in a certain measure, to have corresponded with the decrease of the population of Erfurt, which was occasioned by various circumstances, and more particularly by the great pestilence of 1683, by which 9437 of the inhabitants were swept away. The numbers of labouring hands left after this calamity were not sufficient to maintain the extensive vineyards in a proper state of cultivation. Accordingly, it appears that in many places the vines were rooted up, and the grounds employed for productions which required a less laborious cultivation. In the succeeding century, other circumstances occurred to impede the progress of vine cultivation; such as the introduction of coffee and tea, the use of punch and brandy, &c. Various foreign liquors and wines were imported, which must have operated against the consumption of our home-made wine. It must also be considered that, on the potato and other new vegetables being introduced, their cultivation, promising a more certain profit, supplanted that of the vine on inferior grounds. These circumstances induced the Ments government, which wished to encourage the wine trade, to issue an ordinance, in 1760, by which persons who extirpated their vines were, notwithstanding, required to pay their share of the expense of maintaining the watch for the protection of the vineyards. This ordinance checked, but did not prevent, the decay of vineyards; for, during the succeeding years, many unfavourable circumstances occurred, and in particular the great scarcity and high price of grain in 1771-3, which induced many proprietors to convert their vineyards into cornfields. During the period of nearly thirty years from the commencement of the French revolution, prices became, from well-known causes, almost constantly favourable to the agriculturist, and discouraging to the vine-grower. The proprietors of vineyards experienced in all that time few good years; and it very often happened that the returns did not pay the expense of cultivation. This confirmed many in the opinion, which had for some time been current, that our climate was entirely

changed and deteriorated; and they were, of course, little disposed to continue a cultivation which afforded so doubtful a prospect of advantage. It is not surprising, therefore, that many were anxious to get rid of vineyards of which they were formerly proud, more especially as, during the retreat of the French, and the siege of Erfurth, the vine-props were burnt, and the plantations in other respects greatly damaged. At that period vine culture was in a very low state.

718. *Vines are no longer extirpated*; "and in latter years, since the fall in the price of corn, circumstances have become more favourable to their culture. New plantations, of small extent, begin now (1828) to be made, and many proprietors regret the too hasty conversion of their vineyards into cornfields. Those who held out, had the satisfaction of obtaining last autumn a fortunate vintage, in which the grapes were chiefly distinguished for their superior quality, and in some instances for the quantity which they yielded. However, in consequence of unlucky events and unfavourable circumstances, our vine cultivation is so reduced, that our vineyards now scarcely occupy a surface of 200 Magdeburgh acres, including the grounds both of the town and the neighbouring villages. In Reichart's time the extent of the vineyards must have been three or four times greater.

719. *Cultivation of the water-cress at Dreienbrünnen*. "The gardens here are formed out of what was formerly a marsh, and they consist of large beds appropriated to the rearing of vegetables, and of water-trenches of different breadth, which are formed between the beds, and which generally run in a parallel direction. Between the beds and the trenches borders of turf are raised. These borders, which are about two feet broad, and in height above the level of the water, from three-fourths of a foot to a foot and a half, serve as banks to the trenches, and afford the footpaths necessary for carrying on the ordinary garden work, whether it consist in the cultivation of water-cresses in the trenches, or the rearing and irrigating of the plants in the beds. The owner of a bed or a cress-trench may, according to a right established by usage, walk upon his neighbour's contiguous turf border, and there perform the operations necessary for cultivation; for the different gardens are in reality only separated from each other by the trenches or ditches already described, and rarely by hedges, which are almost exclusively confined to the roads running through Dreienbrünnen. The water trenches between the beds have a twofold destination. They serve either for the irrigation of the culinary plants in the adjoining beds, or for the production of water-cresses. The former are called irrigating trenches, and the latter water-cress trenches. The irrigating trenches are in general only about two feet broad, and from one and a half to two feet deep, and contain about from six to eight inches of water. The water-cress trenches are from six to ten or twelve feet broad, and from one and a half to two feet deep; and besides containing from six to twelve inches' depth of water, must have in a hundred feet of watercourse a descent of four or more inches, which is not necessary for the irrigating trenches. As the water-cresses thrive well with a flowing and often-changing water, the water-cress trenches must be so formed as to admit of a sufficiently strong afflux and reflux."

720. *In Hanover*, George II., after establishing an agricultural society, is said to have introduced the best English fruits, about 1751.

721. *In Wirtemberg* horticulture has made great progress. The royal kitchen-garden at Stuttgard, in extent and management, and in the articles cultivated, bears a near resemblance to that of Munich. The forcing is chiefly carried on in Dutch pits, with fire-heat within and linings of dung without. Vines are laid down from the walls, and forced under frames; and in this case, as throughout Wirtemberg, whether in forcing-houses, against walls, or in vineyards, the young shoots are always bent in circles, to make them break regularly. The shoots are also every where laid down flat on the ground, and kept there during the winter by stones; or, in default of stones, by spadefuls of earth, or by hooks. They are soon covered with snow, and are thus protected from the severity of the frost. Pine-apples are cultivated extensively in this garden; and grapes, peaches, cherries, plums, figs, and strawberries are forced. The cherries bear three crops in three years, and are then removed; the plums bear only one crop, and the trees are therefore changed every year; cucumbers are forced so as to be gathered in February; and asparagus is cut from the first week in November till it is fit for use in the open air. Supplies of the alpine strawberry are furnished during the whole of the winter, as at Munich. The pine-apples are for the most part kept in an opaque-roofed house, on shelves and stages, like dry stove-plants; and carried out, and sunk in tan, in pits, for fruiting during summer. In winter, almost every description of vegetable is preserved, with astonishing success, in cellars, not only for the kitchen, but for planting out in spring to produce seed. Plants of *Phytolacca decandra* are preserved for the latter purpose, the cooks using the berries for colouring different preparations. Various articles are preserved for the purpose of being taken out from time to time during the winter, and planted in pits to be forced; such as succory roots; knoll celery or celeriac, for the leaves; common beet for the leaves to be used as spinach, common sorrel, mint, and

other pot and sweet herbs, &c. Carrots, turnips, kohl-rabi, knoll celery, scorzonera, winter radishes, borsradish, and all similar roots, are laid horizontally in earth, layer over layer, with their tops outwards, exposed to the air, and suffered to grow: it being found that they keep much better when allowed to grow, than when this is prevented by cutting off the top below the bud. In the open garden, in 1828, we found asparagus in rows two feet apart, and the plants at two feet distance in the rows; the soil beneath was light, rich, and four feet deep, and the shoots were said to attain a very large size. Artichokes were covered with wooden boxes, whelmed over litter; cardoons, which are grown in large quantities, are preserved in the cellars. On beds we found what is called *blat kohl* (leaf or blade kale) a small-leaved borecole, very dwarf, which is said to produce no seed: it is propagated by cuttings in September and October, and is recommended as being more hardy than any of the other borecoles. There is an orangerie in this garden, in which, besides orange trees, are preserved large plants of *Bruggmansia*, *Solanum Pseudo-Capsicum*, *pelargoniums*, *Fúchia*, and other green-house plants, which are planted out in the open air during summer, and produce a magnificent appearance till winter, when they are taken in again.

722. *The vineyards and orchards in the neighbourhood of Stuttgart* have a beauty and singularity of which it is difficult to convey an idea. They occupy the steep sides and summits of singularly irregular hills; and, as they are all small properties, each with its dwelling-house, vegetable garden, and orchard, the effect is rich beyond expression. In many places the ascents from one vineyard to another are up steep precipices, by winding flights of stone steps, which give an idea of extreme care and cultivation, highly gratifying. In some of the vineyards and orchards in the suburbs, belonging to individuals who live in the town, instead of dwellings, there are summer-houses, built of wood, and painted white and green. These are so numerous in some places, the gardens being very small, that they look like tombs in a churchyard, and thirty or forty of them are often seen at once. The fruit trees, which are chiefly apples, every where border the roads, and rise up the declivities among the vines, grouping with the cottages and the rocks, and crowning the varied summits of the hills. Taken altogether, Stuttgart and its environs are not to be paralleled on the Continent, for horticultural richness and picturesque beauty.

723. *In Baden* horticulture is as far advanced as in Bavaria. The kitchen-garden of the palace at Carlsruhe contains five or six acres, and appeared to us, in November, 1828, to be as well managed as those of Wirtemberg and Munich. The pines are grown in pits in the summer-time, and removed to shelves, in houses with opaque roofs, and nearly perpendicular front glass, in the winter-time. On the 28th of November the pines were still chiefly in the pits, and a great many had ripe fruit. They are generally taken in on the 1st of December, and taken out again on the 1st of March. About 300 ripe pines are used every year for the purpose of making wine, which is found to be of an extraordinarily good quality; and 400 are annually cut for eating. There are pines on the grand duke's table every week in the year. The plants are grown in soil composed of two parts of mould formed from rotten dung and leaves, one part and a half of turf from a meadow, broken into small pieces but not sifted, and half a part of sand. Fruiting is not effected in a shorter period than three years. Figs are grown here under glass, for the purpose of forcing; but they, and also peaches, bear in the open air as standards. There is a large winter-house, in which we found large-knoll celery, kohl-rabi, cauliflower, Italian broccoli; red, green, chard, and white beet; large black radishes, scorzonera, parsley, leeks, endive, lettuce, lamb lettuce, and other articles, in large quantities, planted in beds of earth. Young carrots and young turnips are grown all the winter, in pits covered with glass, and protected from the frost every night by straw mats. These articles, with young onions and leeks, are gathered almost every day during the winter for soups. The varieties of kohl-rabi, borecole, and *runkel riben* (green beet) grown in this garden are among the most beautiful that we have seen in Germany. Mushrooms are grown in frames with boards instead of sashes, with dung linings, and under the stages of the pine-stoves.

724. *The kitchen-garden of the old castle of Eutlingen* is worthy of notice. It contains eight or ten acres, surrounded and subdivided by walls of stone about twelve feet high, with rafters laid under the coping six feet apart, and projecting on each side about two feet. These projections are for the purpose of retaining rolls of strong matting, which were formerly let down at night, and during severe weather, to protect the blossoms in spring. The walls, like almost all garden-walls in Germany, are covered with wooden trellis-work. The trees trained are partly peaches and apricots, but chiefly the reinette de Canada apple. Trees of this as well as of other varieties of apples, grow perfectly well in the open air as standards; but the fruit is found to be much larger when the tree is trained against a wall. In the borders and quarters of the garden are pears en pyramide, and apples en tonnoir. The most common apple cultivated in this garden is the Rambourg, a large variety of Calville, known, when shaken, by the rattling of its seeds in their cells. This garden belongs to a ruined château, said to have been

built by the Romans 100 years before Christ. There are about thirty such châteaux, with their gardens in ruins, all belonging to the grand duke, in different parts of the grand duchy of Baden.

725. At Weimar the chief proprietor of the *Landes-Industrie Comtoir*, and author of a work on potatoes, has an excellent garden and extensive hot-houses, where he raises the finest fruits. "The whole," Jacobs observes (*Travels*, 1819, p. 332.), "is kept in excellent order."

726. The kinds of culinary vegetables of Germany are the same as those of Britain; but the Germans are without the greater part of our best varieties. The brassica tribe and edible roots arrive at greater perfection there than in France. The popular sorts are the field-cabbage and the borecoles: they are used newly gathered, and boiled and eaten with meat, in broths or soups, and pickled in the form of *sauer kraut* for winter use. The kohl-rabi, a red turnip cabbage, and the yellow turnip, &c., came from Germany to Britain. The potato, kidneybean, onion, and lettuce, are also in general use; and the principal gardens possess all the olitory and acetarious vegetables grown in France and Holland.

SUMMARY. 4. German Gardening, as to planting Timber Trees and Hedges.

727. Planting, as a matter of profit, has been little attended to in Germany, from the number and extent of the native forests. In some districts, however, Pomerania for example, barren sandy tracts are sown with acorns and Scotch pine-seeds, chiefly for the sake of fuel, and common husbandry timber. Much attention, as Emmerich informs us (*Culture of Forests*), and as appears by the number of German works on *Forstwissenschaft*, is in general paid to the management of forests already existing: as far as we have been able to observe, this extends to filling up vacancies by sowing, and occasionally draining and enclosing; thinning and pruning are little attended to in most districts. The oak, the beech, and the Scotch pine are the prevailing native trees of Germany. The celebrated Black Forest, in the duchy of Baden, though once covered with wood, is now for the greater part bare. Two districts of forest which still remain consist, the one chiefly of silver and spruce fir, and pines, and the other of oaks; some of the latter being of great size and age. (*Gard. Mag.*, vol. iv. p. 492.) A plantation of *Pinus rubra* was made in the park at Carlsruhe: the trees were in 1828 thirty years old, and forty feet high; but whether their timber is superior to that of *Pinus sylvestris* remains to be proved. The *Quercus pedunculata* and *sessiliflora* are here believed to be varieties of the same species, *Quercus Robur*. *Quercus pedunculata* is said to be more abundant on moist ground; for instance, on the borders of the Rhine. In the woods of Carlsruhe, which form part of the forest of Hartwald, both sorts produce equally tall, straight, sound, and durable timber. The oak grows at Carlsruhe with very great luxuriance; and it is not uncommon to find leaves from twelve to fourteen inches long, and from six to eight inches broad. A superior variety of the *Pinus sylvestris* is grown on the Rhine, about Rastadt, on the German side, and near Hagenau, on that of France. Seeds are sent to various parts of Europe from seedsmen in Rastadt and Hagenau.

728. Rows of trees along the public roads are formed and preserved with great care, especially in Prussia. The mulberry is the tree used in some of the warmer districts, and in other places the lime and the elm; the Lombardy poplar is also common near most towns of Germany, especially Berlin, Dresden, and Leipzig. Some attention is every where paid to public avenues; and the highways being, as in France, generally kept up by the government, improvements can be executed promptly and with effect. There being, in general, no accompanying hedges, and the trees being trained with naked stems to ten or fifteen feet high, according to the lowness or exposure of the situation, little injury is done to the materials of the road in wet weather. The breeze passes freely between the stems of the trees; the traveller and his horses or cattle are shaded during sunshine, and sheltered during storms; and the man of taste is furnished with a continued frame and foreground to the lateral landscapes.

729. The practice of planting along the public roads in Germany is generally directed by the respective governments of the different states. Almost all the roads of Bavaria and Wirtemberg are so planted. The tree considered best for the more elevated parts of the country and the poorer soils is the cherry; that for the lower and better soils is the apple. The pear, plum, chestnut, and walnut are also planted in suitable situations; and in some countries the white mulberry prevails, being cultivated for the sake of its leaves for silkworms. M. Hempel, in the *Memoirs of the Pomological Society of Altenburg* (vol. ii.), recommends the lime, the horsechestnut, the oak, the beech, the birch, the common acacia, and the different species of pines and firs. These he would plant in single rows, where the soil is good, and in double rows where it is indifferent, or the situation bleak. But he greatly prefers planting fruit trees, and would form all public roads into avenues of sweet chestnuts, walnuts, geans, cherries, pears, apples, &c.; or a mixture of these, according to the soil, climate, and exposure.

Where it is practicable, he would plant a row of apples and pears next the road, and another row of chestnuts and walnuts four yards distant from these; thus forming a sort of summer avenue on each side of the main road, to protect the traveller from the sun and rain. In low sheltered situations, where the direction of the road was east and west, he would plant walnuts, cherries, and pears, on the north side; and low trees, such as apples and mulberries (the latter to be pollarded for the silkworm), on the south side, so as not impeding the sun's rays from drying the roads after rain. This enthusiastic pomologist would even turn the field-hedges into sources of fruit. Where hawthorn hedges already exist, he would cut them down, and graft their roots *entre deux terres*, (a few inches under ground), with pears and services: on the slope he would graft plums of different sorts; crab-tree hedges he would turn into hedges of good sorts of apples; and where hedges were to be planted *ab origine*, he would oblige, under a severe penalty, all proprietors and occupiers of land to use the commoner sorts of plums. But in certain situations he would, however, admit of the elder, filbert, sorbus, and other fruit-bearing shrubs, provided circumstances were unsuitable for plums and pears. As hedges for sheltering gardens, he will allow of nothing but espaliers of fruit trees, or fruit shrubs on beds, or double rows of raspberries. (*Gard. Mag.*, vol. ii. p. 347.)

730. *Hedges*, though not general in Germany, are used on the Rhine and in Holstein: the plants are generally hawthorn, but sometimes hornbeam, or a mixture of native shrubs. *Hungary* is the most backward province in respect to planting and hedges, as well as to every thing else. A hedge there is rare; and there are scarcely any public avenues beyond Presburg. Existing woods are subjected to a sort of management, for the sake of the fuel they afford, and for their produce in timber and charcoal for the mines.

SUBJECT. 5. *German Gardening, as empirically practised.*

731. *The use of gardens* is as general in the best districts of Germany as in England; but in Hungary and some parts of Bohemia, Galicia, and Prussia, many of the lower orders are without them, or, if permitted to enclose a few yards of ground near their wooden hovels, they seem too indolent and indifferent, or too much oppressed by the exactions of their landlords, to do so. The cabbage tribe, and chiefly red borecole, and the potato, are the universal plants in the cottage-gardens of Germany; but lettuces, peas, onions, and turnips, with some other sorts, and the common fruit trees, are introduced in some districts. Flowers are not very general, but the rose, thyme, and mint are to be seen in many places, and a variety of ornamental plants in the better sort of cottage gardens.

732. *Farmers' gardens*, as in most countries, are a little larger than those of the lowest class of cottagers; but inferior, in point of order and neatness, to that of the man who lives in his own cottage.

733. *The gardens of the hereditary families* are not, in general, much attended to: their appearance is too frequently that of neglect and disorder. Cabbages, potatoes, apples, and pears, and perhaps a few onions, are the produce expected from them: these are cultivated by a servant, not always a gardener, and who has generally domestic occupations to perform for the family. It will readily be imagined that, in such an extensive country, there are innumerable exceptions; in these, the gardens are better arranged, and the produce of a more varied description. Next to the gardens of the princes or rulers, the best are those of the wealthy bankers and citizens. These are richly stocked with fruit trees; generally contain hot-houses, and are liberally kept up. Some of them contain collections of exotics.

734. *There are very few good gardens in Hungary*: that of Prince Esterhazy, the greatest proprietor of that country, is extensive, abounds in hot-houses, and contains a very full collection of plants. The prince has an English gardener, whom he sends occasionally to this country to collect whatever is new.

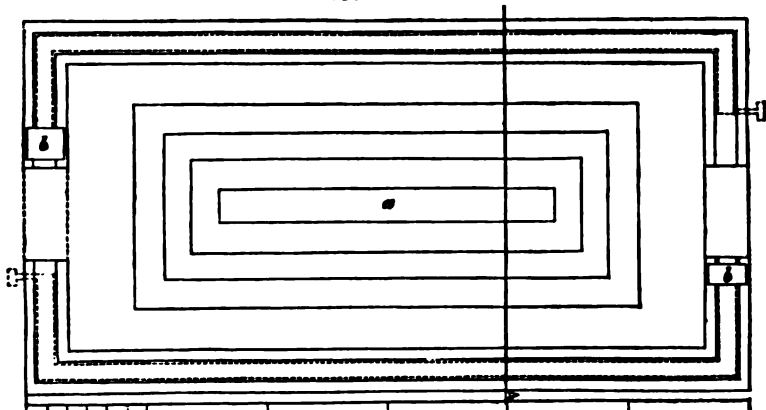
735. *The German princes and rulers are in general attached to gardens*, and have very considerable ones at their principal residences: some of these have been mentioned, and various others might be added. These gardens are under the direction of intelligent men, who, in general, have spent part of their time in botanic gardens; and, in many cases, have studied or practised in Holland, or in the Paris gardens.

736. *There are market-gardens and nurseries near most large towns*; and most of the court gardens and horticultural societies have also establishments for the propagation of fruit and forest trees, for planting along the public roads, and also for sale.

737. *In Austria*, the principal nurseries are those of M. Rosenthal and Messrs. Held and Seidel, in the neighbourhood of Vienna: the latter have also an establishment at Dresden. Forest and fruit trees are here scarce and bad, because there is no demand for them. (*Gard. Mag.*, vol. iv. p. 372.) M. Seidel has lately made an improvement in the construction of hot-houses. This consists in forming them with double walls and double roofs; and in heating the space between the walls and roofs, with or without heating the interior of the house, according to the nature of the plants to be pre-

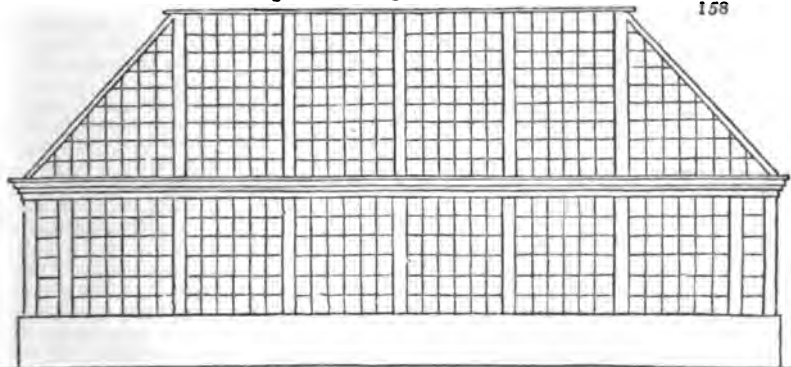
served. Double-roofed hot-houses are common in Russia ; but we believe there is no instance of heat being applied between the roofs in that country. We shall give a plan,

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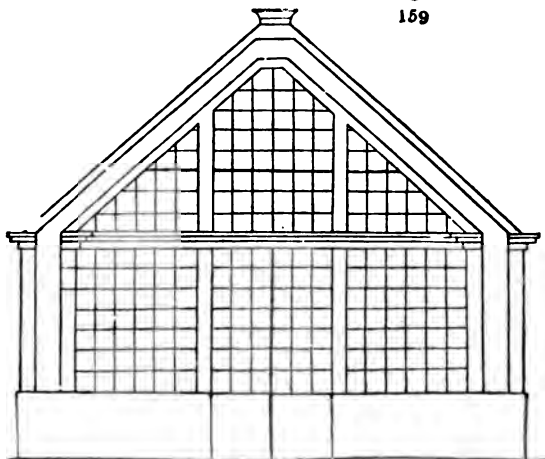
elevation, and section of a double-roofed camellia-house, erected at Vienna for the archduke John, in 1831. *Fig. 157.* is the ground-plan, in which *a* represents the stage,

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and *bb* the furnaces for heating the vacuity ; *fig. 158.* is a side view ; and *fig. 159.* a section on the line *A B*. The hot-water system of heating hot-houses is said to have

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been established at Vienna about 1890, and still earlier at Dresden. (*Gard. Mag.*, vol. v. p. 467.)

738. *The market-gardens round Vienna are numerous; and great abundance of common vegetables and hardy fruits are grown in them, especially plums, apricots, and grapes. They are without walls, which are unnecessary in that climate; and, indeed, are more like fields than gardens. The apricot ripens as a standard in the vineyards; but the peach is little cultivated. The best sorts of French and Flemish pears, and English apples, are never seen in the markets, and seldom to be met with even in private gardens.*

739. *The vegetable and fruit market of Vienna is but very indifferently supplied, compared with those of London or Paris. As an example of the rarities produced there, a correspondent of the Gardener's Magazine states, that, about the middle of March, 1898, asparagus sold at 6s. a hundred; lettuce, radishes, and small carrots were abundant; and French beans sold for from 4d. to 6d. a hundred. These prices continued till about the middle of May: every thing in June became much cheaper; but peas, lettuce, and cabbages were even then almost the only vegetables in the markets. Some forced strawberries had appeared, and a few forced cherries; plums and peaches were to be had, but they were very scarce and dear. (*Gard. Mag.*, vol. iv. p. 271.)*

740. *In Prussia the principal nurseries are in the neighbourhood of Berlin, where there is an extensive establishment of this description belonging to the Horticultural Society there, and another to the government. There is a good nursery at Aix la Chapelle, in which are several hot-houses with a tolerable collection of Cape and Australian plants, and many succulents. At Frankfort on the Oder a small nursery has been lately established.*

741. *In Bavaria, the principal nurseries are those belonging to the king, Louis I., who has some of the largest establishments of the kind in Europe, and who is, indeed, anxiously endeavouring to turn his whole kingdom into one blooming and prosperous fruit-garden. The two royal nurseries at Munich and Weyhenstephan will, no doubt, powerfully contribute to the accomplishment of this end, not only by their ample supplies of trees, but by producing well-instructed gardeners.*

742. *The royal nursery at Munich is divided into two equal portions, and contains a surface of about eleven Bavarian acres: it is bounded on the west by a stream, and on the east by a fence of planks and stakes. The soil is of a clayey kind, mixed with sand and light turf earth, in which all the trees and shrubs thrive vigorously. Some years ago, this nursery was intended merely to raise native forest trees and shrubs for planting in the royal gardens. During late years, however, it has been considerably enlarged and improved, till, when we saw it in 1829, it had arrived at the greatest perfection as to order and regularity. Many beautiful kinds of trees had been raised from North American seeds; and other rare trees and shrubs had been planted. But the cultivation of fruit trees had increased in a particular degree. There were 900 sorts of apples, 400 sorts of pears, 80 sorts of plums, 200 sorts of cherries, 90 sorts of vines, and 60 sorts of peaches and apricots, exclusive of other kinds of fruit. The apples, pears, and plums were chiefly obtained from Dr. Diel, on the Lahn; the cherries from M. Truchsess, of Bettenburg, who had been a collector of cherries for forty years, and has published an excellent work on them: the vines were mostly from France, England, and Italy; and the peaches and apricots from Austria and Alsatia. There was also a collection of fruit trees in pots, of more than 1500 different sorts, which was formed at the same time as the rest of the collection, and is yearly increasing: it facilitates the study of the sorts, and has the advantage of taking up little room. (*Gard. Mag.*, vol. v. p. 386.) The trees from this nursery are sold at very low prices; and printed directions are given away with them for their pruning, planting, and future management. Whenever a new sort is introduced into the nursery, it is fruited in a pot before it is put among the general collection, to prevent the introduction of the same fruit under different names. The office and the garden library in it are among the most complete we have seen: the latter includes a collection of models of fruits, made and coloured by M. Hinkert, the superintendent; and specimens of all the principal tools and instruments used in the culture of fruit and forest trees. M. Hinkert has travelled through all Germany; he has also been in France, Holland, and England; and is the author of various essays, some of which have obtained prizes. In 1828, in this garden, a plant of common furze was pointed out to us as a curiosity, it having stood the preceding winter.*

743. *The royal central fruit nursery at Weyhenstephan, near Freysing, was founded in 1827. It contains nearly fifty acres, and has a north-east aspect. The soil is of lime and marl, mixed with sand; and trees reared there are so hardened by the operation of the raw air and cold weather, that they are enabled to bear any other climate with great ease. Besides these, there is a large fruit and forest-tree nursery, which forms an appendage to the English garden at Munich. The nursery of M. Schultz, between*

Munich and Nymphenburg, consists of about two acres, chiefly devoted to florists' flowers and roses. There is a large green-house, and also a hot-house: in the former are 150 sorts of pelargoniums from Vienna, and upwards of 100 English sorts. There is a good collection of succulents, and some camellias, ericas, and Australian plants. Among the hardy flowers, twenty-four sorts of hollyhocks, five of *Zinnia*, 900 of auricula, and 350 of carnation, are in the catalogue. The range of glass, which is about 900 feet long, is sometimes covered with straw mats, for weeks together, during severe weather. The mulberry for the purpose of feeding the silkworm is propagated extensively in the royal mulberry nursery at Nymphenburg. Ten different sorts are propagated, by flute-grafting, on seedlings of the common white mulberry.

744. *The nursery at Schleissheim* was laid out by M. Sckell, and is one of the most complete in Bavaria. It is laid out in parallel compartments from east to west, so that the rows in beds across them are from north to south; thus admitting the sun once every day in the year to every part of the ground's surface. Along the walks are planted single specimens, in alphabetical order, and handsomely named on wooden tallies, of all the hardy forest and fruit trees and shrubs cultivated. The principal part of the trees planted along the public roads are supplied from this nursery; they are generally from twelve to eighteen feet high; after being taken up, they are carried to a shed, and pruned, and afterwards placed in a cellar, to protect them from the frost, till wanted. Shrubs, especially the more tender kinds, such as *Kérria*, &c., are taken up and planted in beds of earth in cellars; where they remain till spring, when they are sent to their final destination. The principal object in removing the trees from the nursery before they are wanted for the plantations, is to prevent the interruption of the labours and cropping of the nursery in the spring: every thing in this, as in the other departments of national gardening in Germany, going on in the most systematic and scientific manner.

745. *At Hohenheim* there are two nurseries; one for forest trees and shrubs, and the other for fruit trees. The first occupies what was formerly the flower-garden: the articles grown in it are sold at a low rate to the public; but they are chiefly used in planting the royal gardens and parks. In 1828 we found it very well stocked with some fruit trees, in addition to the usual articles. Some pits and frames were devoted to seedling American trees, and among these were a great many tulip trees raised from seed ripened on the spot; a proof of what may be done by a long summer, notwithstanding the winters are more severe than those of Britain. The Weymouth pine ripens its seeds here; and those of *Cerasus virginiana* and *Pópulus canadensis* are ripened and self-sown; so that these trees may soon be considered as naturalised. On an old archway in this garden is a tree of *Pópulus canadensis*, a birch tree, a Scotch pine, and several bushes, forming a group between twenty and thirty feet high, and as much in diameter, though none of the roots have reached the ground. The largest of these trees is the poplar, and the next the birch, both considered as preferring moist situations. Among the fruit trees are seventy-two sorts of gooseberries from Bollwyller.

746. *The fruit-tree nursery at Hohenheim* occupies twenty-five acres, and the trees propagated are chiefly apples, pears, and cherries, for the purpose of planting along the public roads. Some part of the ground has been cropped with apple and pear trees, in succession, for more than twenty years, without rest and without manure. The trees, however, do not thrive: they are covered with moss, and are liable to the attacks of a species of coccus, which preys on the bark in the night-time, and takes refuge in the soil during the day. These insects are kept under, by watering the soil with strong tobacco water, and brushing the stems over with a mixture of lime and clay. It is found that the sweet chestnut grows better on the exhausted soil here than any other fruit tree: we saw some of them with shoots five feet long, where apple and pear trees did not make as many inches. There is a pear tree here with 900 sorts grafted on its extremities, all doing well. The nomenclature employed is that of Diel. Wips of straw are tied to the young trees, in different places, as a signal that, if any of them are stolen, the punishment which the law directs (and which, in Wirtemberg, Bavaria, and Baden, is always a fixed fine, denoted on boards stuck up on the spot) will be inflicted on the offender.

747. *The nursery of Messrs. Schultz, at Augsburg*, contained, in 1828, so considerable a collection of hot-house and green-house plants, as to be equal to that of the Bristol nursery in 1816, or any nursery in Scotland in 1805.

748. *The nursery of M. Falcke, at Nuremberg*, is situated in the town; but it contains a number of select plants in pits. In November, 1828, we found a frame of ranunculus, and another of anemone, in full flower; in a green-house, *Campánula pyramidalis*, twelve feet high, and covered with blossoms; sixty sorts of pelargoniums, fifteen sorts of *Camellia*, and twelve sorts of *Chrysanthemum*. The green-house plants were chiefly those of the Cape: but even in England they would have been considered a

respectable collection. In the frames were 300 sorts of carnations; no pinks, which are little cultivated in Germany; 140 sorts of auriculas; with stocks, many sorts in flower; violets, mignonetta, &c. In a cellar under the seedshop, among barrels of beer, tubs of *sauer kraut*, and piles of apples and potatoes, covered with straw, we found cabbages, endive, and broccoli planted in earth; pomegranates, figs, and *Althæa frutex* in tubs, and 1000 pots of *Hydrangea*. M. Falcke deals chiefly in seeds, and has another garden, or rather large field, at some distance from Nuremberg, where these and other commoner nursery articles are grown in large quantities. The soil for some miles round Nuremberg is a warm dry sand, and it is almost wholly occupied in the growth of garden seeds, which are sent to all parts of Germany and the north of Europe, and to France, England, and Turkey. Clover seeds are here raised in large quantities, and even the seeds of tobacco and asparagus. What is remarkable (considering the climate) is, that large quantities of tuberose, tiger flowers, hyacinths, narcissi of different kinds, *Amaryllis formosissima*, and Guernsey lily, are grown to a great extent in this warm sand. In the year 1827, M. Falcke sent 2800 double tuberose to one house in Peterburgh. He sends a great quantity of seeds annually to Spain and Portugal. On the whole, he is of opinion that there are more garden-seeds raised in the neighbourhood of Nuremberg than there is round any other city in Europe, and that the next greatest quantity is grown in the neighbourhood of Erfurth. The seeds are grown for the dealers by a particular description of cultivators, who answer to the seed-farmers of England.

749. *The vegetable market at Munich* is well supplied, and at remarkably cheap rates. The principal articles, in November, 1828, were, white and red cabbage, white and red kohlrabi, white and red borecoles, and a few cauliflowers. No green legumes, but abundance of dry kidneybeans, lentils, and peas; potatoes of three or four different sorts, long carrot-shaped white turnips, rutabaga, and the Teltower rüben, here very black skinned, and known as the Bavarian rüben; carrots, parsneps, salsafy, scorzonera, beet, black and red radishes, and horseradish; spinach, common and French sorrel, onions of different sorts, leeks, garlic, shallots, chives, &c.; lettuce and blanched endive in immense quantities; common and Hamburgh parsley, turnip-rooted celery, sage, rue, thyme, marjoram, winter savory, and dried bay leaves. The fruits were chiefly apples and pears, the production of the country; and, next, grapes brought from Tyrol and the Rhine; an immense quantity of quetsche plums; medlars, quinces, and even some peaches and pomegranates; walnuts, chestnuts, dried pears, plums, and cherries; elderberries, which are dressed along with the quetsche plums; berberies, for colouring vinegar; privet-berries and sprigs of *Eubonymus europæus* with the arillus attached, for decorating tombs; and dog-hips, the flesh used in making sauce for game, and the seeds for roasting and using as coffee, the drink so made being considered an antidote to the gravel. The flowers were, stocks, marigolds, and annual chrysanthemums. There were wreaths of moss and box; leaves of the striped *Dégraphis arundinacea*; bundles of the tops of *Equisetum arvense*, and plaited stalks of *E. hyemale* (the Dutch rush of London), both used there for scouring saucepans and glass beer-pots; brushes and hearth-brooms made of *Lycopodium clavatum*, stuck in, in the manner of bristles; snails, and thighs of frogs; *Agaricus muscarius*, a red-coloured poisonous mushroom, which is here bruised in milk, and the mixture set in rooms to destroy flies. By the Tartars and others this fungus is eaten to procure the pleasures of intoxication. Swedish and other turnips, cut into slices, like *sauer kraut*, &c. The fruits of the Rhine and the Tyrol are brought in baskets on the backs of the peasants, who walk that immense distance, and yet can afford to sell them at remarkably low prices. A bunch of black and one of white grapes, three peaches, and a pomegranate, cost about sixpence. The apples, pears, and plums, like every other production of Bavaria, were proportionately low; Munich being, it is believed, the cheapest city in Germany for the necessaries of life. (*Gard. Mag.* vol. iv. p. 498.)

750. *The vegetable, fruit, and flower market at Nuremberg* displayed, Nov. 13. 1828, abundance of the cabbage tribe, all the roots grown in England, with bulbous-rooted celery, and Hamburgh parsley, onions and leeks, black and white winter radishes, Teltow turnips, rutabaga, endive, sorrel, spinach, lettuce, pears, apples, walnuts, chestnuts, filberts, and cauliflowers. There were also roses, pelargoniums, stocks, and other flowers of the season in pots, and nosegays, and great abundance of marsh-mallow roots, and of various herbs used medicinally.

751. *In Saxony* the principal nursery is that of M. Traugott Seidel, at Dresden; but there are minor nurseries at Leipzig, and extensive seed-growers at Erfurth and various small towns in Silesia. The numerous varieties of German stocks are grown by the weavers in the latter districts. Erfurth is celebrated for its culinary vegetables. The nursery of M. Fred. Adolphe Haage, jun., at that town, is noted among the gardeners of Germany for its flower-seeds.

752. *In Württemberg* the principal nurseries and flower-gardens are in the neighbourhood of Stuttgart. Leutner's garden contains a green-house, hot-house, and several

pits and frames, with a moderate number of green-house plants, and a good assortment of auriculas. Walter, a nursery and seedman, has the best general collection in Württemberg. In his green-house, in 1828, were 100 sorts of pelargonium, 15 species of *Erica*, 70 species of *Cactus*, 18 sorts of chrysanthemum, and 46 of double georgina; *Primula prænitens*, and a number of the comparatively new and showy articles, had been in this garden for a year or two. What is called the Turkey ranunculus is grown here in pots in large quantities; coming into flower in October, continuing till January, and, by successive plantings, carried on till the plants flower in the open ground. Gooseberries and currants are here trained in the pyramidal form, and reach from six to eight feet high. Gumpfer's nursery and flower-garden is an establishment more particularly devoted to florists' flowers. It contained, in 1828, 300 sorts of auricula, as many of carnation, 26 sorts of chrysanthemum, 100 sorts of georgina, and a green-house crowded with plants, including 40 species of *Cactus*. In cellars under the dwelling-house, and in the garrets, *Laurus nobilis*, rhododendrons, including arboreum, pomegranates, hydrangeas, figs, &c., were kept in pots and boxes. In the open garden were thirty sorts of gooseberry, all of Württemberg origin: this fruit being a native of the woods, and found in a wild state, green, yellow and red, in this part of Germany. Some time ago, M. Gumpfer raised and cultivated 100 sorts of Württemberg gooseberries; but he has now reduced them, retaining only the more valuable kinds. He raises a number of them every year, but does not find one per cent. worth keeping. Reichard's nursery contains a large green-house, well stocked with orange trees, *Solanum Pseudo-Capsicum*, rosemary bushes, succulents, chrysanthemums, mignonette, Bengal roses, and other popular flowers. Meyer's flower-garden consists of two terraces backed by a high wall, and contains a similar collection to that of Reichard. Schickler's nursery is the third in point of rank. In the green-house there is a moderate general collection; more camellias than in the other establishment, and, as usual, an ample assortment of succulents. There are pits for forcing vines and other articles; and in one of these we found a boiler over the fire-place for filling the house with steam. Rhododendrons are here grown in the open air, protected by straw mats.

753. *The vegetable market at Stuttgart* is abundantly supplied at all seasons. In November, 1828, we found there great quantities of lamb lettuce of different ages, young carrots, very young leeks, young kohl-rabi, cauliflowers, Teltow turnips, Swedish turnips, carrot-shaped white turnips, curled Hamburg parsley, scorzonera, endive, lettuce, chervil, scurvy grass, spinach, and cabbages of various kinds, particularly the sugarloaf cabbage, which is raised in great quantities at a village long celebrated for this vegetable, and sent to Holland and other countries, as an article of commerce. The fruits were chiefly apples, pears, walnuts, and filberts. The flowers, stocks, chrysanthemums, and China roses in pots.

754. *In the duchy of Baden* there are nurseries and market-gardens at Carlsruhe, Rastadt, Baden, and other towns. There is a government nursery at Carlsruhe, which is most systematically laid out; and round the borders are specimens of all the fruit and forest trees and shrubs, in alphabetical order, and named. The soil, however, from having been so long cropped with trees, has ceased to produce them in vigour; and the plants raised, if not removed to their final destination at an early age, speedily become covered with moss. It is the practice in this nursery to keep the surface of the ground covered during the whole summer with dry loose leaves collected from the woods; which are found not only to retain the moisture, but to prevent the cockchafer from depositing its eggs in the soil.

755. *The vegetable market at Carlsruhe* is exceedingly well supplied with vegetables; and, indeed, with the exception of forced articles, the variety is nearly as great as in London or in Paris. The quality, however, of the cabbage tribe, of the turnips, and of the fruits, appears very inferior to what they are in the market of Covent Garden. Near Hamburg is one of the first nurseries in Germany, viz., that of the brothers Booth, at Flotbeck. Hardy fruit and forest trees are here propagated to a great extent, and there is an excellent collection of the more popular house plants. From the convenient intercourse of this nursery with those of Britain, it forms the principal medium of introducing whatever is new and valuable from the latter country into Germany and Denmark.

756. *The operative part of gardening*, in the better classes of gardens, is performed by men who have, agreeably to the general custom in Germany, not only served an apprenticeship, but travelled and worked for a certain time in different parts of the country, or in other countries.

757. *The term of apprenticeship* is three years and a half, and for travel three years, unless the apprentice is the son of a master-gardener; in which case the term for travel is reduced to one year. All apprentices must be able at least to read and write, and are taught to draw, and furnished with written secrets in gardening by their master, during

the term of apprenticeship. When that is completed, the youth is initiated into what may be called the freemasonry of gardening, and, being furnished with a pass-word, he proceeds from one town to another, till he can get work. Till this happens, his pass-word, and also a passport from the gardeners' society of the place where he was initiated, procures for him, at every *gärtner herberge*, or gardeners' lodging-house, lodging and food, and as much money as will supply his wants till he arrives at the next inn of a similar description. In this way he may walk over the whole of the German empire, Denmark, and a part of Holland, at the general expense; the numerous ramifications of the society extending over the whole of this immense tract. Such institutions have long existed for every trade in Germany, but being disliked by the governments, and being, politically considered, of an arbitrary and injurious nature, are now on the decline. On his return from probation, the travelled journeyman is entitled to take a master's place; and very commonly he continues travelling till he hears of one. The regular German gardener is a careful, neat-handed, and skilful workman; and, if allowed sufficient time or assistance, will keep a garden in good order, and produce all the crops required of him in their proper seasons.

758. *The artists or architects of gardens*, in Germany, are generally the *land-baumeisterei*, or those architects who have directed their attention chiefly to country buildings. Where only a kitchen or flower garden is to be formed, an approved practical gardener is commonly reckoned sufficient. It occasionally happens, that a nobleman who wishes to lay out an extensive garden, after fixing on what he considers a good gardener of some education, and capable of taking plans, sends him for a year or two to visit the best gardens of England, Holland, and France. On his return, he is deemed qualified to lay out the garden required; which he does, and afterwards attends to its culture, and acts as a garden architect (*garten-baumeister*) to the minor gentry of his neighbourhood.

SUBJECT. 6. *German Gardening, as a Science, and as to the Authors it has produced.*

759. *The Germans are a scientific people*: they are a reading people; and, in consequence, the science of every art, in so far as developed in books, is more generally known there than in any other country. Some may wish to except Scotland; but, though the Scotch artisan reads a great deal, his local situation and limited intercourse with other nations subject him to the influence of the particular opinions in which he has been educated: he takes up prejudices at an early period, and with difficulty admits new ideas from books. On the other hand, the Germans of every rank are remarkable for liberality of opinion: all of them travel; and, in the course of seeing other states, they find a variety of practices and opinions, different from those to which they have been accustomed: prejudice gives way; the man is neutralised; becomes moderate in estimating what belongs to himself, and willing to hear and to learn from others.

760. *There are horticultural societies and professorships of rural economy* in many of the universities; one or two gardeners' magazines and almanacks of gardening; and some eminent vegetable physiologists are Germans. The Prussian Gardening Society, for the number and rank of its members, and the value of its published Transactions, ranks with the Horticultural Society of London; and as a scientific body, having an institution for instructing young gardeners in the sciences on which their art is founded, it ranks before it and every other society. The Pomological Society at Altenburg is also an institution which has rendered important services to the culture of fruits. There are, besides, in Germany many societies, independently of those which combine agriculture with gardening, to all of which the art is much indebted. Even in Hungary, it appears (*Bright's Travels*), a *Georgicon*, or college of rural economy, has been established by Count Festetiz at Keszthely, in which gardening, including the culture and management of woods and copses, forms a distinct professorship. The science of France may be, and we believe is, greater than that of Germany in this art, but it is accumulated in the capital; whereas here it emanates from a great number of points distributed over the country, and is consequently rendered more available by practical men. The minds of the gardeners of France are, from general ignorance, less fitted to receive instruction than those of Germany; their personal habits admit of less time for reading; and their climate and soil require less artificial agency. The German gardener is generally a thinking, steady person; the climate, in most places, requires his vigilant attention to culture, and his travels have enlarged his views. Hence he becomes a more scientific artisan than the Frenchman, and is in more general demand in other countries. All the best gardens in Poland, Russia, and Italy are under the care of Germans.

761. *The Germans have produced few original authors on gardening*, and none that can be compared to Quintinye or Miller; but they have translations of all the best European books. Hirschfeld has compiled a number of works, chiefly on landscape-gardening; J. V. Sickler and Counsellor Diel have written extensively on most departments of horticulture, especially on the hardy fruits. In regard to apples and pears, the two most scientific writers on their classification are Manger (*Anleit. zum einer Systemat. Pomol.*)

and Diel. The first takes form as the foundation of his arrangement; the second takes jointly the quality of the fruit and the peculiarities of the tree. Diel's system is, in our opinion, decidedly the best; in short, it is in pomology what the natural system is in botany. (*Gard. Mag.*, vol. ii. p. 445.) Truchsess is the standard author on cherries, and Sickler on grapes and on the genus *Citrus*.

SECT. V. *Of the Rise, Progress, and present State of Gardening in Switzerland.*

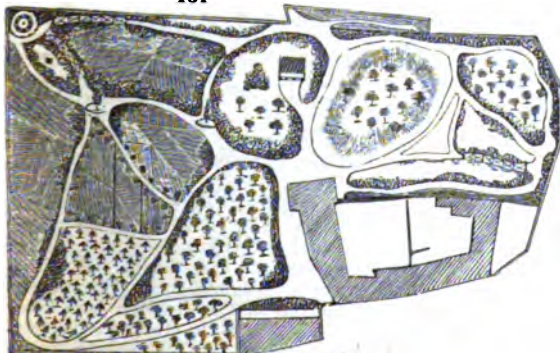
762. *Extensive gardens are not to be expected in a country of comparative equalisation of property, like Switzerland; but nowhere are gardens more profitably managed, or more neatly kept, than in that country.* "Nature," Hirschfeld observes, "has been liberal to the inhabitants of Switzerland, and they have wisely profited from it. Almost all the gardens are theatres of true beauty, without vain ornaments or artificial decorations. Convenience, not magnificence, reigns in the country-houses; and the villas are distinguished more by their romantic and picturesque situations, than by their architecture." He mentions several gardens near Geneva and Lausanne; Délices is chiefly remarkable because it was inhabited by Voltaire before he purchased Ferney, and La Grange and La Boissier are to this day well-known places. Ferney is still eagerly visited by every stranger; but neither it, nor the château of the Neckar family,

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nor those of the Empress Josephine, Beauharnois, and others, eulogised in the local guides, present anything in the way of our art particularly deserving of notice; though their situations, looking down on so magnificent a lake, the simplicity of their architecture, and the romantic scenery by which they are surrounded, render them delightful retirements, and such as but few countries can boast. The villa-gardens excel in rustic buildings (*fig. 160.*) and arbours; and are, for the most part, a mixture of orchards on hilly surfaces, cultivated spots, and rocks. However insignificant such grounds may look on paper (*fig. 161.*), in the reality they are

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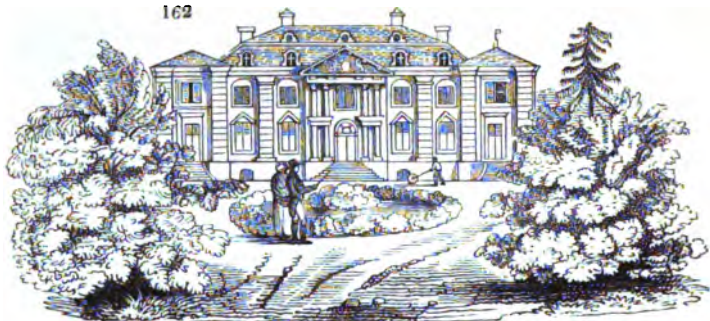


pleasing and romantic. The public promenades at Berne are most beautiful, and kept with all the care of an English flower-garden. In the capitals of the other cantons, public gardens are either of much smaller extent, or altogether wanting. Indeed, in a country abounding in picturesque scenery, and common pastures, and parochial forests, limited spaces for

recreation are altogether uncalled for. Who that is free to climb the rocks, or the grassy steeps, or even to walk along the highways, in such a country, would desire to be confined to enclosures in or about towns? Switzerland has the peculiar advantage of producing a close turf, which, in most places, and particularly at Lausanne and Berne, is as verdant as in England. Harte says that great part of the Pays de Vaud is like the best part of Berkshire; and, indeed, every one feels that this is the country most congenial to an Englishman's taste and feelings.

763. *Ferney.* The grounds are laid out in varied walks, like an English pleasure-ground, very ample, and well planted. From the terrace, in front of the house (*fig. 162.*), the lake of Geneva is seen at a distance of three or four miles; and, beyond, Mount Blanc, with other hills, making a very grand termination to the view. The situation, which is delightful, has, nevertheless, one great abatement, the total want of water, which, for every domestic purpose, is brought three miles. Summer-seats and bowers, where Voltaire used to sit and write, and even his little theatre, time has swept away. A long avenue, between two high hornbeam hedges, where he walked for hours together and dictated to an amanuensis, and a large elm tree planted with his own hand, are the only memorials that remain. As these pleasure-grounds were formed and planted by himself, it is remarkable that there is not, nor ever was, a single bust or column, or inscription, dedicated either to friendship or to genius. In the house, the hall and his

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bed-room are now shown in the same state as they were left at his death. (*Duppa's Observations, &c.*, p. 75.)

764. *Gibbon's house and garden, at Lausanne.* The mansion, as Gibbon tells us himself, "was spacious and convenient, connected on the north side with the city" (that is, in a narrow street), "and open on the south to a beautiful and boundless horizon. A pleasure-ground of four acres was laid out by the taste of M. Deyverdun. From the garden, a rich scenery of meadows and vineyards descend to the Leman lake; and the prospects, stretching far beyond the lake, are crowned by the stupendous mountains of Savoy." The house and grounds are now occupied by a rich banker; but there is no appearance that his riches, since Gibbon's death, have been bestowed upon either. Nature has preserved the terrace, which commands a prospect of the country, the lake, and the mountains; but the summer-house at the end of it, where Gibbon composed the last page of his history, is now a forlorn room, the repository of broken earthenware and fragments of worthless refuse. (*Ibid.*, p. 81.)

765. *The first botanic garden which appeared in Switzerland* was that of the celebrated Conrad Gesner, at Zurich, founded before the middle of the sixteenth century. He had not, Deleuze observes, sufficient fortune to obtain much ground, or to maintain many gardeners; but his activity supplied every thing, and he assembled in a small spot what he had been able to procure by his numerous travels and extensive correspondence. Public gardens were, in the end of this century, established at Geneva, Bâle, and Berne, and, subsequently, in most of the cantons. The first of these gardens at present is that of Geneva, lately enlarged and newly arranged, under the direction of that active and highly valued botanist, De Candolle. The garden of Bâle is rich in the plants of all the mountainous regions which lie around it, including the Tyrol and Piedmont. A taste for flowers is perhaps more popular in Switzerland than in Germany; for though frugality is not less an object in every branch of rural economy, yet real independence is more general: a poor man here has generally some little spot that he can call his own, and which he delights to cultivate and ornament. Speaking of Zurich, Simond observes (*Tour, &c.*, 1819, p. 404.), "Haerlem excepted, there is not a town where more attention is paid to fine flowers: many new plants, as the *Horténsia* (*Hydrangea horténsis*), *Volkamèria*, &c., are here grown in perfection. The taste for flowers is particularly displayed on the occasion of the birth of a child. When the news is carried about to all the relations and friends of the family, the maid is dressed in her best attire, and carries a huge nosegay of the finest flowers the season affords."

766. *The botanic garden at Bâle* was visited by Murray, author of a *Glance at Switzerland*, in 1827. He found it of limited dimensions, with a small pond for aquatics, which contained a jet-d'eau, and was surrounded by rockwork, covered with alpine plants. What he thought most worthy of remark were, the *Arundo Donax*, fifteen feet high, and two fine specimens of *Cereus heptagonus*, one in flower, fourteen feet high. They stood as sentinels at the entrance, and had always been exposed. (*Gard. Mag.*, vol. ii. p. 225.)

767. *Horticulture is carefully practised in Switzerland*; vineyards are formed as far north as Lausanne; and the apple, pear, plum, cherry, and walnut are common on every farm; the first three are in every cottage-garden. The filbert, gooseberry, currant, raspberry, and strawberry are natives; but only the filbert, raspberry, and strawberry are common in the woods and copses. In the sheltered valleys of this country, the apple and the pear are most prolific. Stewed pears is a common dish among the cottagers in autumn; the fruit is also dried, and, in winter, forms an excellent soup ingredient. The cabbage, the potato, the white beet, grown for the leaves as spinach and their footstalks as chard, and the kidneybean for haricots and soups, are the

popular vegetables. Particular attention is paid to bees, which are kept in neat rustic sheds (fig. 163.), or have their hives carefully thatched with bark or moss.



768. *Horticulture in the neighbourhood of Geneva*, Duppa observes, "is not good, and the fruits and vegetables are, in general, very inferior to those of England; not but that I have occasionally seen excellent vegetables and fruits, which show that there is nothing hostile in the soil or climate, but there is a deficiency of care or skill in the cultivation. In this opinion I was confirmed by Sir Thomas Maitland, a name I mention with the greatest respect and esteem, who was an old and very experienced visiter at Geneva, and sufficiently partial to Switzerland to insure his opinions from any unfavourable bias." (*Duppa, Observations, &c.* p. 102.)

769. *There is little or no forest planting in Switzerland*, but hedges of hawthorn are not unfrequent. The walnut is there a very common high-road tree, and in the autumnal months furnishes the pauper traveller with the principal part of his food. Poor Italians have been known to travel from Naples and Venice to Geneva on this sort of fare. They begin with Indian corn and grapes, which they steal from the fields, till they arrive at Milan, and the rest of the road they depend on walnuts, filberts, and apples.

770. *The Pinus Cembra, Cembra Pine, Apherouski Pine, Siberian Stone Pine, or Siberian Cedar* (fig. 164.), is one of the most useful trees in Switzerland. It is, indeed,



of very slow growth; one of these trees, cut down when nineteen inches in diameter, displayed 353 concentric circles. Its usual growth is a span in height in six years. The timber of the Cembra Pine has a most agreeable perfume, and is much used for domestic utensils, as well as for wainscoting rooms. A traveller, who visited the château of Tarasp, was struck, in almost every apartment, with the perfume of this wood; and he remarks it as a surprising and inexplicable circumstance, that the wood should have exhaled this perfume for some centuries in undiminished strength, and without the wood itself having suffered any decrease of weight. But this wood possesses another recommendation: rooms wainscoted with it are not infested with bugs or moths. Its seeds

are esteemed a delicacy: they are eaten in great quantities at the winter parties; and on those occasions, it is said, the fair sex display, in extracting them, a degree of skill, mixed with much innocent gaiety and vivacity. This species of pine is becoming very rare in the Alps. In order to expedite and secure its growth, and thus remove the principal objection to its cultivation, the seeds should be deposited in a compost of earth, and of the clippings and leaves of the pineaster and larch; or this compost should be put round the roots of the young plants. The larch is a valuable tree, not only for the purpose of forming manure, but also for its durable timber. This lasts four times longer than pine timber grown at the same elevation. If, therefore, the larch were planted where the pine now grows, it is evident that much forest ground might be gained and applied to pasture. The foliage of these and other trees is carefully collected on the mountains for winter fodder, put into large nets, and then hurled down into the valleys. (*For. Quart. Rev.*, Jan. 1828.)

SECT. VI. *Of the Rise, Progress, and present State of Gardening in Denmark.*

771. *Gardening was introduced into Denmark* at an early period; and the Danish court gardeners, considering the severity of the climate with which they have to contend, rank deservedly high for their forced productions. The parks and pleasure-grounds of Denmark, though not extensive, abound in natural beauty; and art has never in that country done so much to deform nature, as under governments of greater wealth and

more absolute power. Denmark has some good botanic gardens, and has produced some eminent botanists.

772. *Artificial plantations*, for the purposes of utility, are not common in Denmark; because in such a long narrow country, possessing so many seaports, the supplies from Norway by sea are sufficiently abundant for every purpose of construction. The native trees of Denmark are the same as those of Britain; but many of the exotics which endure our winters require protection in Denmark. The native trees which thrive most luxuriantly are, the spruce fir, the Scotch pine, the poplar, the birch, the beech, and the oak. The poplar thrives luxuriantly in Denmark. There is a tree of the white poplar in the south of Zealand, near the school of Herlufsholm, upwards of 100 feet high, with a trunk twenty-two feet in circumference. It is of great age, is very majestic, and was in full vigour, without a decayed branch, in 1826. Hawthorn hedges are common in Holstein, and in the immediate vicinity of the towns throughout Zealand.

773. *The empirical practice of gardening in Denmark* corresponds with that of Germany. Young men used to serve an apprenticeship of three years in the royal gardens; and when this period was completed, they received a certificate with the royal gardener's name and seal attached, and they were then considered fit to travel. This practice, however, has, for some years, been given up; and though an attempt was lately made to revive it, it was without success. The details of the examinations in this attempt at revival will be found in the *Gard. Mag.*, vol. iv. p. 77., and may be useful in assisting those in want of gardeners to discover the merits of candidates for employment.

SUBJECT. 1. *Danish Gardening, as an Art of Design and Taste.*

774. *The principal gardens in Denmark* are the royal gardens, near Copenhagen; but there are many noblemen and gentlemen's places, throughout the kingdom, beautifully situated, and kept in good order. The gardens of Marienlust, near Elsinore, which occupy the same space as those in which Hamlet's father was murdered, and those of Prince Frederick, near the city, may be considered the Greenwich and Hyde Park of Copenhagen. Hirschfeld mentions Ashberg, on the lake Pleon, as one of the finest residences in Denmark in his time; and enumerates nearly a dozen others as seats of great beauty.

775. *Frederiksborg* (fig. 165.), his Danish majesty's summer residence, about two

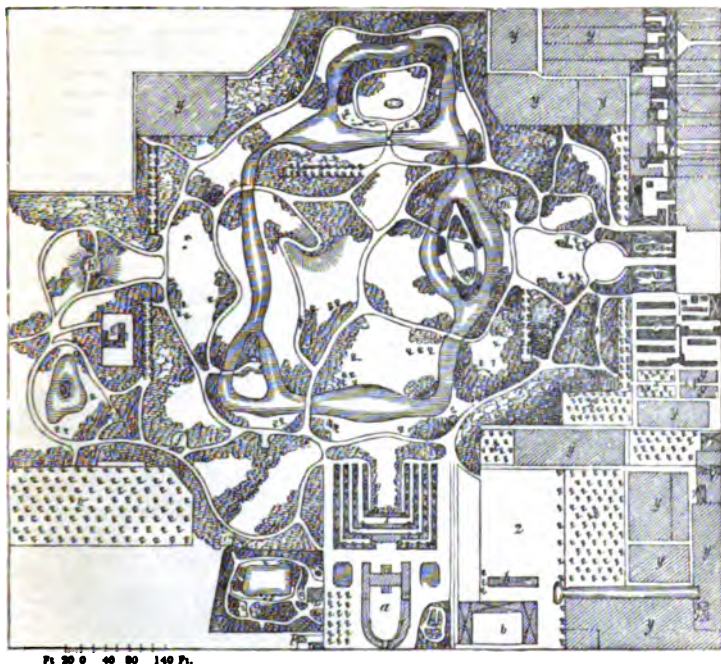


miles from Copenhagen, is a most delightful place. The extensive palace is situated on a hill in the pleasure-ground, from which is a beautiful view over the greater part of Copenhagen and some part of the Sound. The pleasure-ground is extensive, and was originally laid out in the Dutch manner. About twenty years since, it was, however, laid out in the English style, by the late M. Voigt, and improvements continue to be made, to a certain extent, every year. It is now one of the most celebrated in Denmark. A fine canal runs through the garden, over which are several handsome bridges, and there is a beautiful little island, called the Chinese Island, besides many other garden scenes, which add greatly to its natural beauty. During all the summer season, the garden is open to the public from early in the morning till late at night. The forcing department, kitchen-garden, orchard, &c., are very extensive, and are kept in good order. (*Feldborg's Denmark*, &c., *Gard. Mag.*, vol. i. p. 270.) Sondermarken, a beautiful and extensive park, belongs to this palace, and is situated near it: it is

devoted exclusively to the royal family, and is more like a pleasure-ground than a park. (*Gard. Mag.*, vol. i. p. 270.)

776. *A plan (fig. 166.) of the garden at Frederiksborg, taken in 1831, has been kindly*

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furnished us by our esteemed friend the court gardener, M. Petersen. The following are the details:—

- a, Court of honour to the palace.
- b, Stable offices.
- c, Temple.
- d, Swiss hut.
- e, Grotto.
- f, Place for swings.
- g, Pleasantry.
- h, Aviary.
- i, Covered seat.
- k, Banqueting-rooms.
- l, Chinese pleasure-house.

- m, Stone bench.
- n, Coffee-house.
- o, Bath.
- p, Appendages to the palace.
- q, Lodgings for servants of the royal family.
- r, Herb garden.
- s, Lodges for gardeners.
- t, Lodgings for servants of the royal family.

- u, House for preserving plants through the winter.
- v, Nursery.
- w, Quarter for fruit trees.
- x, Culinary vegetables.
- y, Flower garden.
- 1, Terrace, communicating by flights of steps.
- 2, Place for exercise.
- 3, The park.

777. *The gardens of Fredensborg* have been variously described by different travellers. Some think them very interesting, though not in the newest style; others, grand and magnificent, although on the old plan; others, again, consider them stiff, melancholy, and neglected, being environed by lofty pines, which exclude views of the adjacent lake, render breathing difficult, and expose the visitor to swarms of gnats. A Danish author, speaking of those gardens, describes them as being in a most desolate condition:—“Even that beautiful spot, the Norwegian Valley,” says he, has felt the effects of neglect. This valley is a circular spot, on which sixty-five figures in sandstone, representing peasants in the different costumes of Norway, are placed. These figures, which are considered Wiedewelt’s masterpieces, are now in a most deplorable state; and among them may be seen dancers with only one leg, and fiddlers with only one arm; while weeds and grass shoot up unmolested all around, and every thing appears to be fast falling to decay. Although the gardens of Fredensborg are not laid out in the English style, there is something imposing about them which surpasses all idea. From their vast extent, and stiff yet majestic avenues, the tops of the trees appearing to be lost in the clouds, they may be justly esteemed the principal gardens in Denmark. The number of alleys and parterres is, indeed, so great, that a person who has not been there before may easily lose his way, unless he has a guide.”

778. *The road to Frederiksborg* is one of the most beautiful in Denmark. The palace is approached by an avenue of four rows of lofty lime trees, lining a broad carriage road in the centre, and forming, on each side, a spacious walk for pedestrians, with a narrower path edging the exterior lines of the trees. The traveller who is anxious to

carry away pleasing recollections of this country, will pursue his path through the gardens of Fredensborg, down to the boat-house on Esrom lake. Thence he should cross the lake to a wood called Nöddeboe-holt. There he will enjoy an extensive view of this fine lake, which must be allowed to surpass even Loch Lomond in the softer beauties; as it possesses a luxuriance of grand forest scenery, of which Loch Lomond (with the exception of some scanty plantations) is altogether destitute. From Nöddeboe-holt, the traveller should proceed to a more elevated position, near the house of a forester, named Bruhl, who has displayed great taste for the picturesque in his management of the king's forests: This spot commands a remarkably fine view; and as its wooded banks project from both sides far into the lake, the water appears to be divided into smaller lakes and beautiful bays: the Swedish ridge of hills, called Koll, presenting a noble background to the picture. (*Feldborg's Denmark.*)

779. *Frederiksdal* (fig. 167.) is a spot possessing much natural beauty; and if it has



not been improved, neither has it been injured, by art. It forms one of the finest views from the hill of Sorgenfrie.

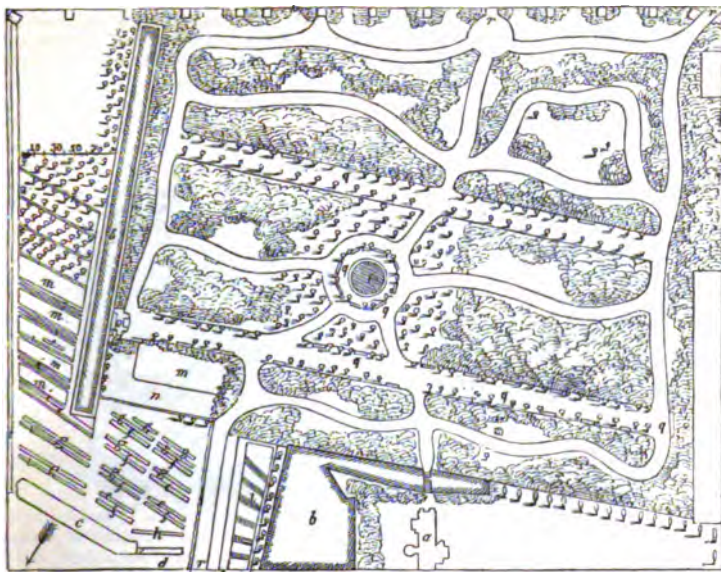
780. *The royal gardens of Rosenborg*, near Copenhagen, are particularly remarkable for their extensive and well-managed forcing-ground; in which are grown fruits for the royal table, and select flowers. The present well known head-gardener, M. Lindegaard, the first horticulturist in Denmark, grows the best fruits and flowers in the country. He has also the finest and most extensive orangery, and the best managed peach trees and vines, both in hot-houses and in the open air. The pleasure-garden is not now so extensive by one third as it was in the days of Christian IV.; it has, however, during the last five or six years, been much improved, and in 1829 recalled to the mind of the British traveller the beauties of English landscape gardening. The gardens of Rosenborg, like those of Frederiksborg, are open every day in the year for respectable-looking people. During the summer season, there is music in both gardens once a week, performed by military bands, at the king's expense. (*Gard. Mag.*, vol. i. p. 270.) In a succeeding section (§ 800.) will be found a detailed account of the horticultural practices carried on in the Rosenborg garden; and the reader, who is desirous of perusing its praises in detail, will find them at great length, accompanied by numerous and beautiful engravings, in *Feldborg's Description of Denmark*.

781. *A plan of the gardens at Rosenborg* (fig. 168.) was taken in 1830 by an intelligent correspondent of the *Gardener's Magazine*, a gardener, who in point of general acquirements, and professional knowledge, may be ranked with any young horticulturist in Europe, and forwarded to us expressly for this work. Like many other plans on a small scale, of first rate gardens, it offers nothing particularly attractive when viewed as a picture; but, in the reality, the great variety of the surface, and the skilful distribution of the trees, render it eminently interesting. The following are details:—

- a. The palace.
- b. A piece of water, formerly part of a moat.
- c. Large orangery.
- d. Pine-avenue.
- e. Pine-plantation.
- f. Vines and peach-houses.

- g. Hot-beds.
- h. Pit for forcing flowers.
- i. Walls, and pelling over them.
- k. Orchard.
- l. Flower-garden.
- m. Kitchen-garden.
- n. Compost ground.

- o. Pavilion.
- p. Basin and fountain.
- q. Basin.
- r. Main entrance.
- s. Statue.
- t. Gardener's house.
- u. Iron railing.



782. *Hamlet's garden* is situated in the neighbourhood of Elsinore, and is the favourite promenade of the inhabitants of that seaport. It consists of two parts, the upper and the lower garden. The lower garden is laid out in the French style; but the upper part is in the English manner. The palace of Marienlust (Mary's delight) (*fig. 169.*) stands in the lower garden. It was intended for the residence of his present

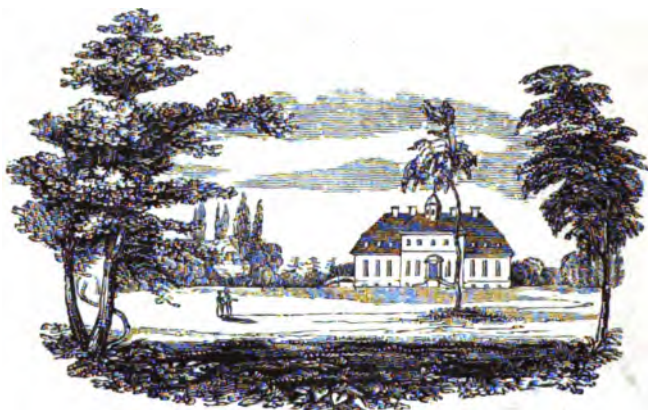


Danish majesty, when crown prince. From the hill behind the palace may be enjoyed a marine prospect, which, travellers say, exceeds every thing between Denmark and Naples. Near Hamlet's garden is Hellebek, a village belonging to Count Schimmelmann, who, for many years, was one of the cabinet ministers of Denmark. The situation of this village, close to the sea, combines such a variety of marine and rural scenery as would afford many interesting studies to the painter. The beech, the national tree of Denmark, flourishes here in superlative vigour, overtopping the oak, of which, however, many very fine specimens may also be observed. Nature in this place seems to be left to herself, and altogether divested of those ornaments, which, in too many

cases, injure what they were meant to improve. The traveller would scarcely suspect that he was approaching a nobleman's seat when he enters Hellebek. (*Feldborg*.)

783. *Sorgenfrie* (fig. 170.), the residence of his royal highness Prince Christian Frederick (the crown prince), is about six miles from Copenhagen. The palace is situated on a hill, and surrounded by a beautiful park; and the neighbourhood

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is said to be the finest part of the country for natural beauty. His royal highness improves this place every year; and the pleasure-grounds are open to the public all the year round. As their royal highnesses are as great lovers of gardening as any other royal individuals in the kingdom, or, perhaps, greater, the art will, no doubt, be carried to a great height in this delightful place.

784. *Jägersborg park* displays the magnificence and beauty of Danish scenery in the highest perfection. The red deer, here called down deer, are of a far superior species to those in Windsor Forest, or in the Duke of Bedford's park at Woburn Abbey. It is a truly majestic sight to meet with a herd of thirty or forty old stags grazing in some of the solemn circular glades in *Jägersborg park*, where, from the closeness of the wood, the light chiefly descends perpendicularly. The hinds, with their fawns, on the other hand, seek an extensive plain, in which stands a hunting-seat, very improperly called the "Hermitage," but now very seldom used for its original purpose. The house, from its lofty situation, commands a fine view of the sea; but, as a building, it is scarcely worth inspecting, and is now rapidly falling into decay. It will not, indeed, be missed in a park, of which Mr. Coxe says, "It is perhaps the finest spot for the natural beauty of the gentle waving grounds, and the richness of the wood; and sufficiently proves that the nobles may lay out their grounds equal to ours in England, if they would trust more to nature, and less to art."

785. *Jägerspruis* is an old royal seat, on a finely wooded isthmus. Here is an oak supposed to be one thousand years old; the trunk is about six yards in height, and sixteen yards in circumference. Although nearly excavated, it still displays a luxuriant top, and the branches, which extend all round to a distance of ten yards, are of the size of considerable trees. Four peasants on horseback once found room in its cavity, and eighteen men on foot at another time. This phenomenon stands on a moist and loamy soil, surrounded by magnificent beeches and oaks, which afford good shelter to the sire of the forest. In the gardens of *Jägerspruis*, a beech tree also forms a very curious object: its branches have been bent backwards to the ground, and fastened to circular trellises; thus producing a beautiful arbour, impenetrable to rain and heat. This beech is said once to have afforded shelter to a king and eighty courtiers at dinner.

786. *Gurré* is a place of note, in the neighbourhood of Elsinore. An old king of Denmark, *Valdemar Atterdag*, was so partial to the situation, that he called it his heaven; declaring, at the same time, that God might keep heaven to himself, if he would only allow him to keep *Gurré*.

787. *Dronninggard* may be considered as one of the best examples of the English style. It is an extensive park, the late residence of an eminent Dutch banker, *De Coninck*, about sixteen miles from Copenhagen. The grounds are situated on a declivity, which descends to a natural lake of great extent, whose circuitous shores are

bordered with thick woody scenery, and country houses. The soil here approaches more to a clayey loam than is general on the Continent; and the climate being cold, the turf is happily of a deep tone of green, and of close texture. The oak and beech abound in these grounds, as well as firs, and a number of exotics. Buildings are not too frequent; but there are several, and among them is a hermitage, to which one of the family actually retired, on occasion of a matrimonial disappointment, and lived there for several years, till roused and restored to active life by the dangers of his country.

788. *The ferme ornée of M. Hauch, situated on the Esrom Lake.* This scientific gentleman has introduced a style of rural architecture which gives the proprietor all the benefits of a residence in the country, without occasioning heavy and useless expense. Having cleared a considerable tract of land, which had formerly been forest, in the vicinity of the Esrom lake (fig. 171.), he allotted it, in small divisions, to a great

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number of cottagers. In an elevated part of the estate, he has built a two-story dwelling, in a neat and unassuming style. It possesses an extensive view of the country, and will itself form a most interesting object, when the adjacent cottages shall wear that general appearance

of comfort and happiness, to which they are rapidly advancing under the auspices of this nobleman. At a short distance from his seat, he has laid out a farm on the most approved principles, that the neighbouring cottagers may derive the best guidance, in the culture of their plots of ground, from what they see practised. M. Hauch's gardens and plantations have also been the means of turning the attention of the cottagers to an improved method of horticulture, and of making fences, in which the peasantry of Zealand were generally very deficient. The Rev. Mr. Junge, in his invaluable work on the character, customs, opinions, and language of the peasantry of North Zealand, mentions that hedging was diametrically opposed to the peasant's principles of agriculture. The learned author had himself seen quickset hedges ruined in the course of a night, long rows of young timber trees irrecoverably broken, and the tops of fruit trees cut off, just as the savages of Louisiana do, that they may pluck the fruit with greater ease. He proposes to remedy these evils by the enforcement of an old law in Holstein, by which every young man was obliged to plant a dozen of trees before he could ask the minister to read the banns for his marriage; and for every son with which God blessed him, he had besides to plant six or eight trees.

789. *Public gardens.* All the royal parks and pleasure grounds may be considered public gardens; because they are open at all times to all persons; as, indeed, whatever is supported by, and belongs to, the public ought to be. As in most European monarchies, a number of the royal residences are unoccupied, and never visited by the royal family, the enjoyment of walking in them at pleasure may be said to be all that the public receive in return for the immense expense of keeping them up. Fredensborg, Frederiksborg, Jägerspris, and Marienlust are all royal seats, which the royal family never see. Travellers agree in praising, not only these gardens, but the general scenery in the neighbourhood of Copenhagen. Col. Alexander (*Travels through Russia and the Crimea*, 1829,) was much struck with the regularity of Copenhagen; with the spiral stair on the outside of the tower of St. Saviour's; with the substantial air of its public buildings and private dwellings, and, above all, with the beauty of its environs. Country seats, groves, and lakes, he says, are to be seen every where from the ramparts; and, in the summer, the island of Zealand looks like a highly cultivated garden. The palaces of private individuals in the city and neighbourhood are worthy of being royal residences.

790. *Cemeteries.* The burial-ground at Copenhagen is about a mile distant from the city. Like the cemeteries in Mussulman countries, it stands by the roadside. The cemetery of the Danish capital is a miniature of Père la Chaise. The graves are all decked with flowers. Some of the epitaphs and devices are very fanciful. One motto consists of the sentence, "Not lost, but gone before:" another, "I shall see you again:" a third, in Danish verse, may be thus translated: "Rest, O sweetly rest, dear, in the garden of the dead, amid groves, and flowers, and tears; till little angels, bearing the 'forget me not,' shall summon me to join thee in eternity." One grave contains the remains of a mother, whose husband and children are represented in marble, as doves brooding over the dust of her they loved. The ages of the little ones are represented by

the size of the nestlings, and the widowed mate covers with his wings the last half-fledged pledge of conjugal love [1]. The scenery around is beautiful; but the cypress and myrtle are wanting. The Jews have here, as always, a separate burying-ground. Their corpses are interred in a standing position, with the face turned towards Jerusalem. (*Elliott's Letters from the North of Europe*, p. 62.)

SUBJECT. 2. Gardening, in Denmark, in respect to Flowers, Plants of Ornament, and .
Botanic Gardens.

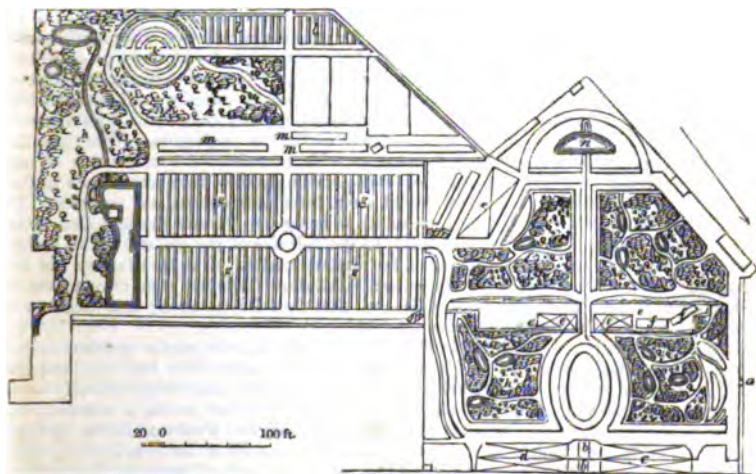
791. *The flowers generally cultivated in Denmark* are, roses, carnations, stocks, hyacinths, tulips, &c.; and herbaceous, biennial, and annual plants. Great collections of stove and green-house plants, except of the old species, are not commonly seen in noblemen or gentlemen's gardens. The fine New Holland plants, such as banksias, epacris, all the new acacias and melaleucas, &c., are wanting, except what there are in the botanic gardens. Great and fine collections of American plants, as *Rhododéndron*, *Azalea*, *Magnolia*, &c., are very rare; at least the finer kinds cultivated in Britain; they all require the protection of a house during severe winters, and to be kept in pots or tubs. In this way even the common laurel must be treated. A floricultural society was established at Copenhagen in 1830; and the reigning family are ardently attached to every department in gardening.

792. *Botanic gardens in Denmark* were established at an early period. In 1600, a medical botanic garden was established at the university's buildings in Copenhagen; but it was feebly supported, and on so small a scale, that the united seal of O. Worm, J. Tuires, Simon Pauli, the Bartolonis, and Ol. Borck for the science of botany, could not raise its reputation to an equality with a later establishment of the same kind, laid out at the palace of Rosenborg, by P. Vrylling, and by him called Hortus Christianæus. Among distinguished men the taste for botany declined in Denmark, and, from the beginning till nearly the middle of the eighteenth century, the kingdom had not a single botanist: for the Buchwalts, who taught the science, did not deserve the name. But the great luminary of Sweden shed a light over all the neighbouring states: a taste for the knowledge of plants was created; and from this time eminent men, as F. Holm, C. F. Rottböll, and J. Zoega, showed, by their useful exertions, that the science was embraced with much avidity, and that a love of it became general over all Europe. In 1752, a skilful pupil of the Hallerian school arrived from Germany, who afterwards became professor of botany in this university. By his ability, and the fostering care of the then ministers, Count A. G. Moltke, and Count Thott, botany, as well as other sciences, was greatly promoted. A new and large botanic garden was laid out in the same year at the custom-house, which was graciously presented to the university by King Frederick V., who also endowed it with an annual grant of money. At this time Oeder was on his travels, collecting plants and drawings for the *Flora Danica*, of which he was the first author; John Zoega, brother to the celebrated archaeologist Zoega, and a beloved pupil of Linnæus, was lecturer; and the cultivation of the plants was conducted by an excellent Dutch gardener of the name of Kösemakker. When Oeder and Zoega gave up the pursuit of botany, the one for that of agriculture, and the other for that of finance, C. F. Rottböll, the professor of medicine, and who, since 1771, had given lectures on botany, was made superintendent of the garden. This gentleman's works were chiefly extracted from the labours and discoveries of his pupil, J. G. König, in the East Indies, and are well known: but his valuable monograph of *Epidéndrum* placed him in the first rank as a practical botanist. During his direction the garden was removed to Charlottenburg, in 1778, where it now remains. In the following year, the celebrated botanist Martin Vahl, just arrived from the prosecution of his studies at Upsal, was appointed lecturer on botany; but soon gave up the office, in consequence of a disagreement between himself and some others with respect to regulations connected with the establishment. M. Vahl set out on a botanical excursion over Europe and part of Africa, and was succeeded in the lectureship by his pupil, Eric Wiborg. After this time, the garden was improved, in consequence of its connection with other establishments of the kind; and, though it was strictly a royal garden, the entire use of it was given up to the university. Rottböll died in 1797, having bequeathed the whole of his interesting herbarium to the garden; which being united with what it before contained, viz. the collections of Rolander and Forakil, added much to the value of the institution. Rolander was a native of Sweden, and a pupil of Linnæus. He made a voyage to Surinam, where he collected many rarities in natural history, of which he gave a description in the Latin language. Returned from his travels in Surinam, he went to Copenhagen, and, being in want of money, sold his herbarium and journal to the professor of physic at the university, Kratsenstein, who immediately presented both to Rottböll. The manuscript was afterwards given to the privy counsellor Count Thott; and, when the great library of this nobleman was sold, Vahl had the good fortune to purchase the MS., which contained much valuable matter. (See

Hornemann's Life of Rolander.) The hortus siccus of Forskål was of great importance; and though, after its arrival at Copenhagen, it was mismanaged and deranged, it still contains many good specimens. Vahl and Shnedmacher were entrusted by Rottböll to arrange this collection; and they, having had leave to select some of the duplicates for themselves, have, consequently, preserved the best. Rottböll's collection is now of no great consequence, especially as Vahl has described the best in his *Symbole Botanica*. After the death of the naturalist, P. C. Abildgaard, professor at the veterinary college, Viborg succeeded as director of this school, in 1801; and, having previously been elected author for the continuation of the *Flora Danica*, &c., was also made professor of botany. Before the year 1754, botany was not considered as a science requiring a special professor; and, therefore, was usually attached to medicine. Oeder was the first botanical professor; but, on his retiring, it again merged into the professorship of medicine, and so continued till Viborg's appointment. During Vahl's direction, and with the able assistance of the superintendent, F. L. Holböll, the culture of the plants received quite a new impulse: their names were corrected; useless encumbrances cleared away; and a new classification and general arrangement adopted. In 1801, M. Petersen was appointed lecturer in botany. His highness the Duke of Augustenburg, who was an active member of the directory, strongly recommended the improvement of the garden to the king, who granted a liberal sum of money to pay off the debts of the establishment, and to build a new hot-house, &c. Vahl died in 1804; and having, in his latter years, occupied much of his time in composing his *Enumeratio Plantarum*, had consequently had but little time to dedicate to the garden: Professor Hornemann, author of the *Flora Danica*, succeeded to the united offices of professor and lecturer in botany.

793. The present botanic garden of the university (fig. 172.) is situated at Char-

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lottenburg, and contains somewhat more than five English acres, inclusive of buildings; this, with all appurtenances, was, in 1817, presented to his majesty, who, at the same time, ordered the director to resign, and decreed that in future the direction should be solely vested in the university. The following are more minute details:—

- a, Palace; formerly occupied by the royal family; but now turned into an academy of the fine arts.
- b, Library.
- c, Dwelling-house of the professor of botany.
- d, Gardener's house.
- e, Store and green-houses for Cape plants.
- f, Green-house.

- g, Systematic garden for annuals, biennials, and perennials.
- h, Arboretum.
- i, Alpine and rock plants.
- k, Rosary.
- l, Nursery.
- m, Hot-beds.
- n, Aquarium and fountain.

794. In the arrangement of a botanic garden, Professor Hornemann observes, many difficulties present themselves. The various natures of the plants, as to climate, soil, exposure, volume, duration, and all the varying circumstances of seasons, &c., render any arrangement, whether natural or artificial, extremely difficult to execute with propriety and convenience. A considerable extent of ground is requisite for even the types of the genera, multiplied as they now are; and for the reception of the species, an incredible space must be had. Besides, such an intermixture of closely allied species would very probably produce such a confusion in the mind of the student, as would retard, rather than advance, his knowledge of the science. For these reasons, the system

of Van Royen, according to which the plants of the Charlottenburg garden were arranged by Rottböll, was rejected in 1805, and the sexual system of Linnæus was introduced. But this could be followed with perennials only, in what is called the systematic quarter. The annuals are necessarily kept apart; and, in the arboretum, shrubbery, and experimental quarters, no systematic order is maintained. In the latter quarter, newly received plants and seeds are raised, and kept till the names received with them can be verified. Experience has taught this lesson; for much disappointment arose from the credulity with which the names sent with seeds were at first relied on. This manner of proceeding is unavoidable, unless the botanic garden is to be made a chaos. With the plants in pots no attempt is made at classification. (*Gard. Mag.*, vol. iv. p. 201.)

795. *The plants in the Charlottenburg botanic garden* are numbered, and correspond with the *Enumeratio Plantarum Horti Regii Botanici Hafniensis*, 2 vols. 8vo, which the professor published in 1813 and 1815. The specific and generic characters being given in this work for every plant, the student is enabled, with its assistance, to make his own examination; and should he wish to consult other authorities, he goes to the library, which is open at certain hours of the day, and looks at any book it contains. The work above-mentioned is published at his Danish majesty's expense, on the condition that the proceeds from the copies sold be applied to the purchase of botanical works for the use of the library; and by such means many books have been procured, which were before very much wanted. The commercial intercourse of Denmark with the rest of the world, and the liberal intercommunication between this botanic garden and similar establishments, have incredibly increased the number of plants. All useless or super-numerary plants have been banished, to make room; and in 1811 another quarter of an English acre, fenced and prepared, was added by the generosity of the king; who also, to provide sufficient protection for exotics, assisted to erect a stove above seventy-two feet in length, and calculated to hold 2000 plants in pots. Besides this, there are two green-houses, one Cape house, one dry stove for succulents, and two other small houses. The *Hortus Upsalensis*, first published in 1748, contained descriptions of only 1400 plants; at present it contains certainly not less than 15,000, known to be perfectly distinct species. These, perhaps, have been improperly swelled by varieties; and botanists have to regret that the number of species has been surreptitiously augmented by careless intermixture, and sometimes by the silly vanity of authors or cultivators. When identical characters are constant, it has been the custom with botanists to consider this circumstance as a proof that they are specific; and accordingly they have placed such in their lists as species, when, in fact, they should have been only entered as varieties. The celebrated Philip Miller found it impossible to bring the *Daucus Carota* (*Daucus sylvestris* Mill.), from its wild slender habit, to the full size of the old cultivated variety; and therefore concluded that they must be distinct species. But his trial was not long enough continued to decide the question: cultivation for a few years cannot have the effect of cultivation in all kinds of soils and situations for centuries; and therefore his experience was, in this case, defective. (*Ibid.*)

796. *The collection of plants in the Charlottenburg botanic garden* consists, at present, of above 8000 species. A few of them have been purchased; but they have been chiefly supplied by the kind attention of German travellers, and others friendly to the establishment, who are in foreign stations. Of these, it is but justice to mention, with respect, the names of Shousboe, consul-general at Tangier; Professor Balke, of Christiania; Professor C. Smith, of the same place, but who fell a victim to his zeal, before he took his charge; N. Wallich, knight of Dannebrog, Calcutta; Lieutenant Wormskiold; Professor Schouw; the Rev. Dean Dienboll, East Finmark; Dr. Rafn, at St. Croix; Benson, East Finmark; Dr. Hornbeck, at St. Jean; Ecklon, at the Cape of Good Hope; and Captain Lieutenant Holböll, in Greenland. One fact connected with transportation of seeds deserves to be noticed; viz., that of 1800 sorts sent from Denmark to Calcutta, in 1820, 1400 vegetated in four days with Mr. Potter, of the latter place; but those sent to Europe almost all perished before their arrival. It has not been intended, in this place, to compare the botanic garden at Copenhagen with the much more extensive establishments of the same kind at Berlin, Vienna, and particularly in England; but what has been done here, with very limited means, will sufficiently show how much may be accomplished, when enlightened men, zealous in a useful pursuit, unite their endeavours to obtain a desired object. The income is only 685*l.* per annum, which must cover every expense, except the professor's salary. The connection of a library and herbarium with a botanic garden is absolutely necessary. Except Paris, almost all the gardens of the Continent are defective in this respect. Establishments where such advantages exist greatly relieve the preceptor, while they assist the pupil; by a comparison of specimens and descriptions, misnomers of the living plants may be detected, and thereby the arrangement of the garden becomes more complete, and the studies of the scholar are advanced. (*Ibid.*)

797. *The library of the botanic garden at Charlottenburg* contains a good many works of old authors on botany, as well as almost all the cheap works published on the Continent. Among many of less note there is Cupani's *Pamphytum Siculum*, which is a very rare book. But the library is deficient in modern works, especially in the splendid publications of England and France.

798. *The herbarium* is valuable. Vahl's specimens and botanical library were presented to the garden in 1805, by his majesty. Besides this, there is Rottböll's, which contains the specimens collected in Surinam by Rolander; those from Guinea, by Isert; and a fine volume of specimens collected by Piao in Brazil. In addition to the above, Professor Schouw's collection, from Italy, Sicily, &c., will be obtained, as well as the herbarium of Professor Schumacher. (*Ibid.*)

799. *Of specimens of seeds and fruits* there is a very respectable assortment in spirits, arranged by Professor Schouw, which occupies several large cabinets, and is a useful appendage to the establishment. The MSS. are chiefly those of Vahl; they were his collectanea, and the materials from which his *Enumeratio Plantarum* was to have been compiled; from which task he was too soon called away. (*Ibid.*)

SUBJECT. 3. *Gardening in Denmark, with respect to its Horticultural Productions.*

800. *Horticulture* seems to be as much in repute in Denmark as in most other countries. The Crown Prince is a fellow of the Horticultural Society of London; and one of the royal gardeners, M. Peter Lindegaard, has contributed several papers to the *Horticultural Society's Transactions*. The government is using every means to spread the common hardy fruits; and gooseberries, apples, plums, and pears may be purchased from the national nurseries for little more than a halfpenny a plant. A garden library, which was established in the Royal Gardens by M. Petersen, in 1829, contains the best English, French, and German works on every department of gardening.

801. *The climate and circumstances of Denmark* are much less favourable to gardening than those of Britain; yet horticulture is very successfully practised, especially round the capital. There are very fine apples, pears, plums, cherries, gooseberries, currants, raspberries, and strawberries; and the commoner culinary vegetables are grown in abundance. It may give a practical idea of the climate in the neighbourhood of Copenhagen, to state, that the *Cerasus Laurocerasus* requires the same protection there during the winter that the *Magnolia grandiflora* does in England. One plant lived for thirty years in the shrubbery of the celebrated park of Dronninggaard, one of the finest residences in Denmark. It was looked upon as a great curiosity, but was killed with the frost in year 1819-20.

802. *Pine-apples* are grown in great quantities in the two royal gardens of Rosenborg and Frederiksborg; and at Sorgenfri they are likewise well grown, according to the methods practised there, though they are not so plentiful as in the former places. This valuable fruit is also cultivated in several noblemen and gentlemen's places throughout the kingdom, but is nowhere seen equal to the pines grown in England. The old queen pine was, till lately, the only sort grown in Denmark.

803. *Grapes* are preserved in Denmark in the open air till the end of December, and sometimes till the middle or end of January. They are ripened on hot walls, in the royal gardens, and protected during the night with reed mats. They hang there till they are cut for use. The grape is forced by M. Lindegaard by dung heat, in a simple and economical manner, which will be hereafter described. The sorts of grapes mostly cultivated, and also the hardest, which often produce, in good warm summers, by M. Lindegaard's treatment, fine ripe fruit upon the walls, without any artificial heat or covering, are the red Van der Lahn, chasselas blanco (the common white muscadine), and the wassersiet (the small white cluster). The Parille druen (the parsley-leaved malmsey muscadine) is likewise hardy, but does not set well if the weather is cold when it is in bloom. The Frankendalen (black muscadine) and Pottebakker (the black Hamburg) are generally grown in vineries, as their ripening on walls is very uncertain, though it sometimes occurs in hot summers. The white sweetwater (perle druen) is the finest white grape known in Denmark, and is always planted in vineries. All M. Lindegaard's forcing, of every description, is effected by dung heat alone: his early peaches and grapes ripen every year in the month of June, and, in general, he has grapes all the year round.

804. *Peaches*. M. Lindegaard introduced the method of rearing peach trees in Denmark, and particularly the mode of preserving them during the first and second winter after budding. They were formerly always imported from Holland. Peach trees are chiefly trained on wooden walls, and, during severe frosts, are covered with straw mats. The kind grown in general is the double montagne (the English Montauban), which ripens its fruit, without artificial heat, about the end of August. M. Lindegaard's trees are as finely trained as any in England.

805. *Asparagus* is grown extensively in the neighbourhood of Copenhagen, and it is

forced in the open garden, by placing linings of dung between the beds, so as to be had in abundance from Christmas till summer.

806. *Sea-kale and mushrooms* are not cultivated in the country, unless it may have been done lately; all sorts of culinary vegetables in general cultivation are grown in Denmark as plentifully as in Britain.

807. *Rosenborg is one of the first places for horticulture in Denmark.* It is under the superintendence of the royal gardener, M. Lindegaard; and no place in Denmark can in any respect come near to it in cultivation and forcing. Speaking of this garden in the *Gardener's Magazine*, M. Petersen observes, every plant M. Lindegaard has under his care looks remarkably well; but the principal objects of attraction are the vines. One instance may be mentioned:—In 1823, M. Lindegaard planted three plants in front of a large orangery, 160 feet long; viz., two plants of chasselas de Fontainebleau, and one of the parsley-leaved grape. All of them showed fruit the first summer. In 1825, he says, one plant had fourteen pounds' and a half weight of fruit, the second fourteen pounds', and third ten pounds' weight. In 1823, M. Lindegaard planted four plants more; and now (1828) the whole front of the orangery is covered with vines, except the windows: there are five plants of chasselas de Fontainebleau, here named white Van der Lahn; one plant of the parsley-leaved; and one plant of the blue cluster, here named early Leipziger, and, in France, Madeleine hâtive. Each plant has produced upwards of one hundred fine large bunches this year (1828). The wood also has ripened well, and is as thick as one's finger. All the other vines are doing equally well. The extensive walls in the garden are covered with grapes and peaches; and the grapes have ripened on the open wall, without any glass covering whatever. The peaches here are deserving of the same praise as the grapes; the trees are as fine as any in England, covered with abundance of fruit, and beautiful bearing wood for the next year. M. Lindegaard has published a book on the cultivation of grapes in Denmark. There are several grape vines on the walls upwards of a century old, and still in a flourishing state. M. Lindegaard cultivates sixteen sorts of grapes in this garden. Among the pine-apple plants, M. Lindegaard has the New Providence, the blood, the Havannah, and the black Antigua; and, considering the bad construction of his houses and pits, the fruits are good. M. Petersen informs us, that, in the month of July, 1828, he saw a plant of Keen's seedling strawberry in this garden, remarkably fine, covered with large fruit, and equal to any thing in England. Rhubarb is only grown in the botanic garden among the hardy plants, in order to have it in the collection.

808. *Market-gardens.* Two miles from Copenhagen is a little island called Amager, about six miles long and five broad. It may be called the kitchen-garden of Copenhagen, as the greater part of it consists of market-gardens. It was peopled by a Flemish or Dutch colony, in the sixteenth century, who were sent for, to teach the Danes how to cultivate culinary vegetables, and who still retain their old dress and many of their old customs. This island supplies the greater part of Copenhagen with vegetables, which are grown to great perfection. The inhabitants keep themselves quite apart from all other people in the kingdom. There are several other good market-gardens in the country, particularly about Copenhagen. Every nurseryman grows vegetables and fruit for the market, so that there is very little difference here between nurserymen and market-gardeners, only that some of them grow more flowers and fruit trees, and fewer vegetables, than others. (*J. P. in Gard. Mag.*)

SECT. VII. *Of the Rise, Progress, and present State of Gardening in Sweden and Norway.*

809. *Gardening is patronised by the higher classes, and practised round the principal towns of Sweden and Norway.* "All the Swedes with whom I have ever met," observes Hirschfeld, "whether elevated by birth or enlightened by education, were estimable friends of beautiful nature and of gardens." Sir J. E. Smith (*Linn. Trans.*, vol. i.) expresses an equally high opinion of this people. Mediocrity of circumstances, a poor court, political liberty, and a varied and comparatively unproductive country, seem to have contributed to give a more thinking turn to the Swedish nobles, than to those in countries naturally prolific. So beautiful is the scenery in some parts of both Sweden and Norway, that the district of Waas, in the latter country, has been called the Northern Italy. Their immense public works, canals, harbours, and excellent roads, careful agriculture, extensively worked mines, botanic gardens, literary institutions, and scientific authors, are proofs of what we assert.

810. *The ancient style of gardening* appears to have been introduced into Sweden at least previously to 1671; for Hermand, who published his *Regnum Sueciae* in that year, mentions the gardens of the palace as well as the vivarium or park. The gardens, he says, were used for delight and recreation. They lay between the palatium and vivarium; and the latter contained some wooden buildings, in which were kept lions, leopards, and boars. This garden and park appear to have been formed by Gustavus Adolphus, about 1620. Charles XII. procured plans from Le Nôtre, and had the trees and plants

sent from Paris. It is remarked by Dr. Walker, as a curious fact, that, though the yew tree is a native of Sweden, those plants of the species sent from Paris, to plant Le Nôtre's designs, died at Stockholm the first winter.

811. *The mixed style* is exemplified in Haga, formed on a rocky situation, about the middle of the eighteenth century, by Gustavus III., with the assistance of Mæretier. It is the Trianon of Sweden. The approach is a winding walk through rocks and luxuriant verdure. Drottningholm is a royal palace, formed by the same prince on the island of that name. The gardens are in a sort of Anglo-Chinese manner; but, so far as art is concerned, in no respect remarkable. Both these gardens are surrounded or intermingled with water, rocks, Scotch pine, spruce fir, and buildings; forming a picturesque assemblage of saxatile and verdant beauty. There are some confined spots laid out in the English taste, chiefly by British merchants, in the neighbourhood of Gottenburg, as there are also near Christiania and Drontheim, in Norway: but it may be remarked, that this style is not likely to be generally adopted in either country, because they already possess much greater beauties of that kind which it is the aim of landscape gardening to create, and with which those created by art would not bear a comparison.

812. *As eminent gardens in Solhønen*, in 1831, may be mentioned the following:—Maltheholm, Löparöd, Offeldskloster, Vanase, and Witaköffe; all of which contain kitchen-gardens, with hot-houses, in which pine-apples are grown; and forcing-houses for grapes, peaches, cauliflowers, cabbage lettuce, carrots, cucumbers, and melons. The forced fruits are seldom ripened earlier than June or July.

813. *At Matthesholm* they excel in growing the coffee tree, and gather a good deal of fruit. At one time, the queen, on a tour through the country, stopped at this place, and was served with a cup of coffee from berries grown in the garden. In 1824, two fine plants of *Agave americana* flowered at the same time, and were considered so much alike, that scarcely any differences could be observed between them. They sent up stems twenty feet high, which were covered with a profusion of flowers. The pleasure grounds here are laid out in the old French taste.

814. *The other gardens mentioned* (§ 810.) are more or less in the new or English manner. At Vanase there are several New Holland plants. At Witaköffe there is a small mulberry garden, which produces plenty of fruit every year. There are also from twenty-five to thirty fig trees, about six feet high, which are planted in the open ground every summer; and taken up in the beginning of every winter, and kept till next season in a cellar.

815. *The villa of Mr. Kaudtzen, in the environs of Drontheim*, is in a delightful situation, on an eminence commanding the city, and near the fortress of Christianstein. Capel Brooke says, when he visited it, "the weather was very fine, and even hot; and (July 8.) the different fruits in the garden were fast ripening. I tasted some very excellent strawberries and cherries quite ripe, lat. 63°. There was also a flourishing plantation of oaks, ashes, limes, chestnuts, and laburnums, brought from Scotland. The firs alone, from the same country, had died, probably from the length of time that they had been taken up, and their roots drying more quickly than those of the other trees." (*Travels in Norway*, p. 161.)

816. *The most popular flowers in Sweden* are, the common sunflower, common and French marigolds, pinks, carnations, and sweetwilliams, yellow lupines, garden poppy, and mignonette. Sage, lavender, and box are domestic shrubs, much in use for the decoration of churches on holidays. The double georgina and the *Coreopsis tinctoria* were introduced by Mörsch. The author of the *Manual of Floriculture* (*Hänbok i Blomsterkulturen*, &c.), published at Stockholm in 1831, enumerates many of the common hardy herbaceous plants of England, as fit for the open air in Sweden. This author, Weenström, is a commercial gardener, and an intelligent man; and, as we are informed, one of the few gardeners in Sweden who read English, and receive publications from Britain on the subject of their art. On the whole, however, a taste for flowers is not popular in Sweden; if a farmer or cottager has any spare room in his garden, he prefers rearing a few plants of tobacco. But the study of every branch of natural history is in repute among the higher classes and literati; and the celebrity of the Swedish botanists, and of the Upsal garden, is universal. It was difficult, Deleuze observes, to form vegetable collections in the northern countries; but industry can conquer obstacles, and the more precautions that are necessary to secure the plants from the rigour of the climate, the more will culture be perfected. Among the rare native plants in the neighbourhood of Alten are the *Pedicularis lapponica*, and *P. Scéptrum Carolinum*. The latter has been found five feet in height. *Rhododendron lapponicum*, which resembles in miniature the *R. ponticum*, is there found in abundance; and so extremely small, that Capel Brooke found one shrub, apparently very old, and bearing, perhaps, 500 flowers, which might be covered with the palm of the hand.

817. *The botanic garden of Upsal* was founded in 1657, under the auspices of King Charles Gustavus, and by the attention of Olaus Rudbeck. This learned man, seconded

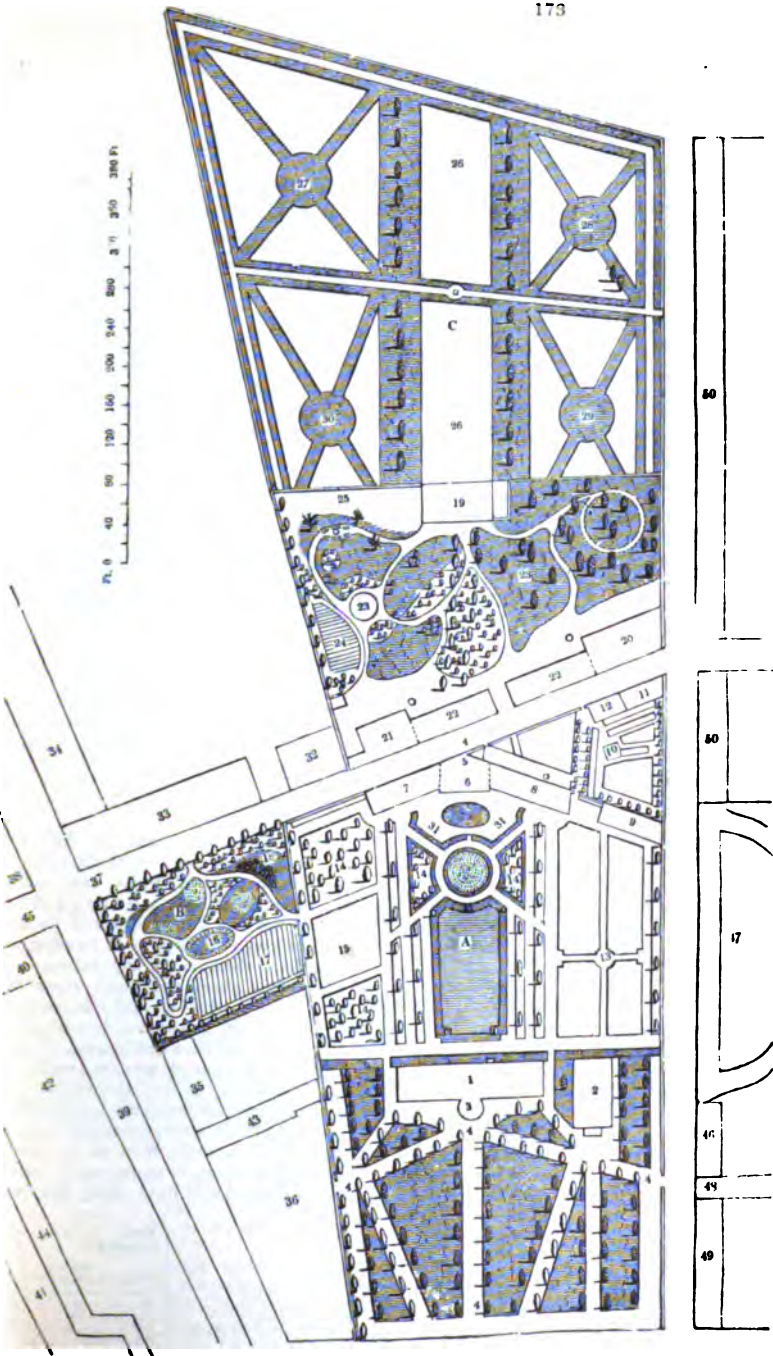
by the credit of the Count of Gardie, chancellor of the academy of Upsal, and who had himself a fine botanic garden at Jacobedahl, obtained funds necessary for the construction of a garden and green-house, and to collect foreign plants; and he augmented its riches by the gift he made of his own garden in 1662. The progress of this establishment may be seen by comparing the three catalogues given by Rudbeck in 1658, 1666, 1685. The latter enumerates 1870 plants, among which are 630 distinct species of exotics. (*Bibl. Banksiana.*) In 1702, the fire which consumed the half of the city of Upsal reduced the green-house to ashes, and the garden was in a deplorable condition till 1740, when its walls were rebuilt. Two years afterwards the botanical chair and the direction of the garden were given to Linnæus; and the university, undoubtedly induced by that reformer of natural history, took charge of all the necessary expenses for the acquisition and preservation of plants. Linnæus, feeling how essential it was to be assisted in all the details of culture, obtained Diedrich Nutzel, a clever gardener, who had visited attentively the gardens of Germany, Holland, and England, and who had then the charge of that of Clifort, in Holland. He there constructed new green-houses, intended for plants of different climates; and he solicited successfully the principal botanic gardens of Europe for specimens. Soon afterwards, several of his pupils, to whom he had imparted a portion of his own enthusiasm for botany, went across the seas to collect seeds and specimens; and many tropical plants, first grown at Upsal, were sent thence to the southern countries of Europe.

818. *The description and plan of the garden of Upsal may be seen in the Amanitates Academica.* (Dissert. vii. t. i. p. 172.) Linnæus, in 1748 and 1753, published the catalogue of the plants cultivated there, and since his time others have appeared, containing the additions which have been made by his successors. In 1804, the large orangery built by Linnæus was found to be considerably out of repair, and was taken down and rebuilt. A magnificent lecture-room and museum were at the same time added. The ceilings of these rooms are supported by columns, which, being hollow, are used as flues, and thus afford an elegant and effectual means of heating the air. On the whole, the garden is respectably kept up; and many hardy plants, natives of North America in particular, are found here in greater luxuriance than in France or Germany.

819. *The botanic garden of the university of Lund (fig. 173.)* was founded in the first half of the eighteenth century. Its professors and directors have been Andrew Lidbeck, A. J. Retzius, and the distinguished C. A. Agardh. The gardener since 1826 has been O. J. N. Mörch. The garden contains about two and a half English acres; the soil is a mixture of gravelly clay and mould; and the surface is somewhat irregular. It has been remarked that the box tree thrives here remarkably well; there being hedges of that shrub upwards of six feet high. The tender plants are said to thrive here better than in the garden at Copenhagen. The herbaceous plants are arranged according to Professor Agardh's *Aphorismi Plantarum*; each genus being planted by itself. There are a good many species of trees and shrubs, though but few North American plants. The green-houses contain the plants of the South of Europe; but few natives of the Cape, or of New Holland. The most remarkable plants in the stoves are the banana and the date. The hot-houses are heated by German stoves, in which wood is burned as fuel. The garden has no library, herbarium, or collection of seeds; nor is this to be wondered at, when it is considered that the entire expense of the establishment, including the gardener's salary, seldom exceeds 50*l.* a year. The total number of species in this garden, in 1829, was 2300. An arboretum had been planted by M. Mörch, and also a shrubbery in the English style. A good many white mulberry trees had been propagated, with a view to the culture of the silkworm; but the severe winter of 1798 destroyed most of the trees, and the culture has been given up. The worms were reared in the orangery in the botanic garden; some silk cloth was made, and a fragment is still kept in the museum at Lund, of a piece which was presented to the queen. No attempt was made to renew this plantation, which is now occupied by trees of the *Acer Pseudo-Platanus*, introduced into Sweden from Holland, in the year 1770. The following are details of the plan:—

- | | |
|--|--|
| 1. The botanic garden. | 15. Annual plants. |
| 2. The new arboretum. | 16. New arboretum. |
| 3. The plantain. | 17. Medicinal plants. |
| 4. Old academy. | 18. Rockwork or lapidarium. |
| 5. New academy. | 19. Old infirmary. |
| 6. The astronomical observatory. | 20. New infirmary. |
| 7. Vestibule to the academy. | 21. Lying-in hospital. |
| 8. Anatomical theatre over the same. | 22. Storehouse and kitchen for the lying-in hospital. |
| 9. Conservatory. | 23. Place of exercise for invalids. |
| 10. Store. | 24. Garden of medicinal herbs for the hospital. |
| 11. Gardener's house. | 25. Area for gymnastic exercises. |
| 12. Conservatory. | 26. Campus experimentalis (field for trying experiments). |
| 13. Conservatory. | 27. Seminarium (seed place). |
| 14. Store. | 28. Pinetum (various species of pines). |
| 15. Lecture-room. | 29. Acerinum (various species of acorns). |
| 16. Arrangements of herbaceous plants according to the natural system. | 30. Fruticetum (a collection of fruit trees). |
| 17. Arrangement of trees and shrubs. | 31. Hedge of box, 6 feet broad at the base, and 6 feet high. |

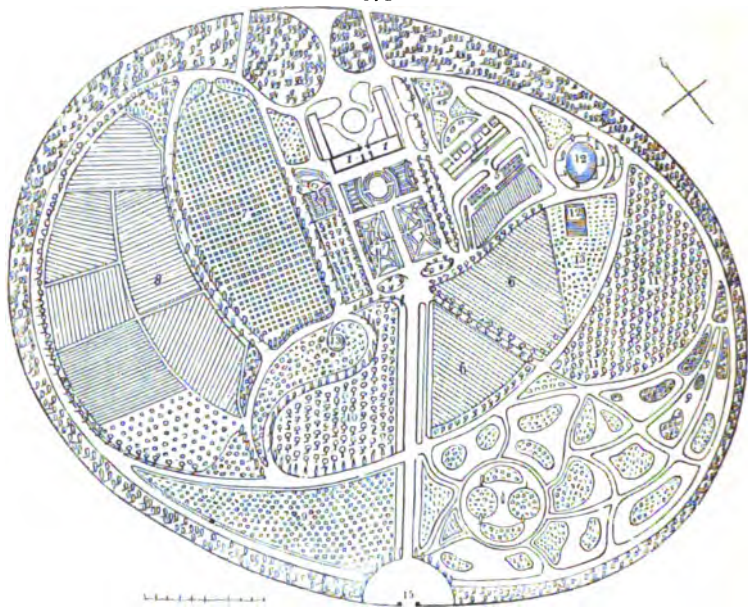
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R

820. *The botanic garden of Christiania* (fig. 174.) was founded in 1812, and laid out by that distinguished traveller, and botanist, M. Holböll. A catalogue of the plants was published by J. Rathke in 1823.

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Ft. 20 0 20 40 60 80

- 1, Museum, with the houses of the demonstrator of botany and the gardeners.
- 2, Parterre of flowers and ornamental shrubs. The walks forming the letters F. R.
- 3, Green-house, dry-stove, and conservatory. The latter constructed with double windows, at the suggestion of M. Siebek, the gardener, in order to render the covering with mats unnecessary, and for the purpose of not excluding the light. (See *Gard. Mag.* vol. viii. p. 535.)
- 4, Compartment exposed to the south.
- 5, Terrace and sundial.

- 6, Compartment for annual and biennial flowers.
- 7, Compartment for perennials.
- 8, Compartment for plants used in agriculture, and in the arts and manufactures.
- 9, Compartment for young fruit and forest trees, and shrubs.
- 10, Pomarium.
- 11, Arboreum.
- 12, Aquarium.
- 13, Different species of trees and shrubs.
- 14, Smaller gates.
- 15, Main entrance.

821. *In horticulture* the Swedes are considered successful operators; but their short summers are adverse to the culture of many sorts of fruits and culinary vegetables in the open air; and there is not yet sufficient wealth to admit of much forcing, or of forming artificial climates to any extent. The apple, pear, and plum ripen their fruits in the best districts, especially in warm situations; but where the better varieties are grown, they are always planted against walls, and protected, as in Denmark. The *Rubus Chamæmorus*, or cloudberry (fig. 175.), is very common in Lapland:

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its fruit is delicious, and is sent in immense quantities, in autumn, from all the north of the Gulf of Bothnia, to Stockholm, where it is used for sauces, in soups, and in making vinegar. Dr. Clarke says he was cured of a bilious fever chiefly from eating this fruit.

822. *The fruits of Sweden* are the following:—

Applcs.			
Rosenhager.	Bonstorfles	Bourré gris.	King.
Astrachan, red winter.	Pigeon.	Sugar.	Dumascena.
Glass apple.	Pears.	Iron.	
Engl. Gyliden.	Winter bonchrétien.	Dry.	Cherries.
Calville rouge.	Summer bonchrétien	Cinnamon.	Plums.
Danziger Kantapple.	Jargonelle.	Blue Swedaker.	Green Swedaker.
White Gyliden.	Double bergamot.	Reine Claude (Green gage).	Yellow egg.
Pauv-pomme rouge.	Summer bergamot.	Red egg.	Green mirabelle.
Union.	(Gratiol.)	Fig.	
Princess Noble.	Margarette.	Yellow mirabelle.	
Pomme de Jerusalem.	Windsor.		
Pepin d'or (golden pippin).	Beurré blanc.		

Kirch van der Nacht (for preserving).

Apricots.
Early Hungarian.
Large Breda.
Small early Orange.

Peach.
Double montagne.

Nectarine.
Bragnon, or Violet hâit.

Grapes.
Wassersriet.
White Muscadine, or early Margaret.
Sweetwater.
Blue Leipzig, or blue cluster, and blue August grape. These sorts of grapes are most commonly cultivated in gentlemen's gardens; but Professor Sonnerberg of Lund, a great amateur, has in his collection ten different sorts,

grown and described by M. Lindsgaard of Rosenborg.

Walnuts.

1. Double.
2. Single.
3. Tender-shelled.
4. Thick-shelled.

Raspberries, Gooseberries, Currants, and Strawberries.

823. *The culinary vegetables* grown by the farmers and cottagers in Scione, are blue or brown borecole, Rosen cabbage, a very delicate green cabbage or kale, white cabbage, onions, carrots, parsley, parsneps, red beet, potatoes, kohlrabi, and ruta бага: sea-kale has been tried by way of experiment. Autumn or harvest turnips, a variety generally sown about midsummer on heathy wastes which have been pared and burned, leek, marjoram, thyme, sorrel. The brown kidneybean is in some places grown in great quantities; and, when ripe, it is stewed with sugar and vinegar, and is usually termed "sour and sweet." The white runner is rare, as is also the sugar pea. Caraway and anise are grown for seasoning rye bread. *Astrágalus bæticus* is grown by almost every farmer, for the purpose of mixing with coffee.

824. *Tobacco*, as we have already observed, is a good deal cultivated in Sweden; and, after carefully trying eleven sorts, M. Gernandt, the late curator of the botanic garden at Lund, gave the preference to the Maryland (*Nicotiana fruticosa crispula Agardh*), and the Brazilian (*N. decurrens Agardh*); that commonly grown is the *N. rústica*. The grower generally sells the tobacco to the manufacturer, after it is dried under cover, but not fermented.

825. *Garden seeds and young trees* are generally grown in private gardens, and are exposed for sale in the markets; and not, as in other countries of Europe, by men who make the production of these objects a distinct business. The winter fairs in Wexio, Jonköping and Christinehamn, are attended by gardeners from Stockholm, and other provinces, for the purpose of selling and purchasing seeds. The public market at Stockholm is supplied with fruit trees of five or six years' growth from all parts of the country, which are sold at 6d. each. The potato was introduced into Bergen in 1762; and into Nordland and Finmark in 1782; its culture is not yet well understood; but the produce, though small, is found to be of good quality. (*Brooke's Lapland*, p. 203.)

826. *The towns and cities of Norway*, Dr. Clarke informs us (*Scandinavia*, ch. 17. 1806), were formerly supplied with culinary herbs from England and Holland; but gardening became more general after the publication, by Christian Gärtner, of a manual adapted to Sweden. Now all sorts of vegetables are common round Drontheim. The gardens of the citizens are laid out in the Dutch taste, and full of fruits and flowers. Of these are enumerated, apples, pears, plums, cherries, strawberries, cabbages, cauliflowers, turnips, cucumbers, potatoes, artichokes, lupines, stocks, carnations, pinks, lilies, roses, and many other garden flowers. In the garden of the minister of Enontekis (*fig. 176.*),

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a village situated 287 miles north of Tornea, and perhaps the best garden in Lapland, Dr. Clarke found peas, carrots, spinach, potatoes, turnips, parsley, and a few lettuces. The tops of the potatoes were used boiled, and considered a delicate vegetable.

827. *Planting is little wanted in Sweden*; for seedling Scotch pines, spruce firs, and birch, rise up in abundance wherever old ones have been cut down. The pine forests, Capel Brooke tells us, are seen in their greatest beauty, when the young light green spring shoots are contrasted with the dark colour of the older foliage. The juniper grows every where, and, requiring no drying previously to being burned, forms the general fuel of the country. (*Elliott's Travels*, &c., p. 144.) Enclosures in Sweden, as in Switzerland, are most frequently made of stone or of wood. Trees are planted along

the roads in several places, and especially near Stockholm. The lime, the birch, and the ash, or trembling poplar, are the species used.

828. *There is no such thing as a journeyman gardener in Sweden.* When a young man has served an apprenticeship of three or four years, he is considered qualified to take the charge of a garden, and becomes at once a head gardener.

SECT. VIII. *Of the Rise, Progress, and present State of Gardening in Russia.*

829. *The history of gardening in Russia* is very different from that of the art in any of those countries which have yet come under review. Peter the Great sought, by one gigantic stride, to raise the character of his nation to a level with that of other countries; and, by extraordinary efforts, introduced excessive refinement amid excessive barbarism. He assembled magnificent piles of architecture in a marsh; and created the most sumptuous palaces and extensive parks and gardens, in the bleak pine and birch forests which surrounded it. As a man of Cronstadt rhymes,

"He built a city in a bog,
And made a Christian of a hog."

Nothing can be more extraordinary, in the way of gardening, than the well-known facts, that a century ago there was scarcely such a thing, in any part of Russia, as a garden; and, for the last fifty years, there have been more pine-apples grown in the neighbourhood of Petersburg than round any other town on the Continent.

SUBJECT. 1. *Russian Gardening, as an Art of Design and Taste.*

830. *Russian gardening, as an art of design*, began, like every other art in Russia, with Peter the Great. This emperor's first effort was made in 1714, when the garden of the summer palace, on the banks of the Neva, in Petersburg, was laid out in the Dutch taste. But the grandest and most superb garden, in the geometric manner, is that which he constructed soon afterwards, about thirty wersts from the city, on the shores of the gulf. This imperial residence, as far as respects the gardens, has been justly called the Versailles of Russia; and the Prince de Ligne, an excellent judge, gives the preference to its water-works. The whole was originally designed and laid out by Le Blond, a pupil of Le Nôtre, and for some time court architect of St. Petersburg. This, with the other suburban palaces and gardens, have been minutely described by Georgi, and more generally and eloquently by Storch. Some of them are also described in detail in the *Gardener's Magazine*. From all these sources, and our own observation in 1813 and 1814, we shall arrange our notices of Russian gardens, under the heads of Petersburg, Moscow, and the Crimea.

Division i. *Gardening, as an Art of Design and Taste, in the Neighbourhood of Petersburg.*

831. *Peterhoff*, in respect to situation, is perhaps unrivalled. About five hundred fathoms from the sea-shore this region has a second cliff, almost perpendicular, near twelve fathoms high. Bordering on this precipice stands the palace, thereby acquiring a certain peculiar prospect over the gardens and the gulf, to the shores of Carelia and Petersburg, and to Cronstadt. It was built in the reign of Peter the Great, by the architect Le Blond, but has received, under the succeeding monarchs, such a variety of improvements, that it has become a sort of specimen of the several tastes that prevailed in each of these eras, the influence whereof is visible in the numerous architectural ornaments, which are all highly gilt. The inside is correspondent with the destination of this palace; throughout are perceptible the remains of antiquated splendour, to which is contrasted the better taste of modern times. The gardens are more interesting by their peculiar beauties. The upper parts of them, before the land-side of the palace, are disposed into walks, plantations, and parterres, which acquire additional elegance by a large basin and canal, plentifully furnished with fountains of various designs and forms. The declivity from the back-front of the palace towards the sea has two magnificent cascades, rolling their streams over the terraces into large basins, and beneath which the visitor may walk as under a vault, without receiving wet, into a beautiful grotto. The whole space in front of this declivity, down to the sea-shore, is one large stately garden, in the old-fashioned style, and is famous for its jets d'eau and artificial water-works. Some of them throw up columns of water, a foot and a half in diameter, to a height of two and a half or three fathoms. A pellucid canal, lined with stone, and ten fathoms wide, running from the centre of the palace façade into the Gulf of Finland, divides these gardens in two. In a solitary wood stands the summer-house, called *Mon-Plaisir*, which among other things is remarkable for its elegant kitchen, wherein the empress Elizabeth occasionally amused herself in dressing her own dinner. In another portion of the gardens, close to the shore of the gulf, stands a neat wooden building, formerly a favourite retreat of Peter the Great, as he could there have a view of Cronstadt and the fleet. The bath, situated in the midst of a thicket, is likewise worthy of

observation. We enter a large oval space, enclosed by a wooden wall, without a covering at top, and open to the sky, but shaded by the surrounding trees. In this wall are chambers and recesses furnished with all that convenience and luxury can require for bathing. In the centre of the area is a large basin, surrounded by a gallery, and provided with steps, rafts, and gondolas: the water is conducted thither by pipes, which fill the basin only to a certain height. These gardens still exist, and the waterworks are kept in tolerable repair. There is adjoining a small specimen of English gardening, laid out by Meander, once gardener at Syon House, Middlesex, and who is author of *The Planter's Guide*. Dr. Granville, speaking of these waterworks, in 1829, says, "that, for number, extent, and playfulness, as well as for variety of design, they are superior to those of Versailles." (*Travels*, &c. p. 510.)

832. *The palace at Petersburg called the Hermitage* was set apart by Catherine II. for the enjoyments of social life. Ascending a flight of stairs, says Elliott, "we were conducted into a spacious apartment, one door of which leads to a conservatory of trees called the winter garden; beyond which is another, called the summer garden, 400 feet in length, formed of soil elevated on masonry, to a height of more than forty feet. This artificial garden must have been the result of prodigious labour; but in Petersburg all public works are on a scale of magnificence that fills a stranger with astonishment." (*Elliott's Letters*, &c., p. 288.)

833. *The gardens of the palace of the Hermitage*. Dr. Granville describes the winter garden as a large quadrangular conservatory, planted with laurels and orange trees, among which, in former times, linnets and canary birds were allowed to fly about at perfect liberty. But the feathered tribe have disappeared from this formerly enchanting spot, which is now reduced to a simple orangery. The summer garden, he says, connected with it, and having the form of a parallelogram, is about 392 feet long, divided into numerous parterres, and entirely composed of artificial soil raised forty-two feet above the surrounding ground. This pensile garden forms, certainly, not the least interesting of the curiosities of the Hermitage. "The period of my visit to Petersburg," continues Dr. Granville, "precluded the possibility of my seeing it in its brilliant state; but an English traveller, who had an opportunity of enjoying and contemplating its beauties, speaks of them in the following animated strain: — 'Here, suspended as it were in the air, the visiter, to his amazement, treads on gravel walks; sees the green turf vivid around him, and finds shrubs, and even trees, growing in luxuriance, under the shelter of which he may take refuge on a couch, and contemplate the execution and fair proportions of some favourite statues, several of which are to be found in the garden. The novelty of the whole scene, and the recollection where it is situated, — not on the ground, but on or near the top of a palace, — added to the overpowering influence of the boundless riches of nature and art which I had just examined, produced an effect which for some time kept me tongue-tied, and induced an opinion that the wonders of the Hermitage alone are almost worth a journey to Petersburg.'" (*Travels in Russia*, &c.)

834. *The Palais Michel*, by M. Rossi, is built on a spot which was formerly a morass. By the elevation of one of the finest buildings of the present day, the distribution and arrangement of a garden and pleasure-grounds behind it, and the formation of a large square in the front, planted in the centre, in the English style, and flanked with handsome private mansions on three of its sides, together with the opening of new and fine streets leading to it, that eminent architect has given to this part of the city a grandeur which at once strikes the stranger, and in a particular manner arrests his attention. (*Granville's Travels in Russia*, &c., p. 566.)

835. *The first attempt at the modern style of gardening in Russia* was made by Catherine II., about the year 1768, at Zarskojeselo, or Tsarsco Celo (imperial spot), at that time enlarged and relaid out. This princely residence owes its origin to Catherine I., and its enlargement and embellishment to Elizabeth; but it is indebted for its completion, in its present state, to Catherine II. The gorgeous magnificence of this residence is well known. A natural birch forest, on ground somewhat varied, forms the groundwork of the park and gardens. The gate by which they are approached is an immense arch of artificial rockwork, over which is a lofty Chinese watchtower. The first group of objects is a Chinese town, through which the approach leads to the palace; a building which, with its enclosed entrance court, offices, baths, conservatories, church, theatre, and other appendages, it would seem like exaggeration to describe. The rest of the garden scenery consists of walks, numerous garden buildings, columns, statues, &c.; with bridges of marble and wood, a large lake, and extensive kitchen-gardens and hot-houses.

836. *The gardens are laid out in the English manner*; Catherine II. having imbibed that taste from reading a work written by the Count Munchausen, called the *Hauswater*. She first ordered that no more trees should be clipped in any of the imperial gardens, and afterwards told her architect and gardener, that in future, when making gardens, they

should endeavour to follow nature; but this they could neither feel nor comprehend. They made various attempts to please the empress, but always without success. She did not know how to direct them exactly what they ought to do, yet she felt convinced that what they had done was not right. At length, finding that she could have nothing that pleased her, she determined to get a landscape-gardener from England to lay out her garden. John Busch of Hackney was the person engaged to go out to Russia for this purpose; and he was preferred, on account of his speaking the German language. In the year 1771, he gave up his establishment at Hackney, with the nursery and foreign correspondence, to Messrs. Loddiges. In the year 1772 he commenced his first work, though not at Tzarsoo Celo, but on a hill about five miles nearer the town, called Pulkova. In 1774 the empress paid her first visit to this place. On entering the garden, and seeing a winding shady gravel walk planted on both sides, she appeared struck with surprise, and exclaimed, "This is what I wanted!" This walk led to a fine lawn, with gravel walks round it, which seemed to strike her still more forcibly, and she again said, "This is what I have long wished to have!" The following year the Tzarsoo Celo gardens were given to the charge of John Busch, who carried on the improvements till the year 1789, when he left the service of the empress, and returned to England. His son, Joseph Busch, succeeded him, and went on with the works; but the garden was not completely finished during the reign of Catherine. The emperor Paul, who succeeded Catherine, preferred straight walks and clipped trees, and the late emperor Alexander was fond of both styles. Clipped trees are still partially continued at Tzarsoo Celo, and other places. Carriage roads being introduced, intersecting the walks, make the gardens rather unpleasant to walk in, as one must always be on the look-out, in case of a carriage coming. Hence these gardens have become a park in a pleasure-ground, and not, as is usual, a pleasure-ground surrounded by a park. There are a variety of good buildings in the gardens, particularly some designed and built by Charles Cameron, and a new front to a part of the palace (*fig. 177.*) by Guarini. The em-

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peror Alexander enlarged these gardens considerably, and continued, in a mixed style of old and modern art, to add to and improve them, till his death. In the park, he built a dairy, which the imperial family often visited during their residence at Tzarsoo Celo, and also two gates, with lodges in the Gothic style. These and other buildings, with the new roads and other improvements that have been made, have added much to the beauty of the place since we saw it in 1813. In the gardens, which are about four miles in circumference, the keeping is equal, if not superior, to any in Europe; no expense being spared to have every thing in the best possible order. The improvements made by Alexander were executed by an architect who succeeded Mr. Busch in that department. (*Gard. Mag.*, vol. ii. p. 386.) Among the curiosities of this garden that admit of a description, the following objects may principally be recorded:—A small temple, containing a collection of antique and modern statues; a solitude for dinner parties, like that in the Hermitage; a magnificent bath; a coach-hill, similar to that at Oranienbaum; picturesque ruins; a miniature town, to commemorate the taking of Taurida, &c. Two artificial lakes are connected by a running stream, crossed by an arched bridge, covered at the top by a roof resting on two rows of marble columns, on the model of the bridge at Stowe. On one of the islands on these lakes stands a Turkish mosque, and on another a spacious hall for musical entertainments. In a thick shrubbery there is a pyramid in the Egyptian form, in the vicinity whereof are two obelisks.

837. *This majestic sanctuary of art and nature*, says Storch, is at the same time a magnificent temple of merit. Formed of the rocky foundations of the earth, here the monuments of great achievements tower toward the skies, fearless of the destructive vicissitudes of time. A marble obelisk reminds us of the victory near Kagul, and of the victor Romanzoff Zadunaisky. To the Dey of Tschesmi, and the hero Orlof Tschesmenskoy, a marble column on a pedestal of granite is devoted. A grand triumphal arch proclaims the patriotic ardour of Prince Orlof, with which he faced rebellion and the plague in the capital, and quelled them both. The victory in the Morea and the name of Feodor Orlof are handed down to posterity by a rostral column. Plain and gigantic as the sentiments of the heroes whose memories are perpetuated in these masses of rocks, they stand surrounded by the charms of Nature, who softens her majesty by a veil of artless graces.

838. *The palace of Tzarsoo Celo*, Alexander observes, in 1829, "has had immense sums expended in beautifying it by Catherine and Alexander: the agate, amber, and lapis

lazuli rooms have not their equal any where; the floors are inlaid with the most costly exotic woods; and the chapel is so resplendent with richly gilt carved work on a black ground, that it is impossible to conceive that any thing of the kind can surpass it. The Russians carefully preserve the clothes of their sovereigns; and here, in the bedroom of Alexander, are the gloves, cocked hat, and boots, which he left before his death at Taganrog. The grounds of Tsarsco Celo are of great extent, and are diversified with artificial hills and crags, groves of trees, streams, lakes, and grottoes. A curious Chinese theatre has been recently erected in the park; and the farm-yard contains cattle from all parts of the world: an English bull that we saw there was eighteen hands high." (*Travels in Russia, &c.*, p. 57.)

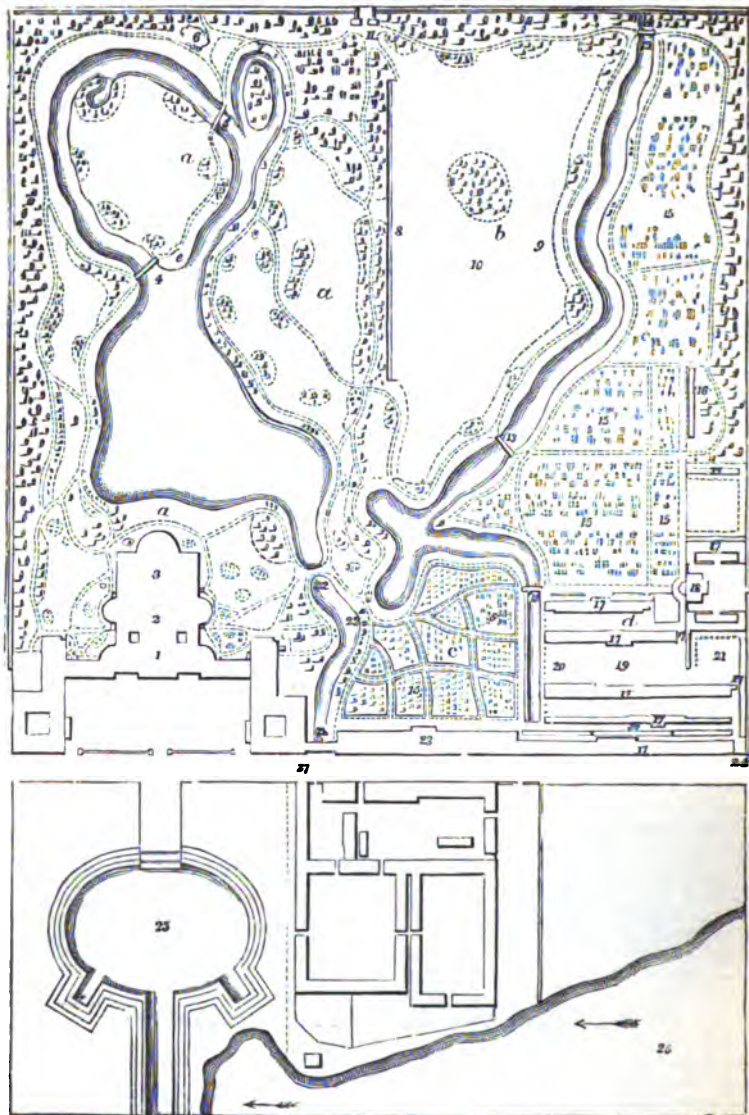
839. *Paulowsky* presents the best specimen of the English style, in the neighbourhood of the Russian capital, or indeed in the empire. It was begun during the reign of Catherine, in 1780, from a design said to have been furnished by the celebrated Brown, from a description sent him by Gould, an Englishman, the gardener of Potemkin; and finished afterwards, during the reign of Paul. This place possesses considerable variety of surface, and a varied clothing of wood; the Scotch pine and aspen being natural to these grounds, as well as the birch. Near the palace there is a profusion of exotics of every description, including a numerous collection of standard roses, which, with some of the American shrubs, require to be protected with straw and mats during winter. The Chevalier Storch has given a very interesting description of these gardens, in his *Briefe über Paulowsky, &c.*, 1802. *Paulowsky*, says Alexander, in 1829, "is quite an Elysian retreat. The grounds present an undulating surface, diversified with lakes, rich foliage, and ornamental buildings, containing statues and cenotaphs. The numismatic collection, in the library, is very curious; also a set of porcelain, presented by Marie Antoinette. The private apartments of Paul contain original drawings by Alexander and Nicholas, with specimens, in ivory, of the skilful turnings of the empress, before whose windows were most charming gardens and flower-beds, filling the apartments with an aromatic perfume." (*Travels in Russia, &c.*, p. 57.)

840. *The gardens of Potemkin*, a man whose mind, as the Prince de Ligne has observed, contained mines of gold and steppes, and who was one of the most extravagant encouragers of our art that modern times can boast, were of various kinds, and situated in different parts of the empire. The most extensive gardens of this prince were in the Ukraine; but the most celebrated were those belonging to the palace of Taurida, now an imperial residence, in Petersburg. The grounds are level, with several winding and straight canals and walks, adorned with numerous buildings, a rich collection of exotics, and most extensive hot-houses of every description. Their grand feature, in Potemkin's time, was the conservatory, or winter garden (*fig. 178.*), attached to the palace. The plan of this



part of the building is that of a semicircle, embracing the end of a saloon, nearly 300 feet long. It is lighted by immense windows, between columns, has an opaque ceiling, and is at present heated by common German stoves. It is too gloomy for the growth of plants; but those grown in the glass sheds of the kitchen-garden are carried there, sunk in the ground, and gravel walks, turf, and every article added, to render the allusion to a romantic scene in the open air as complete as possible. The effect was, after all, it is said, never satisfactory but when illuminated. This palace, the original exterior of which was in a very simple style, and the interior most magnificent, is said to have been the design of Potemkin, but it was entirely remodelled at his death by Catherine, used as barracks by Paul, and is now very imperfectly restored. (*Edin. Encyc. art. Landscap Gardening.*)

841. *This winter garden, or conservatory*, so much spoken of, is thus described by Storch:—"Along one side of the vestibule is the winter garden, an enormous structure, disposed into a garden, only separated from the grand hall by a colonnade. As, from the size of the roof, it could not be supported without pillars, they are disguised under



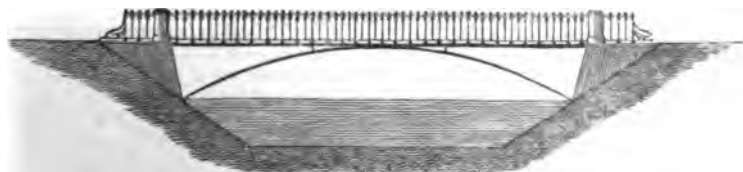
1. Palace.
2. Great hall.
3. Winter garden or conservatory.
- 4, 5. Iron bridges in the pleasure-ground (*Ages 180. and 181.*)
6. Boat-house.
7. Entrance of the water by the conduit.
8. Small canal separating the pleasure-ground from the park.
9. Fence separating part of the park from the pleasure-ground.
10. Park.
11. Entrance of the park.
- 12, 13. Sunk fence which surrounds the garden, park, and nursery.
14. Wooden bridge.
15. Entrance of the water into the winding canal, which separates the nursery from the park and pleasure-grounds.
16. Cherry shed.
17. Green-houses and gardener's house, forcing, and flower-houses.
18. Gardener's house and yard.
19. Melon and pine pits.
20. Iron palisading separating the forcing garden from the nursery.
21. Yard for receiving rubbish, and open shed for garden lights, &c.
22. Cascades.
23. Large orangery.
24. Back entrance to the forcing-houses from the street.
25. Basin of water connected with the river.
26. River Nera.
27. Streets surrounding the garden.
28. Small rivulet which carries off the water from both cascades into the river.
29. Iron bridge over the winding canal in the nursery.
30. Dry ditch.

(*Gard. Mag.*, vol. II. p. 387—380.)

the form of palm trees. The heat is maintained by concealed flues placed in the walls and pillars, and even under the earth leaden pipes are arranged, incessantly filled with boiling water. The walks of this garden meander amidst flowery hedges, and fruit-bearing shrubs, winding over little hills, and producing, at every step, fresh occasions for surprise. The eye of the beholder, when weary of the luxuriant variety of the vegetable world, finds recreation in contemplating some exquisite production of art: here a head, from the chisel of a Grecian sculptor, invites to admiration; there a motley collection of curious fish, in crystal vases, suddenly fixes our attention. We presently quit these objects, in order to go into a grotto of looking-glass, which gives a multiplied reflection of all these wonders, or to indulge our astonishment at the most extraordinary mixture of colours in the faces of an obelisk of mirrors. The genial warmth, the fragrance and brilliant colours of the nobler plants, and the voluptuous stillness that prevails in this enchanted spot, lull the fancy into sweet romantic dreams; we imagine ourselves in the blooming groves of Italy; while nature, sunk into a deathlike torpor, announces the severity of a northern winter through the windows of the pavilion. In the centre of this bold creation, on a lofty pedestal, stood the statue of Catherine II., surrounded by the emblems of legislation, cut in Carrara marble. It was thrown out of the building on its being made into barracks."

842. *The gardens at Potemkin's other residences*, as well as many imperial and private gardens in Russia, were laid out by Gould, a pupil of Brown. Sir John Carr relates an anecdote on Gould's authority, which was confirmed to us, in 1813, by the present gardener, Call, his successor, and deserves a place here. "In one of the prince's journeys to the Ukraine, Gould attended him with several hundred assistants, destined for operators, in laying out the grounds of Potemkin's residence in the Crimea. Wherever the prince halted, if only for a day, his travelling pavilion was erected, and surrounded by a garden in the English taste, composed of trees and shrubs, divided by gravel walks, and ornamented with seats and statues, all carried forward with the cavalcade." On another occasion, "having accidentally discovered the ruins of a castle of Charles XII. of Sweden, he immediately not only caused it to be repaired, but surrounded by gardens in the English taste." (*Carr's Baltic, &c.*)

843. *A plan of the gardens of Taurida*, as taken in 1827 (*fig. 179.*), shows their extent to be nearly sixty acres. The natural surface of the ground was flat, and, in many parts, a bog; other parts were occupied as kitchen-gardens and artillery magazines; there were also many private buildings, all of which were cleared away for the purpose of making this garden, which was begun by Prince Potemkin in the year 1780, and finished by the same prince. Afterwards it fell to the crown, and was a favourite retreat of Catherine II., particularly in spring, before her imperial majesty went to her summer palace Tzarsoo Celu, and likewise in the autumn, when the weather rendered it disagreeable to be so far from town. The garden was planned and superintended by William Gould, from Lancashire, who displayed great judgment in forming the ponds, out of which he got sufficient materials to make an agreeable variety of swells and declivities. The ponds are well supplied with water, which is brought upwards of twenty miles in a small canal, cut by Peter I., to supply the fountains in the summer garden of Petersburg. The gardens of Taurida being adjacent to a large reservoir, a conduit was cut from it to supply the ponds and cascades, after which the water falls into a small rivulet, which forms the main body of water seen from the palace, and thence round the park, which is bounded on one side by a fence of *chevaux de frise*, and on the other side by a winding canal, which separates the reserve-grounds from the pleasure-garden. Over the canal are bridges, leading to the nursery and forcing-garden. Some of these (*figs. 180.*



and 181.) are of cast iron, decorated with gilt ornaments, and are considered handsome. The hot-houses are of great extent, and contain pines, vines, peaches, apricots, plums,



cherries, and figs; there are also flower-houses, and a large orangery, with melon, water-melon, and pine pits. The nursery or reserve-ground contains such flowering shrubs as will bear the climate, as *Cytisus supinus*, *Sambucus racemosa*, *Genista tinctoria*, *Potentilla fruticosa*, *Syringa vulgaris*, *Caragana arborescens*, &c., *Crataegus coccinea*, *Cotoneaster vulgaris*, *Hippophae rhamnoides*, *Lonicera tatarica*, *Cornus alba*, and various species of *Spiræa*.

844. *Villas in the neighbourhood of Petersburg.* The Strelna road lies to the north of the capital; and an uninterrupted line of sumptuous palaces, built in every variety of chaste, fanciful, and imitative architecture, flanks the right side of it, while, on the left, fields, with many clumps of trees and brushwood, separate it from the Gulf. Most of the country residences belonging to the nobility and gentry of Petersburg have gardens and pleasure-grounds in front of and around them; and some few have a piece of artificial water, or a branch of the Neva, passing through the grounds. Many are large, consisting of two and three stories; a few only have one story; and affect the form of the Italian villa. The prevailing colour with which the houses are painted is yellow; the columns, pilasters, and architraves being white, and the roof of a copperas green. In front of the gardens, and immediately on the border of the road, a lofty post bears inscribed on a small square board the name and rank of the proprietor. The magnificent house of Count Scheremetow, with a church annexed to it, containing a small but rich chapel, open all day to such as are devoutly inclined, much in the style of the oratories or sanctuaries to be found in catholic countries; the villa of the late Mons. Narischkin; and the palace of Prince Sherbatov, which has, however, the disadvantage of being too near the road, Dr. Granville observes, were among those objects which most attracted his attention. This line of villas and châteaux, to which some of the most distinguished families resident in the capital come to seek a retreat during the heat of a short-lived summer, is here and there interrupted by a small village, having the appearance of greatness, in which country lodgings and temporary residences are sought by the less wealthy or more humble class of citizens, during the fine season. On the left, the distance at every vest is marked on very high marble obelisks, which serve, at the same time, as an embellishment to the road. (*Granville's Travels in Russia*, &c., vol. ii. p. 412.)

Division ii. *Gardening in the Neighbourhood of Moscow, as an Art of Design and Taste.*

845. *At Petrowka*, near Moscow, is the principal private ancient garden in Russia. The hedges and alleys are chiefly formed of spruce fir, which are shorn, and seem to flourish under the shears. It contains also a labyrinth, and a turf amphitheatre, in which the proprietor, Count Razumowsky, has had operas performed by his domestic slaves.

846. *The most extensive seats laid out in the modern style*, in the neighbourhood of Moscow, are those of Gorenki, a seat of Count Alexy Razumowsky (*fig. 182.*), and

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Petrowka, a seat of Petrowsky Razumowsky. The former is remarkable for its botanical riches, and an immense quantity of glass. The grounds are of great extent, but the surface is flat, and the soil a dry sand. A natural forest of birch and wild cherry trees clothes the park, and harmonises the artificial scenes. The mansion, built by an English artisan, is highly elegant; and the attached conservatories and stoves, and decorated lawn, form a splendid and delightful scene, unequalled in Russia.

847. *Petrowka* contains both an ancient garden, already referred to, and a large extent of ground laid out in the modern style, and adorned with buildings from designs by Signor Camporezi. There is some variety of surface, abundance of birch and fir woods, with some oaks and aspens interspersed, and a large piece of water. Among the orna-

mental buildings is a cotton manufactory, in actual use as such. The practice of introducing manufactories as garden buildings is very general in Russia, and almost peculiar to that country.

848. *Petrovskoyé*, the village and country seat of Prince Dolgoruky, is one of the most magnificent villas, in respect to gardens, in the neighbourhood of Moscow. It is situated on a flat surface, somewhat diversified by natural woods and artificial lakes. The mansion-house is not large, and, though neat enough, and embellished with columns, is not at all remarkable for its architecture. Its appearance is much disfigured by the contiguity of a number of sombre wooden and brick houses, which, however, is quite *à la mode Russe*; for close to almost every nobleman's dwelling in the country is found a village of peasants. The view of the back façade is by far the most attractive, because it is opposite the gardens. The interior is elegantly fitted up, and the inner apartments open into a finely arranged but small flower-garden, enclosed by a double balustrade. It may be remarked, *en passant*, that the Russians show their well known taste for masses of gaudy and splendid colours, even in their gardens. Every where, about Moscow, as well as in the city, and in the interior of Russia, are immense clusters of roses, pæonies, poppies, hollyhocks, sweetwilliams, tulips, jonquils, lilies, pinks, carnations, larkspurs, columbines, Indian cresses, sunflowers, marigolds, hyacinths, bell-flowers, &c., intermixed at times with other flowers of less vivid colours, or arranged in parterres, and frequently disposed with considerable effect. The gravel walks at Petrovskoyé are made in the English style; they are very broad, and are kept in excellent order. They wind, to a great extent, by the banks of a large and beautiful lake (*fig. 183.*), which encircles

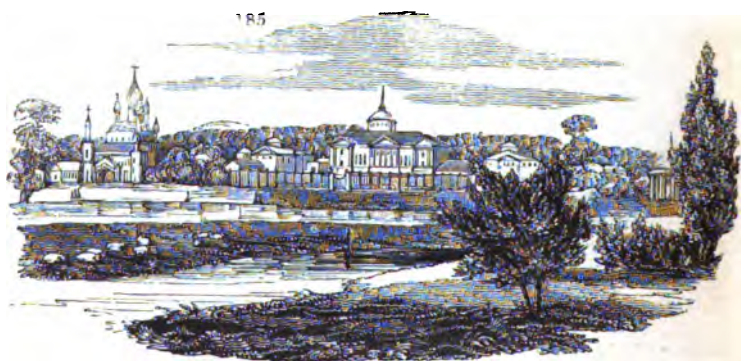


a number of islands and bears a small fleet of boats on its bosom, as well as through lawns and woods of luxuriant foliage. Temples, summer-houses, statues, vases, and fine orangeries, diversify the scenery. In another part of the grounds cropped trees and avenues of fantastic figures display the complete triumph of art over nature, and afford an example, the most complete in the neighbourhood of Moscow, of the geometric style of gardening. The Petrovskoyé gardens at times are open to the public, particularly on Sundays; and the visitors there enjoy fine promenades, which are often enlivened by music. The estate has now most likely passed for ever from the Razumowsky family; Prince Dolgoruky having paid 300,000 rubles for his purchase; a very large sum of money in the Northern Empire. (*Blackwood's Magazine.*)

849. *Pekra*, the country residence of the Prince M. P. Galitzin (*fig. 184.*), is situated a few miles to the south of Moscow, on an elevated sandy bank, on the margin of a small lake. The house, for a Russian country seat, may be considered small; but the church is large, and forms with the house very picturesque combinations from different points of view. At a short distance is a village, reckoned at present (1825) one of the handsomest in Russia: it consists of a street of cottages and gardens detached, and highly ornamented. The gable ends of the cottages are the chief places where ornament is displayed. The roof projects over them, and suspended from the eaves are figures of the sun, moon, stars, wheels, double eagles, wolves, human faces, &c., all carved in wood, and with no other instrument than the axe. The chief ornament in front is a porch, and sometimes a rustic veranda. The walls are built of logs, and the roof covered with shingles. The interior is one room with a stove, sometimes in the end, but more commonly at one side, opposite the door. (*Gard. Mag.*, vol. ii. p. 89.)



850. *Astanawa*, the seat of Count Scheremetow, is situated three versts from the exterior barrier of Moscow, on the Smolensko road. The grounds are low and flat, and wholly covered with natural forest, chiefly of birch, bird-cherry, and black poplar; and the house and its scenery (*fig. 185.*) may be described as situated on the margin of this



forest. A part of the natural woods and glades is enclosed, traversed by walks, and kept dressed as pleasure-grounds. Its ornaments are a few vases and statues, a temple, and some exotic shrubs: the latter, being sheltered by the natural wood, thrive much better than could be expected from the climate. Rustic buildings are not considered pleasure-ground ornaments in Russia, because they approach too near to the common hovels of the peasantry, which are all built of logs, and some of them very curiously ornamented at the gable ends. In the kitchen-garden there are peach-houses and vineries, which, when we saw them (April 23. 1814), were under the care of a Scotch gardener. Both peaches and grapes were set, and some of the former were stoning. The soil of the garden is a dry sand, and, being favourable for early crops, peas, beans, potatoes, and radishes were in an advanced state; but they required to be covered every night with spruce fir branches, on account of the frost: indeed, there are no early crops in the neighbourhood of Moscow that do not require a great deal of protection; but the materials are abundant, and labour cheap. A foreign gardener may have as many Russian labourers under him as he chooses; though these being generally slaves who work so many days in the year for their cottage and a few acres of land, it requires three or more of them to do the work of a single Briton. It is but doing them justice to state, however, that a little extra pay, and occasional presents or indulgences, have a most sensible effect upon them; and, being docile and imitative, they sometimes make very neat workmen. One circumstance in their favour, it may be interesting to British gardeners to know, viz., that they are perfectly good-hearted, and retaliation in any form,

and much less murder or robbery, are scarcely ever heard of among them, from the one end of the empire to the other. The church or chapel here, on the left (in *fig.* 185.), is of that peculiar architecture which may be called the Russian ecclesiastical style: it is covered with minarets and crosses exteriorly, and with pictures of saints within; and is open every day in the year, from early in the morning till sunset, for the use of the family and their numerous domestics. Service is performed by the priest at stated periods, without regard to the attendance of any one; and any person goes in and says his prayers, without regard to the hours when the priest attends. Like most of the houses in and about Moscow, the mansion of Astankina was built in a great hurry a few years previous to 1814, when we saw it, and it was then showing symptoms of decay.

851. *Kuskovo, near Moscow*, is a country residence belonging to Count Dmitry Nikolaivitch, about eight versts (six miles) to the south-east of Moscow. The mansion has an extensive front, terminating at one extremity in a church, and at the other in an immense group of log-houses, used as outer offices, and as lodgings for peasants. In front is a court, enclosed by an iron palisade; beyond this there is a hollow, across which a bank has been thrown up to retain a few acres of water. The bank, however, is placed in the most conspicuous point of view, and spoils the effect by showing the naked hollow on one hand, and the raised dam of water on the other. The garden front of the house looks into a natural forest, part of which has been cleared away; and the ground, after being smoothed, has been interspersed with walks and ornamental objects, and kept as pleasure-ground. In the same natural wood is the kitchen-garden, walled round, with an extensive range of hot-houses, narrow, and with steep sloping roofs in the English manner. In them are grown, to a considerable degree of perfection, all the fruits to be found in the hot-houses of England. These gardens and pleasure-grounds are now (1890) under the direction of a Scotch gardener. The park of Kuskovo consists of a part of the natural forest, and contains many wild animals, including wolves. It has some fish-ponds; and a small yacht, armed with cannon, and surrounded by various small sailing and rowing boats, rides constantly in the lake formed by the dam already mentioned. On Sundays and festivals there is a promenade, at which are generally present the most distinguished nobles, merchants, and common people of Moscow.

852. *Petrowsky, near Moscow* (*fig.* 186.), is one of those imperial palaces which are



not surrounded by gardens. It is, properly speaking, a house for the emperor to halt at, before entering Moscow from the Petersburg road. It is in a singular style of architecture; and, as a foreground to the city, has a most imposing, and at the same time harmonious, appearance. It was built during the sway of Potemkin, by the same architect who designed Tzaritzina. (*Gard. Mag.*, vol. vii. p. 661.)

853. *The villa of the Princess Dashkoff*, about three or four versts from Moscow, was visited in 1829 by Captain Alexander, who describes the princess as living in the midst of beautiful gardens which she has planted and laid out with wonderful taste. Originally, the ground was flat and swampy; but she drained it, gave it an undulating surface, and in different situations raised mounds crowned with temples, from which are rich views of Moscow, with its glittering domes, and of the surrounding country. The skill the princess has displayed in the arrangement of the trees, so as to set off the different shades of foliage, and to produce the most agreeable contrasts, is quite unique, and shows excellent management. A piece of water winds through the gardens, by the side of which are shady walks and seats. (*Travels in Russia*, &c.)

854. *A general idea of a modern Russian villa* is easily given. It is a white square building, in the Italian modification of the Grecian style, with a copper roof, painted green. Near it are a number of miserable-looking log-houses as offices, and also a church in the same style of architecture as the house, and, like it, painted green. In

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1813 we took a sketch (*fig. 187.*) of the handsomest small villa of this sort which we met with on the roadside between Petersburg and Brody. The cottages in some parts

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of this road, and even the post-houses (*fig. 188.*), are as wretched as can well be conceived. The feelings of satisfaction with which the traveller, who has been passing for days together through a country without entering any better human dwellings than

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these, hails the appearance of a large town, such, for example, as that of Kiow (*fig. 189.*), may be more easily conceived than described.

855. *Among other gardens near Moscow* may be mentioned those of Count Alexy Razumowsky, and of Paschow, in Moscow; of Tzaritzina (*fig. 190.*), a singular Turkish

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palace, built by Potemkin for Catherine; and various others, which would well bear description. In general, extent, exotics, and magnificent artificial decorations are more the objects of the modern style in Russia, than scenes merely of picturesque beauty. We think this may be accounted for, partly from the general want of refinement of taste in that country, and partly from its inaptitude for the natural style. The nobles of Russia, suddenly rendered aware of being distanced, in point of civilisation, by those of most other European countries, are resolved not merely to imitate, but even to surpass them in the display of wealth. The most obvious marks of distinction, in refined countries, are necessarily first singled out by rude and ambitious minds, and large magnificent houses and gardens are desired, rather than comfortable and elegant apartments, and beautiful or picturesque scenes; since, as every one knows, it is much more easy to display riches than to possess taste; to strike by what is grand, than to charm by what is beautiful.

856. *Sophiowski*, in Podolia, is a magnificent residence of the Countess Pototcki, laid out by a Polish architect, Mitzel, in the manner of Switzer. It has a magnificent terrace or promenade, and extensive avenues, conservatories, and gardens.

Division iii. *Gardening as an Art of Design and Taste in the Crimea.*

857. *Buckteserai*, the Palatium of Strabo, is seated in a narrow valley, through which runs the stream of the Pchuruksu. Flat-roofed and tile-covered houses are built in the bottom of the valley, and up the sides of the hills: in the midst of them is a most interesting object, viz., the Tartar palace. In some places the limestone rocks overhang the houses in a threatening attitude, and amongst them are gardens filled with fruit trees, over which rises the tall and graceful poplar.

858. *The palace*, Alexander found, in 1829, in a state of decay. The apartments of the seraglio were painted with borders of flowers, and fitted up with curious inlaid presses for female attire, and the requisites for the toilette; beneath them were cool halls for the summer heats, in which marble fountains continually played; but the falling water had a melancholy sound in the deserted chambers. The gardens were latticed, and neatly laid out in parterres of flowers, with trelliswork for vines. The other apartments of the palace consisted of halls of audience, and sleeping apartments for the attendants. The former were lofty, with lancet windows, filled with stained glass, high moresque chimney-pieces, mirrors with gilt frames, glass cases filled with artificial flowers, landscapes and hunting scenes painted on the cornices, and divans covered with brocade. Taken as a whole, the palace of Buckteserai is a most interesting specimen of Tartar magnificence, and a most desirable residence. No Russians are allowed to inhabit the town; and, in fact, the Crimea in general may be said to be given up to the Tartars and their goats. (*Travels in the Crimea*, vol. ii. p. 255.)

859. *Symphheropol*, the capital of the Crimea, is surrounded by green hills, valleys with clear streams, and banks adorned with gardens and Lombardy poplars: the houses are white; and there are numerous mosques. The country residence of the Narishkins is about a verst from town, in the vale of the Saljir, and is surrounded by a delightful garden. The house is large, and is built in the Oriental style, with verandas. (*Ibid.*)

860. *Spasho* is the country residence of Admiral Greig, near Nicholaef, in the Crimea. Here, by planting fruits and ornamental trees, the arid Scythian steppe has been changed into a beautiful garden. Though the soil of the steppe is covered with verdure, it is not of sufficient depth to bear trees; so that, in planting, a deep hole is required first to be dug in the calcareous rock, and then filled in with vegetable mould. (*Ibid.*)

Division iv. *Public Gardens in Russia.*

861. *Around Petersburg and Moscow are several public gardens, and various private ones*, which their owners, with great liberality, convert into places of public entertainment, to which all people of decent appearance are at liberty to come. The country seats of the two brothers Narishkin deserve our particular notice, as being frequented on Sundays by great numbers of the higher classes. A friendly invitation, in four different languages, inscribed over the entrance to the grounds, authorises every one, of decent appearance and behaviour, to amuse himself there in whatever way he pleases, without fear of molestation. In several pavilions are musicians, for the benefit of those who choose to dance; in others are chairs and sofas, ready for the reception of any who wish to recreate themselves by sedate conversation after roaming about with the great throng: some parties take to the swings, the bowling-green, and other diversions: on the canals and lakes are gondolas, some constructed for rowing, others for sailing; and, if this be not enough, refreshments are spread on tables, in particular alcoves, and are handed about by persons in livery. This noble hospitality is by no means unenjoyed; the concourse of persons of all descriptions, from the star and riband to the plain well-dressed burgher, forms such a party-coloured collection, and sometimes groups are so humourously contrasted, that for this reason alone it is well worth the pains of partaking once in the amusement. (*Storch's Petersburg*, p. 441.)

862. *The summer gardens of Petersburg.* The walks are extensive, and said to be well shaded and beautiful. "What, however, excited my attention most," says Dr. Granville, "at a season when all nature's attractions were laid under three feet of snow, was the railing in front of the gardens, acknowledged to be the most magnificent in Europe. It is formed by thirty-six massive Doric pillars of solid granite, surmounted alternately by an urn and a vase, measuring altogether from the ground, upwards of seventy feet. These are connected by an airy and tasteful railing, formed with spears of wrought iron, tipped with the richest gilding. Three entrances interrupt the line with gates, which are closed at night, likewise made of wrought iron, beautifully decorated and worked with foliage and scrolls, covered with gold. The extent of the railing, which is raised on a dwarf stylobate of granite, is about 700 feet." (*Travels in Russia.*)

863. *Cemeteries.* "That of Petersburg presents a more striking display of architectural taste, pure, inventive, and refined, than is elsewhere to be found." (*Ibid.* vol. ii. p. 195.) There is a cemetery, at a short distance from Moscow, situated in a glade, in a birch forest, with numerous tombstones in the shape of sarcophagi. At Kiow there is one cemetery

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on the banks of the Dneiper (*fig. 191.*); and another (*fig. 192.*) near the column of St. Vladimir, erected by Alexander, on the spot where the saint was baptised, for the purpose of commemorating the introduction of Christianity into Russia.



SUBJECT. 2. *Russian Gardening, in respect to the Culture of Flowers and Plants of Ornament.*

864. *Dutch flower-roots* would doubtless be introduced in the imperial gardens with the Dutch taste in design, and soon after copied by such of the nobility as could afford to copy in matters of this kind. It was reserved, however, for Catherine II. to give a serious impulse to a taste for floriculture, by establishing at Petersburg the first public botanic garden, in 1785, for the use of the academy of sciences. Another was soon after formed for the medical college.

865. *Botany, in Russia*, has been encouraged more or less since the time of Catherine II. During the reign of Alexander, 50,000 silver roubles, and the Apothecaries' Island in the Neva, were appropriated to the construction of a national botanic garden; and Dr. Fischer, an eminent botanist, long established in Russia, was appointed its director. This island includes an area of sixty English acres, and the whole is turned into a garden. The operations were commenced in 1824, and carried into execution with such rapidity as, perhaps, has scarcely any parallel in the annals of botanical institutions. Orders were given for ranges of green-houses, conservatories, and stoves, the cost of which was estimated at 1,000,000 roubles (about 40,000*l.* sterling), and the whole were completed before the winter of 1825. There are three principal houses, facing the south, each 700 feet in length, and 20 to 30 feet from back to front, placed in parallel lines, but at such a distance from each other, that with two other houses of the same length, running from north to south, and placed at the ends of these, the whole forms a parallelogram, measuring 700 feet each way, intersected by a central house of the same length. The middle building is most lofty, being forty feet high in the central part. The three that face the south have sloping lights in front, reaching from the top to the ground; those which run north and south have double roofs, are comparatively low, and have the path in the centre. All are heated by means of common flues, and with wood, principally birch. Water is raised by engines from the river, and cisterns are filled in various parts of the houses, and in the most convenient situations. The large spaces of ground, or areas, between the buildings are filled with shrubs and flower-beds; only behind the most southern one is a splendid suite of apartments for the royal family; these have windows opening from above into the house below, so that the plants may be seen to great advantage. Handsome and commodious apartments are built for Dr. Fischer, and for the two chief gardeners, one of whom is a Dane, and the other a Frenchman. Two secretaries are employed, one a French gentleman, M. Fleury, the other a Russian; and also an excellent botanic painter, a native of Germany, who has already executed some very beautiful drawings of new and rare plants: 100,000 roubles were appropriated for the purchase of plants at the commencement; and 68,000 roubles annually for the ordinary expenses. Dr. Granville, who saw this garden in 1829, describes it thus:—

866. *The imperial botanic garden of Petersburg.* The glass-houses in this garden form a parallelogram of three parallel lines (like that in *fig.* 193.), united at each end by covered corridors, and constitute the principal feature of the garden. Of these lines, that which is to the south contains green-house plants in its centre, and hot-house plants at each end. The middle line is for hot-house plants alone, and the north line has no other than green-house plants; the north and south lines contain respectively five different compartments,

of 100 toises each. The middle line has seven compartments. The connecting corridors at each end are thirty-five sajenas in length (245 feet). The plots of open ground between the lines are used, the one for plants requiring hot-beds, the other for exposing the green-house plants in summer. The whole range of hot and green-houses, taken in a continued line, measures 518 sajenas, or 3624 feet, being little short of three-fourths of an English mile in length. This, Professor Fischer informed Dr. Granville, is the largest extent of buildings for plants, covered with glass, to be found in any botanical garden in Europe: the hot-houses are warmed by flues. To the north of this plot of ground is a nursery of every tree and shrub growing in the open air. To the south there is a systematical arrangement of all the plants that live in the open air in Russia, especially intended for the study of botany. The classification adopted is the natural one; and to this part of the garden it is intended to add a collection of plants to form a *Flora Rossica*. An arboretum for such fruit and forest trees and shrubs as can endure the climate of Petersburg, exists in another part of the garden. The study of medical botany is facilitated by the cultivation, in a particular division of the ground, of every vegetable article of the *materia medica* adopted in Russia; and there is another division for culinary and other economical plants. No fewer than three subdivisions of the ground have been devoted to medicinal plants, or simples, on a scale sufficient to supply the hospitals; and with regard to one article alone, the extract of *Aconitum Napellus*, this part of the garden has been the means of saving great expense to the crown, it having furnished the medical department of hospitals in the course of last year (1828), 4560 pounds of the fresh leaves of that plant. Experimental gardening also has not been forgotten in the general arrangement; for which specific purpose a plot of ground has been set apart; and in a farther division of the garden a plantation has been formed, accessible to the student of botany, for examining every plant *oculis et manibus*. The inundation which took place in November, 1824, extended to this establishment, then in an incipient state, and caused considerable damage. The water rose, as marked by a red line in one of the outer rooms leading to the hot-houses, to a height of four feet four inches; and M. Fischer had to regret, among other severe losses, that of about 150 species of heaths. One of the great advantages belonging to such a great extent of glass as that possessed by the botanic garden of Petersburg, is, that it admits of a double classification of plants, namely, a geographical one, and another according to families. Professor Fischer has fully availed himself of this facility.

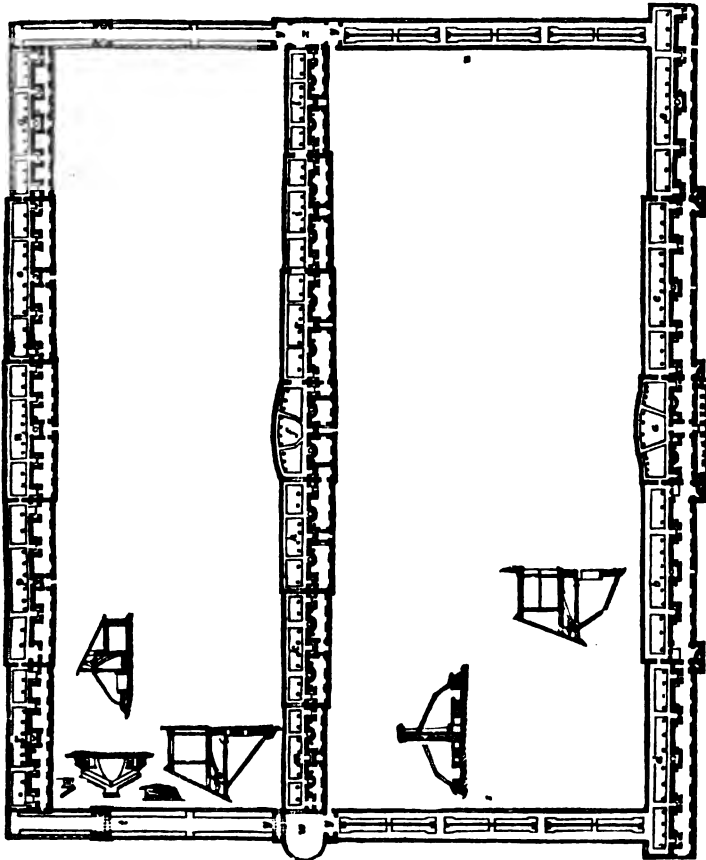
867. *General plan of the hot-houses in the Imperial Botanic Garden at Petersburg.* The following are the details:—

- a, Green-house thirty-two feet high, serving as principal entrance to the hot-houses.
- b, Green-house, with two sides of glass frame work, twenty-eight feet high, for oranges, magnolias, acacias, myrtles, and the trees and plants of New Holland, &c., planted in the ground.
- c, Green-house, of the same height, with one side of glass framework, for the tallest plants of the Cape of Good Hope, China, and New Holland.
- d, e, Green-houses, twelve feet high, with two sides of glass framework, for *Ericas*, and other dwarf plants of the Cape of Good Hope, and temperate America.
- f, Hot-house thirty-two feet high.
- g, h, Two hot-houses twenty-eight feet high, one of which is destined for the Bananas, and other plants of the same family.
- i, k, Two hot-houses twenty-two feet high, one of which contains the succulent plants of the tropics, and representative specimens of all the different families of equinoctial monocotyledonous plants, which are cultivated in the garden.
- l, m, Two hot-houses eighteen feet high, in which the beds

- are raised to a considerable height above the level of the path.
- n, Hot-house for Chinese, Japanese, and Nepal plants, twenty-eight feet high, with glass framework on both sides.
- o, p, Two green-houses, twenty-one feet high, for the plants of the south of Europe, of the Canary Isles, and North America, and for the succulent plants of temperate countries.
- q, r, Two hot-houses, twelve feet high, for dwarf equinoctial plants. The beds in these houses are raised to a considerable height above the level of the floor.
- s, t, Two houses, twelve feet high, and glazed on two sides; forming passages of communication, and containing half hardy plants.
- u, v, Two houses, serving as passages of communication between the principal lines, destined for the bulbous plants of the temperate climates, and as reserve houses for hardy herbaceous plants.
- w, x, Pavilions of entrance, or passages.
- y, y, Entrances into the two squares; both of which are completely surrounded by houses for plants.

The sections are marked with the same letters as the ground plans to which they belong.

868. *The construction of these Hot-houses* was effected agreeably to the following principles; which are extracted from a paper which was lent us in Paris, in 1829, and was said to have been drawn up by Dr. Fischer, the director of the garden. The best exposure for hot-houses, in cold countries, appears to be the S. S. E., or the S. S. E. by S.; and in the north of Russia, on account of the cold and piercing north winds, it is generally thought advisable to place them against walls or buildings, galleries or corridors, in which, during winter, plants which do not require much light may be placed; and in which certain vegetables, such as chicory, rhubarb, &c., may be forced; and mushrooms raised, or workmen lodged. The depth given to hot-houses, in the north of Russia, is generally less than in other countries, unless the house requires to be very lofty, in which case it is made air-tight, so as to preserve the heat. In the orangery of the palace of Taurida, the roof being opaque, the air is kept warm by very few stoves. When the hot-house is high, and the glass slopes considerably, care must be taken in constructing the front wall, so that it may not be thrust out by the lateral pressure of the sashes. Experience also shows that plants thrive in hot-houses with the glass sloping to different angles; it is, therefore, principally necessary to consider what slope is best for throwing off the water exteriorly and interiorly. The sashes may either have one slope, or two different slopes; and these may be more or less oblique, according



to the size of the plants to be cultivated under them. To exclude the cold air during winter, all the joints of the woodwork are filled up with pitch, and the larger crevices with moss. Double sashes for hot-houses are not common in Petersburg, because it is found that the diminution of light they occasion, and the difficulty with which the sun's rays penetrate through them, are injurious to the plants. The form of the panes, and the quality of the glass, are both very defective in Russia: the panes are in right-lined parallelograms, and the mode of rounding them at the lower end, in the form of the flat tiles of some parts of Germany, though preferable, has not yet been adopted. The glass is generally badly made, and is full of inequalities, on which account the leaves of the plants are often blistered by the concentrated rays of the sun. The inequality of the thickness of the glass also renders it subject to crack, and break during great frosts. The methods employed for covering the sashes during the nights in cold seasons, are equally imperfect. Preference is generally given to shutters made of light wood, either in one piece, which is raised up during the day, or in several pieces, which, by means or hinges, fold one over another; and, when not wanted, are retained against the wall. When these shutters are in use, care must be taken to have them rest upon the wood between the panes of the sashes, (which should, for that purpose, be made to project considerably), in order to prevent the snow, which gets in between the shutters and the glass, from freezing the glass to the shutters, and, consequently, breaking the former when the latter are removed. Air is given by opening the sashes, as in other countries, during summer; and, in winter, the air is changed by the stoves which burn in the inside of the hot-houses, by the doors communicating with the sheds or corridors, and by openings in the ceilings. In order to increase the light in the houses, and to prevent the plants from bending towards the windows, which gives them a very ungraceful

appearance, the upper part of the back wall is curved over the glass, as shown in the sections, in fig. 193, in such a manner as to concentrate the sun's rays, and to reflect them into the interior. To execute this curve, half arches of wood are fixed to the wall, and in sand pits, which rest upon posts in the middle of the houses: on these half arches is nailed a double row of thin boards, separated by a thick stuffing of hay, or cotton wadding, for the purpose of entirely excluding the external air. Between the curve and the top a roof is constructed, very close and solid. In order that the light may be better reflected, the boards which constitute the curve, and cover the walls, ought to be very smooth, and well whitened. The effect which this arrangement produces on vegetation is astonishing. In order to get rid of the heated air which rises, and might prove injurious to the plants, small outlets are made, in the form of chimneys, at regular distances at the top of the curve: these outlets ought to be very narrow, and should be made to shut exactly, by little trap-doors, or flaps, which may be raised or lowered from the interior of the house, by means of cords.

869. *The Russian manner of heating dwelling-houses is adopted in these hot-houses*; that is, instead of keeping up a fire all the time that heat is required, a brisk fire is made at first, and the combustibles are burnt rapidly, in order to preserve the embers produced as long as possible, and to have a magazine of heat accumulated in a body which is a bad conductor, in order that it may be communicated slowly and by degrees to the surrounding air. To obtain this result, a great current of air must be established for the rapid combustion of the wood; and when the wood is entirely reduced to embers, this current must be stopped by closely shutting up all the openings. The stoves of dwelling-houses that are well constructed are rarely heated more than once a day, unless in the case of a very severe cold; as a house once heated to a temperature of from 14° to 16° Reaum. (64° to 68° Fahr.) retains the heat for twenty-four hours. Hot-houses, on account of the great extent of the glazing which they contain, cannot retain this temperature so long; and it is necessary, generally, to heat them every twelve hours, especially when the stoves are not very large.

870. *The hot-house stoves with their flues* are constructed in the following manner:—Upon a sufficiently solid foundation, flags are placed horizontally over all the space which the breadth of the flues (which can either be single or double), is intended to occupy. Bricks are then placed at certain distances, to form feet for the flues to rest upon; and these flues ought to be surrounded on every side with a chamber of air, communicating directly, or by means of vent holes, with that of the hot-house. Upon these feet is placed a second range of flags, which flags form the immediate base for the flues; and on these is put another range of bricks flatwise. The lateral walls of the flues are also constructed of bricks placed flatwise, which gives them a thickness of five inches and a quarter, or five inches and one third (English), and makes the interior aperture of the flue ten inches and a half wide and fourteen inches deep. The interior surface is slightly coated with loam, and it is covered on the top by bricks placed flatwise; the flues are afterwards covered with an additional layer of bricks or flags, so as to form a larger mass of non-conducting material, for the retention of heat. The flues, when thus arranged, serve as paths in the hot-houses, and will also form a very suitable place for forcing vegetables. In the old hot-houses, the bricks were laid in loam or clay; but lately calcareous cement has been introduced, which is found to make the flues last much longer. The stove itself is not placed upon brick feet; but is separated from the ash-pit by a grating of iron bars. The upper surface of this grating ought to be at least seven inches lower than the bottom of the flue. The fireplace widens towards the interior, where it ought not to be less than twenty-six inches in breadth; and it is desirable to have cast-iron pipes communicating between the interior of the fuel chamber and the external air, in order, when necessary, to augment the activity of the fire by admitting an additional current of air. The lateral walls are eight or nine inches thick, and the top of the fireplace vaulted, and is at least five inches thick: it ought to be made of firebricks, which it would be always advantageous to use in the construction of all stoves, although they cost triple the price of the others. At the place where the flues enter the upright chimney, an aperture is made by which the soot can be removed; and in the chimney itself another is made, in which is placed the sort of valve called a damper, which serves to close the chimney when the wood is reduced to embers. A little iron frame, with a door hung upon hinges, is fixed on the exterior of the aperture of the chimney top; and is worked from within the house by an iron rod: it is shut and opened with the damper, and co-operates with it, in retaining heat in the flue. At Petersburg, they reckon, generally, that a hot-house from ten to twenty feet high requires a fireplace for every three or four yards in length, and an orangery one for every four or five yards. The stoves are heated sometimes in the interior of the hot-houses, and sometimes from the passages behind. The best manner is to make niches for them in the hot-houses; which may be shut by the means of panels sliding in grooves in the side walls; so that, if the stove smoke, the smoke may be easily

excluded from the house. The outlets in the chimneys ought also to be made in these niches. The fuel which is preferred in Russia above all others is the wood of the birch tree, as it produces more solid embers, which preserve the heat longer than any other white wood. When the stoves are to be heated, the covers of the chimneys are first lifted up, and the damper drawn out; then wood is placed in the fireplace, till it is filled to the height of two feet, and a strong current of air is introduced until all the wood is reduced to embers. When the blue flame of the inflammable gas has disappeared, the doors of the stove and ash-pit are shut; the dampers are pushed in, and the covers of the apertures of the chimney-tops are let down. In the middle of winter the stoves are generally heated at one or two o'clock in the morning. It is necessary that the highest temperature of the flues should coincide with the time when the greatest degree of cold is expected in the external air; but experience is the best guide on this subject. Heating by steam is not generally practised in Russia: wherever it is used, it is a modification of the old English method, and the houses are heated by the steam itself, instead of being heated only by the hot surface of metallic tubes, in which the steam is circulated.

871. *Arrangement for the dissemination of plants and seeds.* As the imperial botanic garden of the capital is intended to become the centre of propagation of vegetables to be distributed to the imperial gardens all over the empire, as well as to private individuals gratuitously, there is a large compartment formed in the north line of the great hot-houses, in which the young plants are kept and cultivated, together with a seed department, for both purposes. The distribution of seeds, cuttings, and plants of all sorts, is one of the surest modes of preserving them, and promoting their propagation in the country. Among the Australian plants were *Acacia speciosa*, which had grown eighteen feet in the space of two years, and an *Eucalyptus*, which had attained the height of twenty-one feet in the same period; a beautiful specimen of the *Smilax excelsa* also attracted Dr. Granville's attention, as the plant is used by the Persian physicians for the same complaints for which sarsaparilla is prescribed in Europe. There are twenty-six families of Australian plants, and thirty-two of those from New Holland in one compartment; forty-five families of Cape plants, an extensive collection of rhododendrons and other American plants; and another of resinous plants fill the fifth division of the north line. The corridor of communication between this and the south line contains, among other plants, a collection of *Amaryllidæ*, those belonging to the Cape being kept distinct from the rest. In the south line, one house is devoted to the plants of the south of Europe; another to succulent plants; and another to the natives of China, Japan, and Nepal: this last contains forty-eight families. The *Flora Canariensis* consists of thirty-four families, and the *Orchidæ* are both numerous, and contain some fine specimens. From the south to the middle line is a green-house, devoted to the cultivation of hardy perennials and reserves. The middle line presents one of the most interesting sheltered promenades to be met with in any botanic garden. The palms, the ferns, and an arrangement of *Cacti* on rocks, are included in this division. Here also are the agaves, among which is one of the two agaves planted by Miller at the Chelsea Garden, and presented, a few years ago, to M. Fischer, by the Apothecaries' Company; the gigantic *Amaryllidæ*; the columnar and gigantic *Cacti*; together with some fine specimens of the most celebrated monocotyledonous woody plants, among which were a plantain (*Musa*) thirty feet high, and a *Caladium sagittifolium*. The cinnamon tree also was in great vigour here, and had more than once flowered; as had also a magnificent specimen of the Japanese sago tree, *Cycas circinalis*. Beyond these was an *Arum appendiculatum*, which has flowered every year since 1824, and whose greenish corollas have, as the professor informed Dr. Granville, the same propensity which its leaves possess, of multiplying themselves under favourable circumstances. A shoot of bamboo, rising to nearly the full height of the hot-house, attracted attention from its beauty. During the great heat of 1826, this plant grew twenty-six feet in the space of eighteen days. The whole collection amounted, in 1829, to above 11,000 species, and 80,000 single plants. (*Travels to Petersburg, &c.*, vol. ii., p. 169.)

872. *The botanic garden of the university of Moscow* was founded by the emperor Alexander, in 1801, but was unfortunately destroyed by the French in 1812; at which time the university was burned down. Both, however, are now restored to their original splendour.

873. *The first private botanic garden formed in Russia* was that of General Demidow, begun during Peter the Great's reign. It was chiefly devoted to native plants; but still the hot-houses for exotics occupied more than one acre of ground. Two botanists were sent to travel over the whole of Asiatic Russia. In 1786 a catalogue was published, when the collection amounted to 4363 species or varieties, exclusive of 572 varieties of fruit trees, 600 varieties of florists' flowers, and 2000 species which had not flowered. "One single anecdote," says Deleuze, "will prove how eager Demidow was to enrich his garden. Being at Rome, in 1773, he found in the garden of the Petits

Augustins del Corso the handsomest orange tree he had ever seen. The monks did not wish to part with it, and he was obliged to employ a good deal of money and influence to overcome their scruples. Having succeeded, he caused the tree, which was planted in the open air, to be taken up with an immense ball, put in a large box, set on a carriage made on purpose, and transported to Moscow." (*Annales, &c.*, tom. ix. p. 174.)

874. *The botanic garden of Gorenka*, already mentioned, presents the most extensive private establishment not only in Russia, but perhaps in the world. The great extent of glass has been alluded to. When we saw these hot-houses, in 1814, they were much injured by the French; the establishment has since been broken up, and Dr. Fischer, formerly its director, is now in the same capacity at Petersburg. (§ 685.) Dr. Fischer is a well known botanist, and corresponds with most botanical cultivators in Europe. A catalogue of this garden was published in Moscow, by Dr. Redowaky, in 1804.

875. *There are other private botanic gardens near Petersburg and Moscow*; and good collections of ornamental plants at Paulowsky and Gatschina, both imperial residences. The Baron Rahl has an extensive range of hot-houses, devoted chiefly to fruits and flowers; and many of the Dutch and German merchants cultivate flowers in the gardens of their summer residences, on the Strelna road, at Petersburg. Excepting however, among the first of the nobility, and the wealthy foreign merchants, ornamental culture of every description is quite unknown in Russia. The taste of the ordinary nobleman is too gross; the peasant is out of the question, and there is no middle class in the empire of the czars.

876. *The climate of Russia is adverse to floriculture.* Dr. Howison remarks (*Caled. Mem.*, iii.), "that there is scarcely any plant, or flowering shrub, which can resist the intense frost and cold of the winter in Britain, to be found out of doors in Russia; and, at times, even the hardy whin-bush is destroyed." He says, the gardener in the Taurida palace, Call, showed him "Persian lilacs, laburnums, different varieties of thorn, whin-bushes, &c., growing in large wooden tubs filled with earth, and which were preserved there all winter, with the intention of being sunk in the borders of the garden, as soon as the weather should grow warm enough to admit of it. In the gardens of the villas and country-houses of the higher classes of Russians and foreigners settled in the country, in the short period of a week from the disappearance of the winter, a beautiful and rich display of shrubs and flowers in full blow, consisting of hydrangeas, various species of pelargoniums and myrtles, wall-flowers, carnations, &c. become visible. All these are, in like manner, reared in hot-houses. As their bloom fades, fresh plants are brought from the conservatory to replace them, thus keeping up an artificial garden, as it may be called, during the whole warm season; and when the cold weather begins again, the whole are removed, and replaced in the green-house."

SUBJECT. 3. *Russian Gardening in respect to its horticultural Productions.*

877. *Dutch and German fruits* were introduced to Russia with the Dutch and French taste in gardening, by Peter the Great. With the English style, Catherine introduced English gardeners and English fruits. Before this period, the wild pear, the wild cherry, the black currant, the cranberry, and the strawberry must have been almost the only fruits seen in aboriginal Russia: all these may be gathered in the woods. The apple is abundant in the Ukraine; and a century ago, as at present, may have been sent to Moscow for the use of the higher classes. At present, the imperial family, and a few, perhaps six or eight, of the first nobility, enjoy almost all the European fruits in tolerable perfection, chiefly by the influence of glass and fire heat. The quantity of pines and grapes grown in the neighbourhood of Petersburg is indeed an astonishing feature in its horticulture. Pines, grapes, and peaches, being grown so as to ripen in August and September, enjoy, in these months, abundance of sun, and nearly equal in flavour those grown in England or Holland; but the apple, pear, cherry, and plum, being in that part of the empire considered as only half-hardy fruits, rarely ripen in the open air so as to be fit for the dessert; and are generally planted in houses, or against walls, and brought forward by glass. About Petersburg the branches of the cherry tree are protected by burying them in the soil, as the French do those of the fig tree, in the fruit-gardens of Argenteuil. The climate being less severe about Moscow, the harder fruits ripen somewhat better in the open air, but still in a far inferior manner to what they do at Edinburgh, which is in the same parallel of latitude. We have seen apples, pears, cherries, &c. fit to eat in the hot-houses of the imperial gardens at Tzaritzina, in April, but without flavour. Peaches grown or forced to ripen in August and September, says an experienced English gardener, long resident in Petersburg, are not so good-flavoured as those ripened in May, June, and July; as frequently in August and September we have cold nights; and it is observed, that if the thermometer remain below 6° of heat (say 45° Fahr.) for any time, the peaches and apricots become insipid, and without flavour. Apple trees about Petersburg generally remain unprotected in the open air, but some-

times in very severe winters they are injured by extreme frosts. Plums rarely ripen unassisted by glass, the season being too short. Cherries of the best sorts are all protected by being planted in large sheds, and covered with shutters during the winter. Early in the spring these are removed, and the trees entirely exposed to the open air, in which manner the fruit ripens to perfection. Apricots force equally well as peaches: there is a house in the Taurida garden containing nine trees planted in the ground, which frequently produce 5000 apricots. (*Gard. Mag.*, vol. i. p. 447.)

878. *Almost all the horticulture of Russia is contained in Moscow and around Petersburg; elsewhere scarcely any sort of fruit tree is to be found but the wild pear.* Kitchen-gardens are rare, even in Podolia, a very fine Polish province in the Ukraine, with a deep rich soil, level surface, and favourable climate. The only fruits a Russian peasant or minor Russian nobleman can taste are the wild pear (*groutchky*), dried or green, the strawberry, and the cranberry. Of the last, a cooling acid beverage is made by infusion in water.

879. *If any culinary vegetables were known in Russia before the beginning of the last century, they could only have been the dwarf, ragged-leaved brown kale and the mushroom; the potato is but lately introduced, and in 1813 was only grown in a few places round the principal towns.* Many of the peasants refuse to eat or cultivate this root, from mere prejudice, and from an idea very natural to a people in a state of slavery, that any thing proposed by their lords must be for the lord's advantage, and not for theirs: thus the first handful of food thrown to untamed animals operates as a scare.

880. *The example of the court, and the number of foreigners employed in the Russian service, civil and military, in their literary institutions, and established as medical or commercial men in the towns, will, no doubt, gradually introduce a variety of culinary plants.* The late war may also have had some influence, by giving the untravelling Russian noble a taste for the comforts of Germany and France; but, unfortunately, the Russians are averse to a country life, and will continue to be so till they acquire a taste for domestic enjoyments and rural recreations. Dr. Howison (*Mém. of Caled. Hort. Soc.*, vol. iii. p. 77.) has given "an account of the most important culinary vegetables cultivated in the interior of the Russian empire." Of these, the cucumber, melon, yellow turnip, radish, and bulbous celery were introduced from Germany, and are known but to a few. The remaining sorts mentioned are, the variegated cabbage, introduced from the South Sea Islands; mustard, from Sarepta, near the Chinese wall; and an onion from Chinese Tartary. These were introduced by Hasenkampf, of the late Russian embassy to China. The English and German court-gardeners grow abundance of all our best vegetables, and contrive to prolong the season of some of them, as cauliflowers, celery, cabbage, &c., by earthing them in cellars. A succession of salading is kept up in hot-houses, during winter, and even the first crops of all the common oleraceous and acetaceous plants are reared under glass and by fire heat in some of the best gardens. In Storch's *Petersburgh* (chap. iv.), the dependence of Russia on foreign countries for her culinary vegetables and fruits is amply detailed. In the Crimea, according to Mary Holderness, horse-radish, asparagus, carrot, dock, sorrel, nettles, capers, and mustard are gathered wild, and used as pot-herbs. Cabbages are cultivated, and they attain a great size: onions, pumpkins, water-melons, and capsicum are also grown. (*Notes, &c.*, p. 125.)

881. *The fruit trees cultivated in the district of Petersburg are, the apple and cherry in gardens and orchards, both by gentlemen and peasants; and the pear, in a few gardens in warm places with protection; but the trees produce no fruit, unless assisted by artificial heat.* Figs, peaches, apricots, plums, and mulberries are grown only under glass. Walnuts, almonds, and chestnuts are not cultivated. (*Com. to Board of Agr.*, vol. i.)

882. *The culinary vegetables grown in the district of Petersburg are, cabbages of different kinds, savoys and borecoles, turnips of different kinds, radishes (these are very common in peasants' gardens), horseradish, carrots, parsneps, white and red beet, the Jerusalem artichoke, asparagus, lettuce, spinach, gourds, water-melons, melons, musk-melons, and cucumbers.* The Finland or Swedish turnips (*rutabaga*), are sown in gardens in the middle of June, taken up in the end of September, and buried in wells or holes dug in the earth, where they keep remarkably well, and eat exceedingly sweet and firm. The common English turnip has been tried in these wells or holes; but they soon become porous, and are neither so firm nor so sweet-flavoured. Cabbage is sown very early, and transplanted about the middle of June. Asparagus is abundant in the open ground, being protected during winter by the snow. The white or sugar-loaf cabbage forms one of the principal vegetables of the peasantry: it is sown very early, transplanted about the middle of June, and pulled up, and hung, or planted in a bed of sand, in cellars, in the latter end of September. Garlic, rocambole, and chives are very hardy, and stand the winter without any protection. The carrot is grown by most peasants; as is the cucumber in the open air among the potatoes, where it produces abundantly till destroyed by frost. (*Ibid.*) The hop is indigenous in the Petersburg district, and its tops might be used as asparagus, but they are not.

883. *The fruits and culinary vegetables of Russia* are thus enumerated by Anderson, in 1815:—"Of wild berries, and fruit-bearing shrubs, there is abundance in Russia. The cranberry is wild and cultivated, as well as the black, white, and red currant, the latter of which grows to the size of an ordinary cherry, on the Altaian mountains. The hazel bush, though found all over European Russia, does not appear in Siberia. Forests of cherry trees may be seen in the south. Apples and pears flourish generally; but apricots, peaches, almonds, walnuts, and chestnuts are confined to the south. Figs and pomegranates are seen only at Kitzliar and Taurida; the quince tree grows wild in the forests of the Terek, as does the vine about the Don, and in Taurida; it is likewise cultivated to some extent in various other provinces. In the kitchen-gardens, which are wretchedly managed, are cabbages generally used to make sauer kraut; turnips, often substituted for bread; Turkish, French, and common beans, peas, onions, cucumbers, and garlic; which three last form the salad of the common people. In the southern provinces, sugar and water melons are raised in large quantities, with little care. Some of the latter weigh thirty pounds." (*Anderson's Sketches of the Russian Empire*, 8vo, 1815.)

884. *The culture of the grape for wine* is making considerable progress in the southern districts. In Moldavia, and on the left bank of the Pruth, a white grape, containing a great deal of carbonic acid, is successfully cultivated. In the Crimea, especially at Soudak, grapes are grown with very large berries, often not less than plums; but they do not yield well in the press. The vines of Spain and Languedoc are successfully cultivated by a Frenchman, at Larci, near Balaklava. A white wine is produced on the banks of the Molotschna, which falls into the Don; wines made from the vineyards on the bank of this river are very well known in Moscow and Petersburg, under the name of Don wines. There is a vineyard near Astrachan, producing very good wine, the greater part of which is sent to the imperial court of Petersburg: what is sold produces a higher price than the wines of France. The north side of Caucasus produces a wine of middling quality, but in sufficient quantity for the inhabitants of these countries. In Georgia and Mingrelia, Russia might produce wines to rival those of Hungary and France. Already Georgia produces a considerable quantity of excellent wine, and in less than twenty years, as much will probably be made there as will supply the whole of Russia. (*Ökonom. Newigh. und Verhandl.*, 1825.) The valley of Soudak, especially towards the east, is said to be one of the most enchanting spots in the world; and Armenia, Siberia, Italy, and Caucasus are said to offer nothing more delightful. What adds to the charms and celebrity of the valley is the success which has there attended the culture of the vine: it is supposed that Russia may, at no distant period, get wine enough from the Crimea for her own consumption. The first vineyards were planted there in the year 1804, at the suggestion of the celebrated naturalist, Pallas; the situation is named Gadjakol, in the territory of Kosi. Cuttings of vines were brought from France, Zante, Tenedos, the Rhine, Astrachan, and Kitzliar; and two Frenchmen, the one a vine-dresser and the other a farmer, were appointed to plant and to manage them. Ten orphan pupils, from the military school of Cherson, were put under the care of these cultivators; government supplied the necessary capital for every part of the undertaking; and 28,000 vines were planted, which, in the year 1826, produced 1500 vedros of wine of Hungary, Bordeaux, the Rhine, Asmalhausen, Muscat, Petit-Bourgogne, Zante, and Kabour, of the best quality. (*Bull. Un.*, Oct. 1827.)

SUBJECT. 4. *Russian Gardening, in respect to the Culture of Timber Trees and Hedges.*

885. *Forest or hedge planting* is scarcely known in Russia. There are yet abundance of natural forests, chiefly of birch, lime, and Scotch pine, for timber and fuel, and in the northern parts, where no system of pasturage can take place, enclosures are not now, and probably never will be, of any use. Hedges are in use in the gardens of the capital, and of the city of residence. The time is not yet come for planting the sides of the high-roads, though that would be a grand feature of improvement. In some governments, towards the south, this has been partially done in a few places, by stakes of the silvery-leaved willow; but the trembling poplar, birch, and lime are the proper trees for the northern parts; and the cherry, alder, sycamore, oak, elm, walnut, &c. may be introduced in advancing southward.

886. *The prevalent timber trees on the borders of the Gulf of Finland* are the following, the most common being first in order:—*Pinus sylvestris*, *Pinus Abies*, *Bétula álba*, *Bétula álbus*, *Pópulus trémula*; different *Sálices*, *Juníperus commúnis*, *Sórbus Aucupária*, *Prúnus Pídus*, *Rhámnus Frángula*, *Quércus Róbur*, *Tília europæa*, *Pýrus Málus*, *Acer campéstre*, *Fráxinus excélsior*, *Ulmus campéstris*, *Pinus Picea*, *Pinus Lárix*, *Pinus Cémbra*, *Pinus rubra* Milleri. These last four grow on the coasts of the White and the Frozen Seas. (*Com. to Board of Agr.*, vol. i.)

887. *The native shrubs in the same places* are the following:—different *Sálices*, *Fibárum Opulus*, *Córylus Avellána*, *Rósa canína*, *Bétula nána*, *Dáphne Mezereum*, *Ribes*

nlgrum, *Ribes rubrum*, *Rubus idæus*, *Rubus fruticosus*, *Erica vulgaris*, *Lonicera Xylöstemum*, *Amyrica Gale*, *Ledum palustre*, *Arbutus Uva ursi*, *Andróméda calyculata*, *Vaccinium uliginosum*. On the borders of the Frozen Sea are, *Salix reticulata*, *Salix incubacea*, *Arbutus alpinus*, *Andróméda tetragona*, *Diapénsia lapponica*, *Azalea procumbens*, *Andróméda cærulea*, *hynnoides*, &c. &c. (*Ibid.*)

888. *The hedge plants and trees of the district of Petersburg are few.* The willow is indigenous, and its bark is used by the tanners; so is that of the birch. The white and Italian poplar will not stand the open air; but the Scotch pine and the aspen are indigenous, and quite hardy. Of shrubs, the common honeysuckle requires to be kept under glass; but the common lilac is so hardy that hedges are made of it. *Robinia Caragana* is equally hardy, and the leaves of both these plants are very seldom infested by insects. (*Ibid.*)

SUSSECT. 5. *Russian Gardening, as empirically practised.*

889. *The very limited use of gardens in this country has been already noticed.* Few are to be seen attached to the isbas, or log-houses, of the boors, and not many to the rich privileged slaves, or the native freedmen of the towns. There is no such thing as a Russian farmer; every proprietor farms the whole of his own estate by means of his slaves and an agent. The greater part of these proprietors have no gardens, or if they have, they are wretched spots, containing a few borecoles, and but rarely potatoes or legumes. The use of gardens is, therefore, almost entirely confined to the imperial family, the highest class of nobles, and a few foreigners, who have settled in the principal cities.

890. *There are nurseries established in different districts by government, especially in Courland and the Ukraine.* In the Nitika nursery, in the Crimea, apple, pear, peach, almond, vine, fig, olive, and pomegranate plants are propagated, under Stevens, a German, and sold at low prices.

891. *The head operative gardeners of Russia are almost all foreigners, or sons of foreigners.* Sometimes a nobleman sends a slave as an apprentice to a gardener, for his own future use; but generally the assistant labourers are mere Russian boors, slaves of the lord; or other slaves who have obtained permission to travel and work on their own account for a few years. These boors make very tractable labourers; for the Russian is imitative and docile, to a high degree. They require, however, to be excited by interest or fear. The freed slaves on the government estates in the Ukraine, Mary Holderness informs us (*Notes on the Crimea*, &c., 1821), dig sitting and smoking.

892. *The garden-artists of Russia are the English or German head-gardeners attached to the establishment of the emperor, or of some eminent noble.* Gould, Potemkin's gardener, was the Brown of Russia in Catherine's time. This man had a character in some degrees analogous to that of his master; he lived in splendour, kept horses and carriages, and gave occasionally entertainments to the nobility. He afterwards returned to England, and died, at an advanced age, in 1816, at Ormskirk in Lancashire, his native town.

893. *A foreigner once established as head-gardener to the emperor, or any of the first nobility in Russia, becomes in some degree a despot, like his master; and, unless he commits very gross errors indeed, his conduct is never enquired into, nor does he lose his place but with life, unless he wishes to return home.* He is not very liberally paid, but he enjoys every comfort the state of society there affords; lives in a house that would be reckoned a considerable mansion in England, and has abundance of servants, and a carriage and horses, at his command. His country, and his broad cloth, procure him the respect of the nobles, and the dread of the slaves; the former he may render tributary by presents of seeds, and the latter he may kick and beat at pleasure. If at any time he goes too far, a few radishes to the police-bailiffs, or a few peaches, or a melon, to the chevaliers their masters, will restore every thing to harmony.

SUSSECT. 6. *Russian Gardening, as a Science, and as to the Authors it has produced.*

894. *Sciences of every kind stagnates in Russia.* However adroit the foreign gardeners may be, in adapting practices to the climate, it can hardly be expected, from the circumstances in which they are placed, that they should increase the knowledge brought with them. Separated from their friends, surrounded by strangers using a language with which they never become familiar, without the means of procuring new books, and rarely coming in contact with intelligent gardeners or naturalists; much of the knowledge they carried with them is unavoidably forgotten or neglected. We regret to add, that it has been remarked by various travellers, that even the moral sense of Englishmen who settle in Russia becomes in time contaminated by the baneful influence of Russian manners. The want of common honour and honesty which pervades all ranks of the natives in Russia, from the first minister to the meanest slave, is incredible. One wonders, at first, how such an immoral state of society can exist; but the refined moral habits

of civilised nations, like their refinements in cookery and dress, may all be traced to the simple principle of self-preservation : and as a savage can put up with a homely fare and a coarse garb, so it would appear a barbarous people may hang together by a sort of tattered moral principle.

895. *We know of no original Russian author on gardening.* There is a poem, *On Gardens*, by Samboursky, translated into the French language by Masson de Blamont : there is also a poem on glass, by the Russian poet Lomonosow, which, as containing a eulogium on hot-houses, may be considered as belonging to this subject. Some translations have been published in German ; and various papers on botanical, physiological, and agricultural subjects appear from time to time in the Transactions of the Imperial Œconomical Society.

SECT. IX. *Of the Rise, Progress, and present State of Gardening in Poland.*

896. *Gardening, as an art of design, was introduced into Poland by the electoral kings, about the end of the seventeenth century, and especially by Stanislaus Augustus, the third elector.*

897. *In respect of gardens in the geometric style of design, the most ancient royal example is the Jardin Electoral de Saxe.* It was never completed, and is now a public garden. The *Jardin Krassinski* is another public garden ; but by far the most remarkable is that of *Lazienki*, or the Bath, formed by the last king, on the site of an ancient park, at *Ujasdow*, within the suburbs of the city. At the beginning of the reign of Stanislaus, in 1764, it was a marshy wood, planted with alders, with some canals and other stagnant pieces of water, near which was a grotesque edifice, called the Bath, from which this park takes its name.

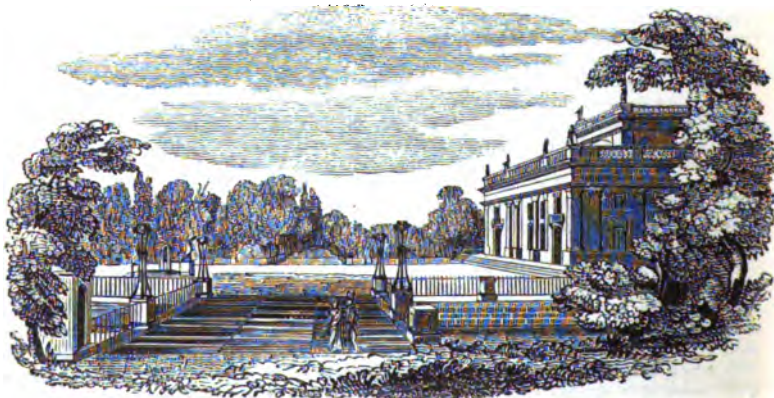
898. *The palace of Lazienki (figs. 194. and 195.), a beautiful piece of Roman architec-*

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ture, from the designs of Camstizer, a German artist, is placed on an island in a considerable piece of water. It consists of a centre and two wings. The centre is placed

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in the middle of a narrow part of the lake, and the wings are on opposite shores, and joined to the centre by arches with orangeries over. The entrance is by a carriage-portico, in one of the wings, at which you arrive without seeing the lake ; and on entering the orangery, its first effect is surprising and delightful. On the north shore of this lake is an open amphitheatre of stone with its orchestra on the brink of the water ; and near the margin is an island of trees, which served as the proscenium. This theatre was

at all times open to the public; and in addition to the ordinary exhibitions, ships and naval engagements were occasionally exhibited. The gaiety which reigned here during the first years of the reign of Stanislaus, the singular effect of the illuminations, the ships, and the resounding of the music in the woods, are still recollected by some of the oldest inhabitants of Warsaw, and spoken of with feelings of regret. The grounds were not extensive, nor, except near the palace, much ornamented: they consisted of a number of broad green alleys, crossing each other at right angles; of smaller covered paths, leading to open circles of turf for dancing and music, and for tents and booths on extraordinary occasions. In several places coffee-rooms and ice-cellars were established, and still remain; there were two pavilions for the king's mistresses; and another, which served as a seraglio, for strangers, or visitors of the king: the three being connected with the palace by arbour-like paths, or arcades of trellis-work, covered by creepers.

899. *One thing deserves to be remarked as to these gardens*, which is, perhaps, not to be found in any others in Europe. Pedestals, as if for placing statues, were ranged in different parts of the grounds, particularly along the broad walk leading from the palace to the amphitheatre. On these pedestals, on extraordinary occasions, selected living figures, male and female, dressed in character, were placed, and taught to maintain certain attitudes, after the manner of the representations called *Tableaux*, and which are sometimes, though rarely, produced in private circles at Paris and Vienna, on days when theatrical amusements are forbidden. It is not to be wondered at that so luxurious a king should have wanted decision of character, lost his honour, kingdom, and, in short, every thing worth having. In 1813, this seat was nearly in the state in which it was left by Stanislaus; but we understand it has since undergone several changes.

900. *The principal private garden in the ancient style* was that of Villanov, the property of Count Stanislaus Pototcki, a few miles from the capital, but now modernised. Judging from the excellent views of these gardens, painted by B. Canaletti, and now in the zamosk, or castle, in Warsaw, they must have been elegant of their kind. At Cracow there are the remains of a geometric garden, of a few acres, laid out by Marshal Loudon, when Austrian governor of that city; one of a convent of some extent; and a small public garden. But in the south of Poland, and especially in Galicia, the only thing remarkable, as to design in gardens, is the powerfully walled enclosures of the convents and religious houses, in some of which are venerable orchards, broad grass-walks, mossy trees, and curious sundials.

901. *English gardening was introduced into Poland by the Princess Isabella Czartoryska*, at Pulhawa. This lady, highly accomplished, of great taste, and much good sense, had been a considerable time in England. She carried to Poland a gardener, Savage, and with his assistance, and that of Vogel and Frey, artists of Warsaw, she laid out Pulhawa, between 1780 and 1784, and published in Polish (*Mysli Rozne o Sposobie Zabladanja Ogrodow*) a work, with plates, on English gardening, in 1801. The situation of Pulhawa (fig. 196.), like almost every other with which we are acquainted in Poland or



Russia, is flat and sandy; but is somewhat relieved by the Vistula. It is about seventy English miles from Warsaw. On the brink of this river, on a wooded bank, stands the house, a plain Grecian building, which with the grounds are described by Burnet, in his *View of Poland* (chap. xi.).



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There are several decorative buildings and statues (*fig. 197.*): detached clumps of shrubs are more frequent in these gardens than would be admitted by a good taste in England; but all Poland is a natural forest; and as the grand object of improvement, in every country, is to obtain applause by the employment of art and expense, artificial forms, from their rarity, are better calculated for this purpose than such as are more universally beautiful, but so common locally as to want the charm of novelty,—or whose beauties are too refined to be generally understood. Thus, clumps in Poland may be as much esteemed as groups are in England, on the same principle that, in a wild country, butcher-meat is more esteemed than game, because the latter is the common food.

902. *Arcadia*, a seat of the late Princess Radzivil, is a very remarkable place, about thirty miles from Warsaw. The far-famed Arcadia belonging to the Princess Radzivil, says Dr. Granville, is one of the finest and most enchanting country seats in Europe. The spot has been sung by Delille, in *Les Jardins*. (*Travels, &c.*)

903. *Villa Nuova* (It.); *Villaneuve* (Fr.); *Villanov* (Pol.), (*fig. 198.*), near Warsaw,

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the ancient seat of King John III., now belonging to the family of Pototcki, and Belvidere, near Warsaw, are also very handsome. Villanov was originally laid out in the ancient style, and afterwards remodelled in the English manner, after the designs of the Princess Isabella Czartoryska. The chateau of Villanov, says Dr. Granville, is, perhaps, the only royal structure in Europe which, like some of the great edifices of ancient Rome, was erected by the hands of prisoners taken in war. It was constructed with the assistance of several thousand Turkish captives. Villanov was formerly the residence of John Sobieski. (*Travels, &c.*)

904. *Monchâteau*, and *Natolia-Gucin*, are not far from Warsaw, and are very beautiful. To these may be added the gardens of Mariejswiec, Konskie, Skierniewice, Bobresck, Woyslawice; all of a rare beauty. (*Gard. Mag.*, vol. i. p. 376.)

905. In *Lithuania* there are several substantial noblemen's seats, surrounded by woods and cultivated grounds, accompanied by walled gardens and often with an extensive farm-yard and a village. In passing through this country in 1813, we took sketches of a number of these (*figs. 199, 200. and 201.*). It was melancholy, at the same time, to observe the ruins of residences which had been burned down during the retreat of the French from Moscow. Among others we examined the naked walls of the hospitable mansion of the enlightened General Benningsen, and the blackened remains of his gardens and hot-houses, in which he had a fine botanical collection, near Wilna. The smaller residences and cottages which were burnt, being generally built of timber, had left no traces of the spot where they had stood, but a rank vegetation, and here and there a solitary brick chimney (*fig. 202.*). The only small villa which had escaped conflagration, that we observed in the route of the army, was that of Colonel Lachanitzki, at Poniemienia,

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on the high bank of the Niemen, near Grodno, a most romantic and picturesque situation, on which much care and expense had been bestowed by the owner.

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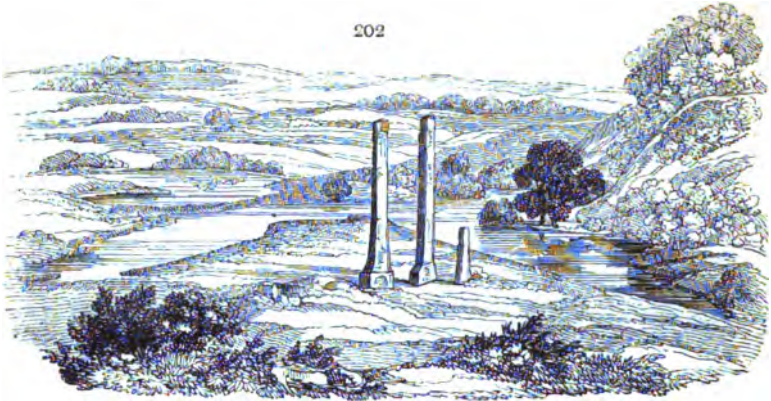
906. In *Gallicia*, or Austrian Poland, there are some wealthy proprietors, and a few handsome residences. As one of the most elegant, we present two sketches (*figs.* 203. and

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204.) of the villa of Count Kownatzki, near Brody. It was built from the designs of Hegner, the architect of the church of St. Isaac, at Petersburg. Near the house (on the right in *fig.* 203.), is the farmyard, which is composed of such handsome buildings that it might pass for a villa of itself. We suggested to the proprietor the idea of uniting it to the house by a conservatory. Attached to this farmyard is a water-mill for grinding corn; the

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same wheel might also drive a threshing machine, and a machine for grinding potatoes, for the purpose of making potato flour, as well as other machines for various uses.

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907. *Public gardens.* Independently of those of the Palais de Saxe, Warsaw may be said to have in its vicinity some of the finest drives and promenades in Europe; for width

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and extent, among these, are the numerous avenues of the Ujazdow, leading to the country residence called Belvedere, planted with lofty lime and chestnut trees, and the drive to Łazienki. (*Granville's Russia.*)

908. *Cemeteries.* At Warsaw there is an old general cemetery, rich in tombs and monuments; also a new one, of great extent, in which a large portion of the ground is regularly trenched from one end to the other, as interments take place; and the calculation is, that ten years will intervene before the operation requires to be recommenced. In this cemetery, as in the others at Warsaw, a part of the boundary wall is built so thick and so high as to contain tiers of cells one above another, in which coffins are inserted endwise, and closed up by masonry, faced by commemorative tablets. There is a German cemetery, characterised by sentimental inscriptions, weeping willows, and cypresses; and the Jews, a persecuted people in this capital, as in most others in Europe, have a cemetery without the walls, covered, when we saw it, in 1813, with long grass, and a few trees. On entering the city of Wilna from Grodno, a large general cemetery is seen on the left (*fig.* 206.).

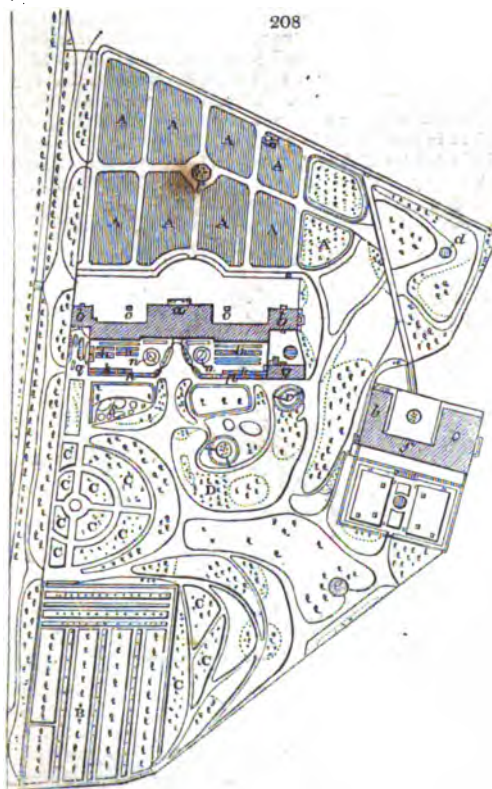


on elevated irregular ground, displaying fine views of the town, and of the hills beyond. If this cemetery were judiciously planted, it would become one of the most picturesque in Europe. A cemetery was commenced on the high bank of the Niemen (*fig.* 207.), in 1813; but whether it has been proceeded with, we do not know. If judiciously planted, it would form a great ornament to the town, on approaching it from Tykochin and Bialystock.

909. *The botanic garden at Warsaw (fig. 207.)* contains upwards of fifteen acres, and in 1824 the catalogue enumerated upwards of 10,000 species. The plants are



arranged according to the natural system. The following are details of the plan (fig. 208.): —



- a. Botanical nursery.
- b. Orchard.
- c. Nursery of foreign trees and shrubs.
- d. Vineyard.
- e. Astronomical observatory.
- f. Dwelling-houses of the professors and gardeners.
- g. Theatre, in which were formerly acted plays for the Polish court.
- h. Small chapel in an old graveyard, formerly used as a burying-ground to the barracks of the royal guard.
- i. Reservoir of water.
- j. Green-houses and vinery.
- k. Pig-house.
- l. Brick-built pits with flues.
- m. Hot-bed frames.
- n. Sheds.
- o. Dial and compass.
- p. Domestic offices.
- q. Summer station for the green house plants.
- r. Pumps.
- s. Shrubbery.
- t. Stations for plants.
- u. Evergreen shrubs.
- v. Compost ground.

The view of the garden shows the ancient greenhouse, observatory, and modern plant-houses, as conspicuous objects. Of the surface of the situation we have a perfect recollection, and know it to be very much varied: the soil is light, sandy, and gravelly; and the surrounding scenery is the most agreeable in the neighbourhood of Warsaw. This garden was not injured by the taking of Warsaw by the Russians, in 1831.

910. *The oldest botanic garden in Poland* is that of Wilna, founded by Catherine, soon after the dismemberment of that country; the most thriving is that of Cracow, placed, in 1812,

under the direction of Professor Oestricher, a zealous botanist. A garden was also begun, about 1810, in Warsaw, on the steep banks of the Vistula. Of the original Warsaw garden, of which a catalogue was published towards the middle of the last century, we could, in 1813, procure no account. Count Benninggen had an excellent botanic garden at his seat near Wilna, which, as already observed, was destroyed, and the château burned down, in 1812. It was rich in hardy plants. At Pulhawa the Princess Isabella Czartoryska has a considerable collection, and used frequently to send her gardener (Savage), now deceased, to England, to procure the newest exotics.

911. *A few flowers are cultivated in some of the wealthier citizens' gardens around Warsaw, and a few in gardens of the conventual institutions; but, in a general point of view, they are as uncommon in Poland as in Russia.* In both countries a few may occasionally be seen in the markets, which have been gathered in the fields, and brought in by the peasants: these are purchased by the minor nobles, to decorate their rooms; by the monks, to display on their altars; or by devotees, to present to the Virgin, or the image of their patron saint. The floors of the higher classes, in Poland, are often strewn with the leaves of the *Acorus Calamus*, which abounds in the marshes of that country. In some districts, towards Courland, the spray of the spruce fir is used for this purpose; a practice, as Mary Woolstonecraft has remarked, common in Sweden and Norway.

912. *The horticulture of Poland is at a very low ebb: excepting in a few of the noblemen's gardens and those of the richest monasteries, there was till lately no vegetable but the kohl-rabi, and no fruits but the apple, pear, and cherry.* Towards the sea-coast, and on the borders of Austria, there is greater variety. The potato is now in more general use in Poland than in Russia, though a slight prejudice still exists against it, from its having been introduced by the Germans. The cucumber is cultivated in many places for salting, or preserving by barrelling, and sinking the barrel in a well. In some places, the common carnation poppy is grown for the seed, which, taken when beginning to ripen, and strewed on a sort of milk-porridge or milk-paste, made from the meal of buckwheat, and from Polish millet (*Digitaria sanguinalis*), is reckoned a delicacy. Bees are kept by some of the freedmen or minor nobles. The Polish hives, and mode of taking the honey, to be afterwards described, are exceedingly simple; and, never requiring the death of the insects, seem preferable to any mode of bee-culture yet devised by the bee-masters of other countries. Hirschfeld mentions, that the gardens of Prince Casimir Poniatowski, elder brother of the last king, contained at one time 5000 ananas, in a range of hot-houses 600 feet long. In 1813, the only pines grown in Poland were a few at Pulhawa, and some grown by a German, who rented the hot-houses belonging to the late king's establishment at Warsaw. Only one or two instances then existed of vines and peaches being grown near the capital, but there was an abundance of these and other fruits at Pulhawa and Zamoyst, and some few at Villanov. The Polish noblemen have gained in every kind of knowledge from having been so long a period in the French service; and, since the re-establishment of peace, they have set about agricultural and gardening improvements with a considerable degree of energy. In the culture of useful plants, and the dissemination of that kind of knowledge amongst the lower classes of society, the Count Wodzicki's patriotic and liberal endeavours are generally acknowledged by his countrymen. His large garden Neidzwiedz, near Cracow, and the Gardener's Dictionary published by him, bear witness to his merit in this department.

913. *Planting, in Poland, is but little required for purposes of utility.* Some public avenues have been formed near Warsaw and Posen; and the elm, one of the best avenue trees, thrives at both places. There are scarcely any hedges in the country, except in gardens, and near towns. The larch tree grows to a very large size in some parts of Poland, and trees have been cut down which, when cleared of the branches and bark, were eighty-four feet long, thirty-six inches in diameter at the broad, and eighteen inches at the small end. The leaves of the pine have been used in tanning leather. A school of forest culture has been established at Warsaw by Count Louis Plater, who has greatly improved the system of managing natural woods.

914. *Original Polish authors on gardening are not to be expected; but translations of various works on rural economy were pointed out to us in the library of the Dominicans, at Grodno.* The only Polish work on gardening, which may be considered as original, we believe to be *Myśli Rozes o Sposobie Zakladania Ogrodow*, &c., 1808; or, "Various Thoughts on the Manner of planting Gardens," by Princess Isabella Czartoryska.

SECT. X. *Of the Rise, Progress, and present State of Gardening in Spain.*

915. *The loss of gardens, or of rural life, it is alleged by Hirschfeld, is far from being general in Spain: not, however, from lightness of character or bad taste, but from a kind*

of supineness which cannot be better described than by calling it Spanish. This supineness is the more incomprehensible, as the country, though desert and uncultivated in many places, is yet full of natural charms in others; thus indicating, as it were, a field of exertion for the hand of man. In many provinces, Puente informs us, one may travel several leagues without seeing a tree; and, according to the same author, the environs of Madrid in his time presented neither pavilions nor country-houses; and it was not till towards the end of the eighteenth century that they began to repair the roads around the capital, and to border them with trees.

916. *Spain enjoys a great diversity of climate*, which, as La Gasca observes, enables her to propagate, at small expense, the greater part of the most precious vegetable productions found in every quarter of the globe. This is clearly manifested by the numerous plants from hot countries, which thrive in her gardens, and which were introduced by private individuals, from laudable curiosity or enlightened patriotism. Those which are the production of northern regions are also found growing spontaneously both on the summits of her high mountains, and on their sloping sides. These fine dispositions of nature would, doubtless, have been turned to more advantage by the inhabitants, had not a depraved government been purposely throwing, for the space of more than three hundred years, insurmountable obstacles in the way of their efforts. A great many enlightened and patriotic Spaniards have repeatedly, though fruitlessly, endeavoured to overcome these obstacles; receiving, as a reward for their benevolent zeal, only sad and bitter disappointments; persecutions, dungeons, the galleys, expatriation, and even death. Such has been the result of their toils, and such will it ever be in countries where there is no liberty to permit the diffusion of useful knowledge through the medium of the press; where no objects are encouraged but those which are not only useless, but hurtful to the national welfare; where no guarantee is to be had for the security of individuals and their property; and where no one can call the soil his own, or cultivate it according to his free will or pleasure. (*Gard. Mag.*, vol. i. p. 235.)

917. *The Arabs of Spain attended to agriculture*, and translated and commented on the ancient authors. Though they occupied themselves more particularly in the study of medicine and botany, they did not neglect the culture of gardens. Many of them travelled to their brethren in Asia, to pursue natural history, and bring plants to Europe. Ebn-Alwan has left us a list of plants in the garden of Seville, in the eleventh century, which are more numerous than those which were cultivated by the Greeks and Romans.

SUBJECT. 1. *Spanish Gardening, as an Art of Design and Taste.*

918. *There are few pleasure-gardens, properly so called, in Spain*; those that pass under this description, La Gasca observes, being of a mixed character, and containing within them spots set apart for culinary vegetables and fruits. These mixed gardens are, however, numerous; and, generally speaking, it may be said with certainty, that, besides the magnificent gardens of La Granja and Aranjuez, and others of less consideration in Madrid and its vicinity, and that of the Escorial and others belonging to the king; the archbishops, bishops, wealthy prebendaries, the grandees, all the monasteries, many convents of friars and nuns, the titled nobility, and some rich commoners and merchants, all have pleasure-gardens belonging to their palaces and country-houses. It may also be said, that, in general, there are more of this class of gardens in the maritime provinces than in those of the interior, and in the eastern and southern more than in the northern and western. (*Gard. Mag.*, vol. iv. p. 16.)

919. *The oldest garden in Spain* is said to be that of the Moorish palace of Alcazar, near Seville; but a great part of this palace was constructed between the years 1353 and 1364, by Peter the Cruel, who exactly copied the Arabian style of the ancient part of the edifice; and part was erected by Charles V. The outside of the Alcazar is miserable in its appearance; but the first court after entering the gate has a very grand effect; the part looking into that court is purely Arabic in its style, though ascertained to have been constructed since the conquest by the Christians. The courts are ornamented with marble fountains, and are well shaded with corridors, supported by marble pillars. The garden of the Alcazar is said to have been laid out by the Moors, and is preserved in its original state. It contains walks paved with marble, and parterres laid out with evergreens, and shaded with orange trees. In many parts of it there are baths, supplied by marble fountains from an aqueduct, and there is a contrivance for rendering the walks one continued fountain by forcing up small streams of water from minute pipes in the joinings of the slabs, which in this climate produces a most grateful effect. As a specimen of an Arabian garden in its original state, this is an interesting object, and we naturally associate with it recollections gathered from the Eastern writers; especially from the Song of Solomon, in which the descriptions very well agree with this garden; for, in addition to the other circumstances, it is completely walled round, and is secluded

from every one, except the inhabitants of one part of the palace. (*Jacob's Travels in the South of Spain.*)

990. *The remains of a reputed Moorish garden* still exist at Granada, another residence of the Arabian kings. It is situated on the Sierra del Sol, or mountain of the sun, occupies above twenty acres, is covered with a wood cut into quarters by straight and winding walks, and is interspersed with fountains; the latter sometimes ostentatiously displayed, and at other times secreted so as to escape notice till they are brought to play on the spectator, and to raise a laugh at his expense. Sir John Carr mentions that they take a particular delight in playing off these reversed showers which rise from the principal walks and places of repose, against the ladies. Several of the fountains, and many of the walks, were formed by Charles V.; so that, except certain venerable cypresses, and the old palace, no other part can with certainty be traced to the days of the Moorish kings. These cypresses, Brooke informs us, are of prodigious size, being the growth of several centuries. (*Travels in Spain, &c.*, vol. ii. p. 212.)

991. *In the beginning of the fifteenth century*, soon after the union of Spain under one monarch, Charles V. made considerable improvements, and formed gardens and fountains at different palaces, of which little now remain.

992. *In the beginning of the seventeenth century*, under the reign of Philip IV., were laid out the finest gardens in Spain. These are the gardens of the Escorial in Madrid, of Ildefonso in its neighbourhood, and of Aranjuez near Toledo. Evelyn, in 1667, being anxious to receive some account of them, writes to the Earl of Sandwich, then the English ambassador at Madrid, who answers him in such a way that Evelyn was "exceedingly affected with the descriptions, and greatly instructed in many particulars."

993. *The gardens of the Escorial* adjoin the palace, from which you descend to them by vast terraces and stairs of marble, varied by fountains. The garden, or rather park, below, is of great extent, and the compartments formed by the intersection of the alleys are filled with different sorts of fruit trees. This is the general outline; and for the details of the statues, fountains, trellis-work, basins, &c., we must refer the reader to Thompson's *Description of the Escorial*, or the art. *Escorial*, in the *Encyc. Brit.*

994. *The Escorial* is in a wild and gloomy situation: there is no town or city nearer to it than Madrid, a distance of thirty-four miles. The terraces and gardens contain nothing remarkable. Ildefonso and La Granja are the same. The palace was built by Philip V. Among the fountains are two remarkable ones with statues. The one representing Fame seated on Pegasus, raises a jet to the height of 132 feet: the other, called *Plazuela de los ocho Calles*, consists of eight fountains, which unite, and form a beautiful and chaste temple of the Ionic order, adorned by columns of white marble. (*Ingles's Spain* in 1830.)

995. *The garden of Ildefonso* is situated around a summer-house, or *château de plaisance*, of that name; and here nature and art, says P. Caimo (*Lettres d'un Vago Italiano, &c.*), combine to spread their respective beauties, and render this garden as magnificent as agreeable. Fountains, jets d'eau, canals, temples, covered seats, cabinets, bowers, grottoes, labyrinths, pastures, hedges of myrtle and laurel, are so distributed as to produce the best effect. The water is collected in streams from the surrounding mountains, and made to unite in a torrent which precipitates itself into an immense reservoir. Hence, from this abundant source, the fountains are as powerful as numerous, and no species of artificial ornament is omitted that can embellish a garden. The alleys are very long, some of them three fourths of a league. Most of them are kept shorn on the sides, forming a thick close surface from the ground to the summits of the trees, and statues are placed at regular distances.

996. *The garden of Ildefonso* occupies a ridge, rising to the south, and falling both to the east and to the west. Near the palace it is laid out in the old taste, with clipped hedges and straight walks, highly adorned and refreshed with numerous fountains; but in proportion to the distance it becomes more wild, till it terminates in the uncultivated and pathless forest, where the craggy rocks appearing among oaks and pines, present a striking contrast with the works of art. This garden, Townsend observes, is delightful for its walks, which, although shady, are neither damp nor gloomy; and if it be true that beauty is founded on utility, this place will always deserve to be admired. In the present day, it is not uncommon to build the mansion in the middle of a field, open and exposed to every wind, without shelter, without a fence, wholly unconnected with the garden. Near the habitation all is wild; and art, if any where, appears only at a distance. In all this we can trace no utility, nor will succeeding generations discover beauty. On the contrary, in the garden of Ildefonso, we find every thing which in a sultry season is desirable; a free circulation of air, a deep shade, and refreshing vapours to abate the heat; while, from its contiguity to the mansion, the access to it is easy, and at any time these comforts may be instantly enjoyed; yet without their numerous fountains, the clipped hedges, and the narrow walks, the circulation would be less

rapid, the shade less deep, and the refreshing vapour would be wanting. (*Townsend's Travels in Spain*, vol. i. p. 360.)

927. *The gardens of Ildefonso, or La Granja*, La Gasca tells us, are considered by many persons to be superior to those of Versailles; and what renders them most delightful, he observes, is their fine stately woods of lime, oak, elm, black poplar, aspen, horse-chestnuts, and other forest trees. The walks through these are completely shaded during summer, and the air is agreeably cooled both by the cascades of water which fall from the elevated summits of the high grounds, and by the diversified play of the numerous fountains. These circumstances, taken in connection with the natural beauty of the situation, render the whole a most enchanting spot. There is a kitchen-garden belonging to this residence, and various nurseries for propagating fruit and forest trees; the latter for the purpose of replacing the decayed plants of the gardens, and for giving away as presents. There is also a flower-garden, in which are cultivated various species of saxifrage, anemone, and ranunculus, which, being peculiar to cold climates, cannot be cultivated in the other royal grounds, nor even at Madrid. There also is the *Erythronium Dens canis*, and other northern bulbs. Among the culinary vegetables and fruit for the royal household are the red and common cabbage, broccoli, French beans without strings, lettuce, &c. Of fruits, there are the strawberry, raspberry, currant, and gooseberry; with many sorts of pear, apple, and plum, which deserve to be particularly noticed, on account of their fine qualities, and of the time they are in season.

928. *The royal gardens of Aranjuez*, La Gasca tells us, are extensive and diversified. They are situated in a beautiful and fertile plain, through the middle of which flows the rapid Tagus. Besides a number of the trees and shrubs of the peninsula, many natives of South America are here cultivated, especially those of the families *Coniferae* and *Amentaceae*; the cedar of Lebanon, different species of lime, maple, ash, and various species of *Æsculus*, *Juglans*, *Morus*, *Crataegus*, *Prunus*, and the *Asimina triloba* of Dunal, which last blossoms, but never yields fruit; the tulip trees, the *Magnolia grandiflora* and *glauca*, the *Sophora japonica*, the *Calycanthus floridus*, *Chimonanthus fragrans*, and various others. An account of all the trees in this garden, written by the brothers Boutelou, may be seen in the *Annals of Natural Science of Madrid*, and in the last volume of the *Seminary of Agriculture*, published in that capital up to the year 1808. The trees, which are planted in ground of great fertility, and irrigated sufficiently, acquire a size which justly attracts the admiration of travellers, and gives a majestic aspect to the avenues and walks; among which the Queen's Walk deserves especial mention. A great part of these gardens is destined for nurseries and seed plots for raising trees; most of which are afterwards annually distributed gratis among individuals, and public establishments. Another sufficiently large portion, divided into squares, and rather monotonous in its appearance, is devoted to the cultivation of ornamental shrubs and flowers. There shine various species of roses, *Viburnum*, and *Spiraea*; the varieties of *Amegdalus pumila* and *nana*; the rosemary, *Sálvia*, and some curious varieties of the *Crataegus monogyna* and *Oxyacantha*; the *Myrtus coccinea*, and the *Syringa*; the *Robinia umbraculifera* and *hispida*, which, when grafted on the *R. Pseudacacia*, assume the shape of a middle-sized tree; the *Ruscus aculeatus*, box, and various others. They also cultivate, in great abundance, many beautiful varieties of *Tulipa Gesneriæna*, and the *sylvêstris* and *præcox Cav.* and *T. Clusidna* of Redouté; many varieties of *Hyacinthus orientalis*, *Bellevia operculata*, and *Muscari moschatum*; many species and varieties of *Narcissus*, *Lilium*, *Gladiolus*, and *Fritillaria*; *Heimerocallis flava* and *fûlva*, and *Punkia subcordata*; many pleasing varieties of *Anemone coronaria*, *hortensis*, and of *Hepatica triloba*, *Ranunculus asiaticus*, gillyflowers, *Iberis*, *Balsamina hortensis*, there called *Nicaraguas*, *Gomphrena globosa*, *Celosia*, *Amaranthus*, and the *Delphinium Ajacis* and *Consolida*, *Chrysanthemum sinense*, georginas, some asters from South America, besides *Callistema chinensis*, *Ximenesia encelioides*; different species of *Helianthus*, *Scabiosa*, *Arméria*; various species of *Cistus*, and a great variety of *Diánthi*. In the green-house are many bulbous exotics, different species of *Cactææ* and other succulent plants; the *Geraniaceæ*; different varieties of orange, lemon, lime, and citron trees; *Psidium pyrifera* and *pomiferum*; and some exotic trees and shrubs, among which are different individuals of the *Cedrela odorata*. (*Gard. Mag.*, vol. iv. p. 68.) The charms of Aranjuez are of quite a different kind from those of La Granja. The latter would have been beautiful if the aid of art had never been sought; the latter would never have been noticed if the wealth of the kings of Spain had not been employed to make it a spot worthy of a palace. It is, however, well irrigated, and the woods are remarkable for nightingales. The gardens in 1830 were in the most perfect order. (*Inglist's Spain* in 1830.)

929. *Of the palace and gardens of Aranjuez*, Baretti observes (*Tour* in 1776, vol. ii.), "that a poet would say, that Venus and Love had here consulted with Catullus and Petrarch, in order to construct a country residence worthy of Psyche, of Lesbia, of Laura, or of some infanta of Spain." The park, which is several leagues in circumference, is intersected by alleys, three, and even four miles in length; these alleys are formed of

double rows of elms, and are sufficiently wide for four carriages to drive abreast. On each side, between the rows of trees, is a canal kept clear by a continual stream which passes through it. This water has contributed to render the trees of an enormous size and thick verdure from top to bottom. The compartments, or *islands*, formed by the alleys and the canals, are covered with copse, and occupied with deer, wild boars, hares, rabbits, pheasants, partridges, and other wild animals and birds, which are regularly fed by certain shepherds or attendants, and have incredibly multiplied. This park, like the garden of Eden, is divided by a river (the Tagus); and, what is remarkable and prince-like, it is without surrounding walls, but verges into an open hilly country. The palace is near the centre of the park, on the margin of the river, and both banks are united by a bridge of five arches. In front of the palace is an immense circular level lawn, ornamented with four trees in its centre. On the whole, according to Barretti's description, this must have been the finest park in the old style in the world.

990. *Buen Retiro*. The most remarkable garden within the walls of Madrid is that of the Buen Retiro, which contains a menagerie. Before the war of independence, it was the most delightful promenade in the environs of Madrid; but nearly the whole garden, with the superb china manufactory it contained, was destroyed at that period. Subsequently, however, the king has laid out a great deal of money in repairs, and in giving Buen Retiro a new form; adorning it with fountains and basins which are new features in the place, and sinking a well to provide a sufficient supply of water, in which it was before rather deficient. The king has also caused a small dockyard to be constructed, close to the large basin belonging to the place where the barges and royal yachts are built. The public enjoy the privilege of walking in the greater part of these gardens (which appear to exceed the Regent's Park, London, in extent), the remainder being exclusively for the recreation of the royal family: this latter portion is enclosed by a wall, and is laid out in pleasure-ground, orchards, and kitchen-gardens; the pleasure-ground has a Russian mountain.

991. *Other gardens in Madrid*. Most of the *grandees* in the city have symmetrical pleasure-gardens; and several wealthy merchants have theirs also. One of the principal of these gardens is that which belonged to the Duchess del Infantado. It is formed on uneven ground, and is laid out without order or symmetry; but is very similar to that which the city of Madrid presented to the late Queen Isabel of Braganza. Most of these gardens have green-houses, for the purpose of keeping succulent and other tender plants which are cultivated in groups of allied families, or natural orders, during the winter.

992. *A royal residence in the vicinity of Madrid* is mentioned by La Gasca as a square of about two leagues on each side; surrounded by high walls. In this residence, besides several woods, some arable land, a few plantations, and nurseries of fruit and forest trees, there is a great basin of spring water, and some symmetrical parterres adorned with statues and fountains. (*Gard. Mag.*, vol. iv. p. 69.)

993. *Moncloa* is a royal residence near Madrid, situated on uneven ground. Half of it is devoted to the cultivation of fruit and culinary plants, and the other half to pleasure-ground; this is partly symmetrical, and partly Chinese. (*Gard. Mag.*, vol. iv. p. 69.)

994. *The Prado*, a much more extensive place than the royal country-house, was kept, during the two last reigns, as a hunting-box; it contains also some pleasure grounds, though they are not very extensive. (*Ibid.*)

995. *La Quinta del Principe Pio* (country-house of the Prince Pio) is situated in a narrow valley; the southern side of which is planted with vines of muscadine grapes, and has a delightful orchard which embowers the bottom of the dale; the northern side is laid out with flowers and shrubs, the slopes being disposed in terraces, and decorated with fountains and statues; and lastly, over the summit of the northern hill is a magnificent semicircular basin, the greater part of which is roofed in the shape of a shell; the roof and basin representing in some measure an oyster half open.

996. *Gardens in the neighbourhood of Madrid*. The finest gardens near the capital, which belong to private individuals, are found in the two Carabanchales; and the most remarkable of them are those of Count Miranda and the Countess Chinchon. The same countess has another garden at Bobadilla. The garden possessed by the Duke del Infantado in Chamartin, and above all the one kept by the Duchess of Benevente (known by the name of the Alameda), are also well deserving attention. It is but justice to the duchess to state, that she has more spirit and taste, in botany and gardening, than all the other *grandees* of Spain put together. The Alameda is embellished with fountains, basins, cascades, canals, statues, temples, &c., and is well provided with glass frames, in which many curious exotic plants are kept.

997. *The open country round Madrid* is extremely barren. The banks of the shallow Manzanares, where gardens might be laid out conveniently, and at little expense, is inapplicable for such purpose, from malaria, which is apt to cause ague in the spring, summer, and autumn months. This naturally makes the inhabitants of Madrid unwilling to

reside there; and consequently these banks will remain unoccupied, till improved by sufficient drainage.

938. *The garden of Mr. Cranston, at Xeres, is laid out in beds, elevated above the paved walks, and bordered by broad stones. Rain falling in this country irregularly and rarely, and water being scarce, the walls which surround the garden are covered with inverted semicircular tiles, which serve as gutters to catch the rain, and convey the rain water by numerous channels to the beds. (Swan's Journal of a Voyage up the Mediterranean, vol. i. p. 23.)*

939. *Gardens of Cadiz.* A few years ago, says La Gasca, Cadiz was an opulent city, and supported, at great expense, many pleasure-gardens on the small space of land which lies outside the Puerta de Tierra. They have, however all disappeared, and the principal gardens now (1828) left in Cadiz, are those of the convents, and some small but very beautiful ones belonging to the hospital. In these latter, *Musa sapientum* produces well-ripened fruit. La Gasca states that in these gardens are cultivated for ornament many varieties of *Cápitum frutescens*, *cerasifórmis*, *microcarpon*, &c., and the *Clarisia volúbilis* of Abat, which Jussieu has called *Arredera*, a corruption of the Spanish word *enredadera*; which is the general name used for all twining plants. There is in Cadiz quite a passion for flowers, which is gratified, in some degree, by the inhabitants of the city buying all those brought from the gardens of Puerta del Santa Maria, with which they convert the very roofs and balconies of their houses into gardens. They cultivate in the open air various species of *Mesembryanthemum*, *Cactus*, and *Pelargónium*, with many bulbous roots from Peru, Chile, and the Cape of Good Hope.

940. *The pleasure-gardens in the Puerta del Santa Maria, and in Chiclana, belong chiefly to the merchants of Cadiz, and supply that city with abundance of flowers. In these gardens are cultivated many of the African and American plants already mentioned. La Gasca states that he saw in them two trees of Erythrina pointhos of Brotero, covered with blossoms and half-ripened fruit, which the gardeners assured him annually produced great quantities of seed. Poinciana pulcherrima, Adenanthera pavonina, and Clementia nitida (in the Havannah called Mate), with other American plants, are also cultivated. In 1823, General Uriarte preserved in one of these gardens the cochineal which had, during the absence of the illustrious Cabriera, perished in Cadiz. In San Lucar de Barrameda there is a very celebrated geometrical garden, called Del Píscacho, the property of the Marquis of Saravia, a Castilian noble, who resides in Cadiz. It is ornamented with fountains and statues, and contains many rare exotics, among which are some small trees brought from the East Indies in 1819. The favourite flower at Cadiz, as well as throughout Spain, is the pink (Dianthus), of which the varieties are infinite: the lilac, anemone, jasmine, sambac, sweet basil, mirabel (Chenopodium scoparium), and various succulent plants, are also greatly esteemed; the beautiful varieties of the poppy are also well worthy admiration, especially as this plant may perhaps some day form a profitable branch of Spanish husbandry. The cultivation of the Mimosa pudica (which produces great quantities of seed in the open air) is also very general; the Mimosa sensitiva is cultivated in some gardens. There is no house without a few pots of Alexandrian laurel (Ruscus racemósus); or garden in which the sponge tree (Acacia farnesiana), in Spain vulgarly called aroma (spice), is not found; indeed, in the south of Spain it is almost wild. They have likewise introduced many varieties of fruit trees, which formerly were only to be found in botanic gardens about Madrid. Among their creeping plants may be observed many species and varieties of Ipomoea and Convolvulus, the Ipomoea Quamoclit, coccinea, and heterophylla, both maurandias; various Cucurbitaceæ, Phaseolus Caracalla, Dólíchos lignósus, Clarisia volúbilis indigenous at the Havannah, with many species and varieties of other plants.*

941. *The gardens of Seville.* As great a love of flowers prevails in this city as in Cadiz; and this the traveller immediately perceives, from the windows and balconies being filled with pots of Amarýllis regina, Belladonna, and formosíssima, Polianthes tuberosa, Narcissus, tulips and other bulbs, yerba Luisa (Alóysia citridora Pall.), Pelargonia, and Jasmineæ. Almost every house has a small flower-plot, and some have rather large ones, as well within the city as at the country-houses in its neighbourhood. The walls of these villas are generally covered with oranges, lemons, citrons, and limes, all entwined and mingled with each other; but the grounds are laid out with great regularity, and are ornamented with fountains and statues, as are almost all the gardens in the peninsula. In one garden La Gasca saw, growing in the open air, the Poinciana pulcherrima and A'brus precatórius; and his friend and fellow-professor, Don José Demestrio Rodriguez, told him that he had often seen two species of Plumieria among the gardens of Seville. The garden of the royal palace is curious, from the capricious variety displayed in the forms of the masses of shrubs and trees.

942. *The garden of the Alcazar at Seville is more beautiful than that of the Alhambra. The hedges are small-leaved myrtle; pelargoniums, and that delicious plant yerba Luisa, cover the walls; and through the whole there is a thick shade of orange and lemon trees.*

Every where around are seen fountains throwing out the clearest water; and, by a very simple machinery, a thousand minute pipes dispersed over the walks and beds shower crystal streams upon the paths, and awaken new fragrance in the flowers. The garden is surrounded by a high wall, near the top of which there is a walk under an arcade supported by innumerable pillars. (*Juglie's Spain* in 1830, vol. ii. p. 80.)

943. *San Juan, near Seville*, is a pretty village, remarkable for a neatness and simplicity of appearance very unusual in Spain: it is celebrated for the fineness of its olives, and, from its contiguity to Seville, is much frequented by parties of the inhabitants of that city, particularly in the spring. The villas beyond it, and which are scattered among the olive groves at the foot of the heights, are very beautiful, and worth visiting, particularly one belonging to a nobleman of Seville. When visited by Sir A. Brooke, he thought it "a perfect little paradise; and, notwithstanding its attractions were greatly lessened by the dry season, the lanes and hedges were covered with roses, honeysuckles, yellow jasmynes, and a variety of other plants. The pleasures, however, of a country residence like this, close as it is to so opulent a city, are greatly diminished, not only by the bad state of the roads, but also from their being infested with robbers. On this account the numerous villas in the neighbourhood of Seville are seldom inhabited, being only occasionally visited by the proprietors in the daytime, and even then not without risk. Such is the wretched state of this part of Spain." (*Brooke's Travels in Spain and Morocco*, vol. i. p. 60.)

944. *Gardens of Cordova*. This city, whose inhabitants are now almost as ignorant as they were formerly illustrious for their learning, does not show the same taste for gardening as its neighbours, Seville and Granada, notwithstanding it possesses equal facilities: it has, however, a few gardens, of which those belonging to the bishop are respectable.

945. *In Murcia and Orihuela de Segura* a taste for fruit-gardens prevails. In Murcia, however, those of the Countess de Valle St. Juan, the Marquis of Espinardo, the silk manufactory, and some others, in an ornamental point of view; and in Orihuela, those of the Marquis of Rafal and the Count of Arneva, are worthy of notice. In the former garden, the *Opúntia cylindrica* of De Candolle, and the *Andra Cherimolia*, bear plentifully. The latter has most delicious fruit, each weighing from four ounces to two pounds. The marquis has another garden at Beniél, a town situated hardly a league to the westward of Orihuela, which, from the number and variety of plants naturalised there, deserves the name of botanic rather than that of pleasure garden. In this garden are a great variety of plants, particularly pelargoniums, Cacti, aloes, agaves, *Euphórbia aphylla*, *Cotyledon orbiculata*, *Portulacaria afra*, and other American, African, and Asiatic plants, all growing together as if under their native skies. There is also a garden hedge composed entirely of the fragrant yerba Luisa (*Alóysia citriodora*), the leaves of which are frequently used in Spain to make an infusion, in the manner of tea, of great service in stomachic complaints. In the low irrigated lands of Murcia and Orihuela there is not a house or a cottage which has not its garden well stocked with carnations, double mulberry-coloured wall-flowers, Job's tears, *Cánna indica*, *Jasminum grandiflorum*, *Rosmarinus* and *Sálvia officinalis*; *Ocymum basilicum*, bullátum, and mínimum; and *Artemisia arborescens*. In every cleft of the rocks which bound the garden of the bishop of Murcia, on the mountain of Santa Catalina, a league to the south-east of the city, the *Jasminum grandiflorum* grows as if wild, and flowers throughout the year. The *Arum Colocasia* is also met with in many gardens, and probably may, ere long, be cultivated as an edible root in that country.

946. *Gardens of Malaga*. Alhaurin, a town situated on a hill, at the extremity of the valley of Malaga, and watered by the Guadalaxara, is not more admired for its picturesque situation and fine supply of water, than for the beauty of its flower-garden. During summer it is much frequented by the rich inhabitants of Malaga.

947. *El Retiro*, the seat of Count Villalcazar, lies a few miles from Malaga, and was formerly a royal residence. The gardens are laid out in the Moorish style, with straight cypress walks. They are remarkable for the lakes, fountains, and beautiful waterworks which they contain; the curious shapes into which the trees and shrubs are cut, and the great variety of the flowers cultivated. Adjoining the estate of Count Villalcazar are the beautiful gardens of the Prussian consul, in which the coffee tree produces fruit plentifully, though growing in the open air. General Don Francisco Abadia sent La Gæca two branches of this tree loaded with fruit, in 1821; and at the same time informed him that many trees indigenous to Cuba flourished near Malaga; among others the hatchet-breaker, so called from the extraordinary hardness of its wood.

948. *The gardens of Granada*. In the romantic city of Granada is still preserved the famous palace or Casa del Amor, built by the Moors, who ruled there many centuries. It is situated on a rugged eminence, and, with its spacious and picturesque gardens, chiefly dedicated to the cultivation of fruit and flowers, occupies great part of the mountain. The ground is formed into terraces, and ornamented with statues, canals,

fountains, cascades, and lakes. From it may be seen great part of the pleasure-gardens belonging to the city, all furnished with beautiful fountains of the purest water. All the banks of the rivers near Granada are embellished with numerous *carmenes* or enclosed gardens. They are chiefly appropriated to the culture of flowers and fruit trees, standards as well as trained; they also have their statues, cascades, and groups of figures. A garden, to be denominated a *carmen*, must be situated on the banks of a river.

949. *The Duke of Wellington's estate, the Sota de Roma*, situated at the extremity of the vega of Granada, is extensive, finely wooded, and watered by several beautiful streams. It was, in the time of the Moors, the favourite retreat of the sovereigns of Granada. The house is a plain building, with the walls much cracked by earthquakes. The different farms on the estate are nearly as well managed as those in England. (*Brooke's Travels in Spain and Mor.*, vol. ii. p. 229.)

950. *Gardens of Valencia*. In the city the most celebrated garden is that of the Baron Manuel; but those of the Marquis la Romana, the Plaza de San Domingo, the capuchins, the nuns of S. Catalina, and the newly erected royal gardens, are also worthy of note. Perhaps there is not throughout Spain a people so passionately fond of flowers as the Valencians: many employ themselves exclusively as florists, and find it a profitable employment. It is true, they cultivate but few species; their collections consisting only of wall-flowers, roses, anemones, violets, jasmines, and a few lilies; but from these they have obtained such a multitude of varieties, particularly pinks, anemones, and wall-flowers, that they must be considered proficient in floriculture. The carnations of Valencia are eagerly sought for; and were it not that the communication with the interior is tardy and difficult, the growers would derive considerable profit from the sale of this plant alone. It is the only place in Spain where they grow pinks of a blue colour: those of straw and lemon colour are common. The only gardener in Madrid who gained a livelihood by his profession was a Valencian. The archbishop of Valencia has a country-house, and beautiful gardens, at Puzol, near the city.

951. *Gardens of Barcelona*. The environs of Barcelona are embellished with many country-houses and pleasure-gardens called *torres*: these are regularly laid out, and, as usual, adorned with sculpture and fountains. The commercial intercourse of the inhabitants of Barcelona with France and Italy enables them to procure scarce ornamental plants and flowers with facility and despatch. The garden of the Marquis of Lluçia, called the Labyrinth, three miles distant from Barcelona, of Don Antonio Gironella, merchant, and that of the Capuchin friars of Sarria, scarcely a league distant from the city, are greatly superior to any of the others. The first of these comprises the greater part of an estate a mile in circumference; and it has, besides an extensive labyrinth formed by hedges of clipped box, another portion of ground exclusively appropriated to the cultivation of flowers and ornamental shrubs; delightfully interspersed with cascades and other waterworks, and the most exquisite marble statues of Italian workmanship. There is on the same estate a fine wood, with a fruit and culinary garden. The garden of Gironella is still more famous than the Labyrinth. It is laid out with great taste; and has, among other curiosities, a labyrinth formed by streams of water; the waterworks are in greater variety, and any person is allowed to visit them. The garden of the capuchins of Sarria forms a complete landscape of the most sombre character, being chiefly composed of cypresses and other dark-foliaged trees: it contains many waterworks, and some clay figures executed by the monks themselves. The whole forms a retreat well calculated to awaken religious feelings, and has convenient walks for the fathers, during the sultry heat of midsummer, impervious to the rays of the sun. Within the city of Barcelona there are many pleasure-gardens; the best belongs to the captain-general; it is situated on the walk of the esplanade, and is always open to the public. (*Gard. Mag.*, vol. iv. p. 76.)

952. *Among the other principal gardens of Spain* are many very celebrated ones in Castile and in Valladolid. Among the latter may be mentioned that of the Marquis of Revilla. The garden of the Duchess and Countess of Benevente, in the town of the same name; that of the Duchess of Alba, in Fredrahita; several others in Navarre, Galicia, and the Biscayan provinces, are also well worthy of notice. (*Gard. Mag.*, vol. iv. p. 76.)

953. *The gardens of Tarragona*. *Granjas*, the seat of Don Ramon Fortunj, near Tarragona, appears to be in good taste, combining the ancient style with the cultivation of the orange, fig, vine, olive, and other fruits, and with an accidental mixture of rocks and picturesque scenery. A very interesting engraving of this peculiar and beautiful residence is given by Sir John Carr, in his *Travels in Spain*; the doors of the dining-room, he informs us, open into a small garden, the walls of which are covered with myrtles, jasmines, and roses, and the view is over an orchard of olives, oranges, and pomegranates. In the centre of the garden are grotesque waterworks. We are not aware of any attempt to introduce the modern style of landscape gardening in this country.

The hermitages of Montserrat, near Tarragona, abound in oak, olives, ash, elm, box, myrtle, eglantine, jasmine, rosemary, lavender, thyme, and other aromatic shrubs and plants, tastefully disposed among the rocks and declivities, by the hand of nature, with very little assistance from man; that of Santa Ana, fig. 209, is one of the most remarkable.

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954. *The public walks and promenades.* Almost every town in Spain has a public walk, where the better classes assemble in the afternoon. The promenade at Madrid is called El Prado, but the more general name in the provinces is the Alameda, from *alamo*, a word used to express an elm or poplar; those trees being most commonly planted for shade. In all the promenades, large stone benches run in the direction of the alleys, for the people to sit upon, either for the purposes of repose or conversation; and there are generally numerous fountains of delicious water. No less than twenty or thirty men carrying each two large glasses which hold about a quart apiece, are constantly moving to and fro, clashing their glasses together, so dexterously, without breaking them, that they keep up a lively tinkling noise, like that of bells. (*Doblado's Letters from Spain.*)

955. *El Prado* is a fine spacious *paseo*, at least two miles long, and from 200 to 300 yards broad, adorned with rows of trees, and several fountains. The most frequented part, however, is not more than half a mile in length, and has scarcely any shade. It is crowded with company every evening, particularly on Sundays. "Every Sunday, from four o'clock until six or seven, the Calle de Alcalá, a noble street, nearly a mile in length, and at least twice as broad as Portland Place in London, is crowded from end to end, and from wall to wall; so that a carriage finds some difficulty in making its way." The view of the Prado from the Calle de Alcalá is very fine. "Standing at the foot of this street, you have on the right and left the long wide Prado, with its quadruple row of trees stretching in fine perspective to the gates that terminate it; behind is the magnificent gate of Alcalá, a model of architecture; and before lies the Calle de Alcalá, reaching into the very heart of the city, and containing many superb hotels, convents, and public buildings." (*Ingles's Spain in 1830*, vol. i. p. 81.)

956. *The Alameda at Ronda* is one of the most remarkable in point of situation in all Spain. It lies high, and the avenues of which it is composed are planted with fine elms. At the extremity of the walk is a neat iron railing, and beyond, a view of the opposite mountains, which generally attract the attention of strangers so completely, as to prevent them from perceiving, till they are close to the railing, that it is on the very edge of a precipice. From this point the eye glances down a perpendicular cliff of several hundred feet, at the base of which the Guadiana dashes swiftly along; the height being so great that the roar of its cataracts dwindles into a faint lulling hum. (*Brooke's Travels in Spain and Mor.*, vol. ii. p. 186.)

957. *At Bilbao* the public promenade leads to the port, and part of it is allotted to the fruit and vegetable market. The bread market is held on the same spot. (*Ingles's Spain in 1830.*)

958. *At Granada* there are two alamedas; one, along the banks of the Xenil, is within

the city, and is the most frequented; the other is a path above the Daro, which flows through a deep and finely wooded ravine. Nothing in Switzerland excels the romantic and striking scenery of the valley of the Daro; and magnificent glimpses of the Alhambra, and the gorgeous city, are frequently caught beyond it. (*Ingli's Spain*, vol. ii. p. 243.)

959. *At Gibraltar*, the alameda is truly a little paradise. Along the whole of the north side of Gibraltar there is a level stripe between the base of the rock and the sea. This stripe varies in breadth from a quarter to, perhaps, two thirds of a mile; the east end is occupied by the town, the west by the alameda. This delightful promenade is about half a mile long; it is intersected by numerous walks, and affords, besides its own attractions, ever-changing and beautiful views of the bay, the rock, the mainland, and the town. The hedges are all pelargoniums of surprising size and beauty, and the trees are chiefly figs, with their broad leaves and fantastic trunks, silver elms, acacias with their yellow tufts full of fragrance, and orange trees speckled thickly with blossoms and bright fruit. The alameda of Gibraltar would be beautiful any where, but how much more so is it, bounded as it is on one side by a rock 1500 feet high, and on the other by a placid bay in the Mediterranean! (*Ingli's Spain*, vol. ii. p. 165.)

960. *The Delicias at Seville* is a most delightful promenade. It is situated about a mile down the river, and is in fact a grove of flowering trees and aromatic plants. There is a complete underwood of pelargoniums bordering the walks, trailing upon the trees, and spreading over every unoccupied spot. Rows of acacias line the avenues, and form, with majestic weeping willows, a delicious shade. All the opposite bank of the Guadalquivir is a succession of orange groves. (*Ingli's Spain* 1830, vol. ii. p. 71.) There are several other public promenades at Seville, particularly one in the town, which is furnished with circular stone seats, and lies on the banks of the river.

961. *At Elche, in Murcia*, the view from the alameda is rendered particularly striking by the fine effect of the forest of palm trees which surrounds the town.

962. *At Cadiz* the alameda is on the ramparts, which are shaded with trees, and command some delightful views. Many other alamedas and pases, in different parts of Spain, are also well deserving notice.

963. *There are few public cemeteries in Spain.* That of Bilbao is of modern date, and is almost the only one planted with trees, and laid out as a garden, which is mentioned by tourists. Bilbao, which has taken the lead of the Spanish towns in this and many other improvements, owes its present flourishing state to commerce; and should a more liberal government give freedom to the general trade of Spain, no doubt other towns would soon follow its example.

964. *Cemetery at Bilbao.* "This public burying-place has been enclosed in consequence of a quarrel between the Franciscan convent and the chapter of Bilbao respecting the dues of burial in a place to which both claimed a right; and the corporation completed the new cemetery at an expense of not less than 30,000*l*. The gateway is beautiful, and has an appropriate inscription over it. The design of the Corpo Santo is this:—A square area of about six acres is surrounded by a covered arcade, supported by Doric columns; the back of the arcade is an immense wall of brickwork, in which there are four rows of spaces for coffins, the opening one yard square, and six feet and a half long; into this the coffin is deposited; the spaces which are not occupied are slightly closed up, and a ring in the centre shows that they are vacant. When a coffin is deposited, the opening is built up with brick and lime, and a stone or marble slab fitted into it records the name of the buried. The cemetery is fitted to receive 3000 dead: a great number for so small a space; and the area beyond the arcade is tastefully laid out as a garden and shrubbery. The inscription over the inner gate is, 'Stop, thoughtless wanderer, and reflect: this gate separates the dead from the living!'" (*Ingli's Spain* 1830, vol. i. p. 29.)

SUBJECT. 2. *Spanish Gardening, in respect to the Culture of Flowers, Plants of Ornament, and Botanic Gardens.*

965. *The study of plants* is of great antiquity in Spain. This study was introduced by the Arabs; there was a considerable collection of plants at Seville early in the eleventh century; and half the common plants of the country, Harte informs us, have names derived from the Arabic. The succeeding seven centuries present a blank in this branch of gardening history. According to Deleuze, the taste shown for botany in Spain and Portugal, at the beginning of the sixteenth century, declined with the sciences; and that country where they had been cultivated when the rest of Europe was in a state of barbarism, appeared to sink into apathy, after having shone with the greatest éclat under Charles the Fifth of Spain and Emanuel of Portugal.

966. *Botanic gardens.* The only botanical gardens existing at the present period in Spain are, that of Madrid, which is denominated the Royal Botanical Garden; those

belonging to the four schools of pharmacy established at Madrid, Seville, Barcelona, and Santiago; that of the college of surgery at Cadiz; that of the university of Valencia; and that belonging to the board of commerce of Barcelona, devoted principally to agricultural botany. In 1818 the government gave orders for six more gardens, also for the study of agricultural botany, to be established at Burgos, Seville, Toledo, Valencia, Badajoz, and Leon; but though professors were nominated to them all, it was only in Seville, Toledo, and Valencia that schools had actually been opened, even in 1830. The botanical garden of Carthagena, being within reach of cannon-shot from that city, was destroyed in 1808, and has never been restored. The horrors of war also put an end to that which had existed at Zaragoza ever since 1796, and which was under the immediate protection of the enlightened society called "The Friends of the Country," who formerly contributed so effectually to diffuse throughout the nation the most useful knowledge, by means of their writings; by the establishment of the Academy of Belles Lettres, and of schools of public economy, mathematics, chemistry, botany, and agriculture; by the erection of a cabinet of natural history; by the annual distribution of prizes; by their labours to perfect the methods of teaching the first rudiments of learning; and, lastly, by the establishment of the Monte Pio for husbandmen, where money was lent on cattle and implements, at a very trifling interest. In the year 1822, the "Friends of the Country" solicited assistance from the government to re-establish their ancient garden at Zaragoza, proposing to make great improvements in it; but it does not appear that they obtained it. The botanical garden belonging to the School of Physicians of Seville, founded by Philip V., at the suggestion of his first physician, the celebrated Don José Cervi, has also ceased to exist; and the same fate has attended the botanico-agronomical garden of Valladolid, which owed its foundation, in 1803, chiefly to the bishop, Don Juan Antonio Hernandez de Larren, and which was supported by the members of the Economical Society of the same city, till the invasion of Napoleon.

967. *The botanic garden of Madrid*, founded in 1755, and situated in the royal country-seat called El Soto de Migas Calietas, on the left bank of the river Manzanares, about a mile and a half from the city, was transferred, in 1788, to the place where it now is, within the walls of Madrid. It is bounded on the west by the magnificent promenade of the Prado, from which it is separated only by an elegant iron railing; on the south by that of Atocha, on the east by the garden of the Buen Retiro, and on the north by that of the monks of St. Jerome, and by the sumptuous buildings of the Museum of Natural History erected by Charles III., and which is now the Museum of Pictures; but another very handsome building is to be erected for natural history in the Prado, so that in this respect it will hereafter be one of the most splendid museums in Europe. (*Link's Travels in Portugal, France, and Spain*, p. 103.) The figure of the garden is an irregular polygon: it has two principal gates, of an excellent style of architecture, as entrances for the public, and four other gates for the private service of the garden. Its extent is twenty-eight fanegadas (about forty-two acres), and is divided into two unequal parts. The largest of these has about eighteen fanegadas; it is divided from east to west into two equal parts by a magnificent walk of about sixty feet broad, beginning at the principal gate of the Prado, and terminating at a handsome portico that leads to the Practical School of Botany, and is to contain such plants and perennials as have not been examined. Each of these plots is subdivided into four equal quarters, and these into as many other divisions, except the two upper ones, which have only three: in the centre of each there is a small fountain, whose waters are brought through subterraneous pipes from the two principal reservoirs intended for irrigation, which have their origin in a source near the Plaza de Toros, at about a mile from the garden, and from two draw-wells, situated at its western extremity. Each division is subdivided, by walks a foot and a half broad, into 280 beds, two feet square, and half a foot deep, in each of which only one species of plant is cultivated. These divisions are enclosed by fences formed of common rose trees (*Rosa gallica* Lin.); and between these and the beds there is a broad walk, with a border about three feet wide, in which different ornamental plants, most of them lilaceous, are symmetrically arranged, at equal distances, in masses. There is externally, between the fences of rose trees and the walks of the garden, a border or plat-band about four feet broad, bounded on the outside by an edging of myrtle or box, about ten inches high, where large umbrageous trees, generally exotics, are planted, about eighteen feet distant from each other, the shade of which preserves, in summer, the plants of the school from the excessive heat of the sun, and without which they would inevitably perish. The spaces left between tree and tree are occupied by shrubs or dwarf trees, which may be pruned; as the yew tree, *Fiburnum Tinus*, *Cerasus Laurocerasus*, *Rosmarinus officinalis*, *Ruscus aculeatus*, &c.; or by those naturally of a fine shape, as the *Robinia hispida* and *umbraculifera*, *Medicago arborea*, *Cytisus austriacus* and *Laburnum*, *Spârtium junceum*, &c.; and by various herbaceous plants of ornament, such as iris, wall-flowers, columbines, different kinds of candytuft or rock cress, dahlias, peonies, common day-lily and yellow day-lily, ranunculus, anemones, upright larkspurs, a great

many varieties of common gillyflowers, speedwells, primroses, sunflowers, starworts, wild marigolds, and various others. The trunks of some robust trees are clothed with creeping shrubs, as ivy, virgin's bower, Virginian silk tree, trumpet flower, *Coccoloba sagittifolia*, which flowers and fruits there in the open air; two kinds of sarsaparilla, the *Menispermum canadense*, and some others. The divisions of the two plots appropriated to perennial and biennial plants of the practical school are divided into twelve parts, each containing twenty-four beds, disposed as already mentioned, and would hold 8000 species; a number which will not easily be collected there, considering the climate of Madrid, which is excessively cold in winter, and very hot in summer. It was projected that each bed should have an iron ticket, with the number of the bed, and the systematic name of the plant it contained, in Spanish; but this plan could not be carried into execution, owing principally to the want of funds.

968. *The upper plot of the Madrid garden is appropriated principally to the cultivation of ornamental plants, and its walks to the reception, during summer, of those plants which, from the middle of October to the middle of April or beginning of May, require to be kept in the green-houses. In consequence of this, though it is also divided into four quarters, the divisions are more numerous, and therefore smaller, and their interior division is changed, at least, once every two years, forming various figures in them, some regular, and others irregular. The transverse walks are considerably less wide than those of the two lower plots, and are all planted with umbrageous trees and fruit trees alternately, whose shade in summer protects the flower-pots which are placed in the walks. These divisions are enclosed by fences made of rose trees of various descriptions, as cabbage rose, red China rose, white rose, and others; while the circular plots of the crossings are crowned with a border in the manner of a garland, formed either of lavender, thyme, cat thyme, sage, savory, seathrift, woolly-leaved mouse-ear, or others; and have in the centre a tree, remarkable either for its handsome top, or for its flowers. At each of their extremities there is a small wood planted irregularly, in the English fashion; and at the upper side of the division are two green-houses, 170 feet long by 30 wide, running from north to south, and presenting a handsome vista when seen from the promenade of the Prado. They are joined by the portico which terminates the principal walk, and by two small parterres, situated between the extremities of each, and a vine-bower. Each parterre has a little fountain, which furnishes water for all the squares in its side. The flower-pots are watered with watering-pots made of tin, which are filled at a beautiful fountain, occupying the centre of a circular plot, which is almost in the middle of the large one, and at the junction of the four principal walks. In each of these two plots there are four stone seats, placed under the shade of the tufted trees which surround them, and which invite to repose those visitors who, in the morning and evening of spring and summer, are attracted thither through pleasure or curiosity. All round this part of the garden there is a walk twenty-five feet broad, most of which, in summer, is shaded by the trees planted along the borders; the whole of the upper plot is embowered by a beautiful trellis, supported with iron arches, and formed by about twenty different varieties of vines. At the western extremity of this plot there is a green-house, facing the south, which contains about 4500 flower-pots. A sloping bank, planted with resinous trees, among which there is the cedar of Lebanon, separates it, to the south, from the other part of the garden; and between the trellis-work and the wall which separates it from the Buen Retiro to the east, rises in the centre a building, in which there is a hall for delivering lectures, a seed-room, and another apartment similar to the latter, which was formerly used as a library. On the left there is a very handsome basin, constructed in 1802; and another, much older, and half ruined, as well as one of the draw-wells above mentioned; and, on the right another old basin, in very bad condition, and a plot of ground in which are prepared the different soils. Near the principal gate, at the western extremity of the garden, is the other draw-well, and a house which was formerly inhabited by the chief gardener, and which now contains all the implements belonging to the botanical expedition of Santa Fé de Bogota. In 1802, a stove was constructed for the plants of tropical countries; but during the war of independence it was so much neglected, that in 1814 it was useless, and has never since been repaired. In the same year, 1802, one of the two green-houses situated at the eastern extremity, and facing the west, was fitted up as a library and herbarium; but both this building and its corresponding one were some years ago declared by the architect in a ruinous condition; and, notwithstanding the repeated applications to government for their re-construction, they continue threatening to bury beneath their ruins every thing which they contain. The part which we have hitherto described is what principally constitutes the botanical garden of Madrid: it is much resorted to, and forms one of the most delightful spots of the capital and its environs. Its broad and straight walks, into most of which the rays of the sun can hardly penetrate; its situation on a gentle slope, which permits the whole to be seen at a glance; the great variety of trees, shrubs, and plants, with which its walks are lined, each bearing a ticket inscribed with its Spanish and*

systematic names; the creeping plants which twine round many of the trees; the multitude of flowers, which in the spring display their brilliant hues, and fill the air with their aromatic perfumes; the gentle murmur of the waters that run through the trenches, or are poured forth by the fountains; — all these, united to the harmonious songs of a variety of singing birds, which have fixed their abode in the thickets, give to the botanic garden of Madrid a decided superiority over the other pleasure-grounds of that city, where the climate, during the summer, is excessively hot. The garden is open to the public, from the last day of the month of May to the last day of October, every day, from half past four in the afternoon till dusk. All persons decently dressed are admitted; and it is very much frequented by the higher classes and the royal family. In the morning, those only are admitted who are well known, and those who have a ticket of admission from one of the professors. The foreign ambassadors may go in with their families at any hour they please, and at all seasons, as well as any traveller who arrives at the capital, and who, if he be himself a professor or an amateur, is attended in his visit by one of the professors of the establishment, who presents him with a specimen of every plant there he may wish for, and, in case of the professor's absence, he is attended by one of the most intelligent gardeners. The students who choose to repair thither are admitted at all hours. The other smaller division of the garden, of which mention has been made, is situated to the south-east, and may also be divided into upper and lower parts. The latter is a prolongation of the inferior plot, extending over four or five fanegadas of ground, and separated from the rest of the garden by a fence formed of the common shrubs, bare's ear, whitethorn, common privet, syringa, and common lilac. Two thirds of it form a single division, which is irregularly divided into smaller ones by means of winding walks in the style of those in the English gardens. It is used also for rearing fruit trees, and as a dépôt for the residence of plants which serve for the demonstrations, and for the medicinal herbs, which are given to the public. The remaining third part, on which formerly stood the lecturing hall, is used now as a kitchen-garden, in which are cultivated, in small portions, various kinds of vegetables, such as lettuces, cauliflowers, French beans, potatoes, onions, love apples, egg plants, cucumbers, melons, pumpkins, asparagus, &c., and some fruit trees. This department is terminated by a yard, in which manure is collected, and where there is a house inhabited by the contractor, who furnishes the manure required for the garden, and who draws the water from the draw-wells. The upper part, which is bounded by the Buen Retiro, and with which it communicates by a gate, forms a small acclivity, from which a great part of the city and its environs are seen. Its most elevated point, which cannot be watered, is planted with about thirty different varieties of vine, which are in bad condition. On the southern slope of this acclivity, which may be watered, there is about half a fanegada of ground used for the cultivation of different varieties of strawberry, garden hyacinth, narcissus, and tulip, and of some shrubs for forming fences; about two fanegadas and a half are employed for rearing, in small quantities, the cerealia; and another portion, about a fanegada, for the cultivation of the *Arundo Donax*, whose reeds are used in various ways in the garden. Lastly, another fanegada is employed as a nursery for trees affording shade, and for some different varieties of olive trees, and other fruit trees which are cultivated in the Peninsula. A walk some twelve feet broad surrounds this part of the garden, and has on both sides, in that part where the vineyard is, a palisade, which is covered over by numerous varieties of vines cultivated for the table; and with respect to the kitchen-garden, it has on its borders fruit trees, with gooseberry trees between. The pruning of umbrageous trees takes place in the fine days of January and February, as also that of fruit trees and of vines. The roots of many herbaceous perennials, and shrubby plants of the valley of Mexico, endure, in the open air, the severity of the winter at Madrid, where it often freezes sharply, particularly in the months of December and January; and they yield fresh shoots in the spring: these plants are the dahlias, *Stœvia*, *Sálvia mexicana*, *mitis odora*, *chamedryfolides*, *angustifolia*, *dolichostachya* (*Lag. MS.*), *canescens* (*Lag.*) *polystachya*, *fulgens*; *Zaluzania triloba*, *Anthemis globosa*; different species of *Solanum*, *Physalis*, *Helianthus*, *Coreopsis*, and the *Oxybaphus Cervantesii* (*Lag.*); *Mirabilis Jalapa*, *dichotoma*, and *longiflora*; *Boerhaavia arborescens*, *Viola verticillata* *Ort.*, *Ceanothus cæruleus*, *Azalea acanthocarpa*, *strombulifera*; *Ceratonia flexuosa*, and others; while the *Lavandula dentata*, *multifida*, *abrotanoides*, and many other spontaneous plants of the south of Spain, perish. The *Chamaerops humilis* bears the open air; and the *Ceratonia Siliqua* lives when it is sheltered from the north by a wall: it blooms, but it never bears fruit. The whole garden, except the hillock planted with vines, is watered at the roots; but previous to the year 1802, the beds of the divisions, which were differently laid out, were watered with a garden engine, with the water of the fountain. Water is very scarce in the hot months, and even the draw-wells are frequently dried up, which occasions many plants to perish in the months of July and August; while in winter there are many that die for want of stoves, and on account of the bad condition of the green-houses. Notwithstanding these serious inconveniences, La Gasca succeeded,

in 1822, in keeping in this garden about 6000 plants, a much greater number than had been kept there before. In this collection, the Gramineæ, of which there were 600 species, excelled the other families, with the exception of the magnificent collection of cerealia, the families of compound flowers, Umbelliferae, Cruciferae, Cistineæ, Malvaceæ, Leguminosæ, and the genus Silène. There was also a good collection of succulent plants, particularly of the genus *Cactus* and *Aloe*. This garden has a considerable library, in which very few books published before the year 1804 are wanting. In that year, the botanical author Cavanilles dying, his library, which had been bought from him by government during his lifetime, was added to that of the establishment; but from that period, up to 1814, it hardly increased, except by the addition of some books on belles lettres, bought from Cavanilles for ten thousand reals (100*l.* sterling). From 1814 till 1823, several applications were made to government; but the acquisitions made during that period hardly amounted in value to 500*l.*, when 3000*l.* would have barely sufficed to buy the many expensive works on botany and agriculture that were published both in Europe and America, without the perusal of which it is not easy to publish works in which repetitions of what has already been said should not occur. This garden possesses one of the most copious herbariums in Europe, which contains about 30,000 species. The formation of it began in the autumn of 1801, with the collection made by Don Luis Née, in his voyage round the world with Malespina, and with what he himself collected before and after that voyage, in Spain; all which amounted to about 12,000 species. It was afterwards enriched with those sent by several Spanish corresponding members, residing in different parts of Europe and America, with the collection made in the island of Cuba by Don Baltasar Boldo; with those which La Gasca collected in 1803, during his journey to the Asturias; with those afterwards collected in the Andalusias by Don José Demetrio Rodriguez, and Don Simon de Roxas Clemente, and in Santander by Don Bernabe Saludo; with those published in the Flora of Peru and Chile by Ruiz and Pavon; and, finally, with all the herbarium of Cavanilles, who possessed a great collection of plants, presented to him by the most celebrated botanists of Europe of his time, and which amounted to more than 1800 species. In the garden of Madrid there also exists the extensive collection of Don José Celestino Mutis, part of which was made in New Spain by Sesse and Mocino; and that which Don Tadeo Haenke formed in America, the whole of which, by previous orders of government, is to be added to the herbarium of the Flora of Peru and Chile, when that work shall be published, as well as what remains of the flora of Mexico. The herbarium is moreover increased yearly, with the new or rare plants reared in the garden itself, and with those sent by the various correspondents of the establishment. The garden of Madrid also possesses the magnificent collection of drawings from the botanical expedition of Santa Fé de Bogota, which during the period of forty years was under the care of Don José Celestino Mutis, which consists of 6969 drawings, half of which are in black, and the other half coloured, but all executed in the most superior style: there are also several manuscripts by Mutis, and a few by the unfortunate Don José de Caldas; a great number of specimens of the woods which are found in the kingdom of New Granada, now Columbia; and some boxes of fruits, seeds, barks, resins, and other vegetable productions. Of the others, which the celebrated De Candolle saw, and caused to be copied, nothing is known. The manuscript of the flora of the island of Cuba, written by Don Baltasar Boldo, was lost during the war of independence, and there remains only one volume of the drawings of plants executed by Gino, who belonged to the same expedition. Lastly, there are 100 drawings of the first volume of the *Hortus Madritensis* of Cavanilles, the plates of which were begun in the year 1804, and the incomplete manuscript which he left of that work. The garden of Madrid had, in 1823, a professor and a vice-professor of botany, another of agricultural botany, a librarian, a treasurer, a chief gardener, with two assistants, eleven permanent gardeners, divided into three classes, three or four supernumerary youths, and a porter. Besides these, there were sixteen or seventeen daily labourers. A contractor furnished the necessary manure, and kept in the summer months the draw-wells at work for 11,000 reals (110*l.* sterling), and inhabited the house and yard which adjoin the garden. In 1805, the building which existed from the foundation of the garden, at its southern extremity, and which was used as a lecture-room and a habitation for the professors and persons employed in the branch of cultivation, was pulled down as ruinous. Its annual allowance is 190,000 reals (1900*l.* sterling), which sum being never sufficient to cover the expenses, recourse was had to other funds to pay the salaries of the professors, which were never fixed, and to defray the expenses incurred in repairs, &c. Of the above sum, 150,000 reals was paid from the funds of the Board of Pharmacy, and the remaining 40,000 reals required to complete the salaries, from the public treasury. From the end of 1816, the direction of the establishment was in the hands of the professors of botany and of agriculture, of the librarian, and of the chief gardener, in direct communication with the junta called that of the Protection of the Museum of Natural Sciences. In 1823, botany and agriculture were taught there. The term of the former began on

the first day of April, and ended on the last day of October, three public lectures being given in the week, the vice-professor repeating the corresponding demonstrations of the last lesson explained by the professor. In the months of July and August are the vacations; and during this period the garden is open, from six in the morning till dusk, to all the students who choose to pursue their studies. They are furnished with all the necessary books, and with whatever plants they may wish to examine; having, moreover, permission to consult either the professor or the vice-professor, who are on the spot examining the plants of the present sowing, and those which had not been examined the year before. During this period, too, the students exercise themselves in the art of describing plants, and in writing memoirs on particular points previously fixed by the professor. Besides this, the scholars, attended by the professor or vice-professor, are also in the habit of going out of Madrid, to botanise in its vicinity, in some of the days of June, July, September, and October. The class of agriculture, or rather of agricultural botany, founded in 1807, begins in the month of February, and closes on the 30th of October; three lessons being there given also in the week. Although this school was established in 1807, the instruction lasted only from 1810 till 1811, under the direction of Professor Don Esteban Bautelon, who died in 1812. At La Gascas's suggestion, the school was opened again in 1815, under the direction of Professor Don Antonio de Santatio de Arias y Costa. In the same year the school of medical botany was opened under the direction of Dr. Don Vicente Sariano: it also was founded in 1807, and re-established, like the former, at the above-mentioned period. The garden has not the requisite extent to execute at large agronomical operations, neither does it possess any great collection of agricultural machinery; nor is there collected any considerable number of species and varieties of fruit trees, olives, vines, and other plants cultivated in Spain, except the cerealia, the collection of which, doubtless, is very superior to that in any other garden in Europe; nor is there any stabling for horses or cattle; but the students are present at all the operations which are executed in the garden, and have a little practice in pruning some of the vines, and performing grafting. This class, as well as the garden, would have increased considerably if the constitutional system had continued; the cortes having bestowed for that purpose the contiguous garden of the Geronimites, which has about forty fanegadas of land, with a great abundance of water for irrigation, and a part of the building belonging also to that convent. During the two hottest months there are also vacations in this class, and the students then employ themselves in writing memoirs on those points previously fixed by the professor who is at the head of it. In order to be able to obtain a diploma for the course or term, the student must first submit to the examination which takes place at the end of each term. The information diffused through the means of the botanical garden of Madrid is not limited to the students who attend the various schools there established. The professors keep up a literary intercourse with the corresponding members of that establishment, who reside in various parts of the empire; they answer the questions which any of them, were he even in the remotest corner of the Spanish dominions, may choose to put; and they send them plants, &c., and receive things from them; for which purpose all letters, packets, and even boxes of plants and seeds, either from any part of Spain, or from abroad, are received free of postage. Besides this, the professors of the garden have, from the time of its foundation, been frequently consulted by the government in every branch relating to the science of botany; and these consultations have occupied much of their time. The garden of Madrid was in open correspondence with the principal gardens of Europe and America, except England, where their only correspondent was Aylmer Bourke Lambert, Esq., to whom they were in the habit of sending annually some thousands of seeds, and who, in his turn, sent considerable numbers of those which were asked of him. The garden made great acquisitions by the annual collections sent from the island of Cuba, from their corresponding member, Don Mariano Espinosa, to whom the government, in consequence, assigned 400*l.* sterling a year, from 1805; by those sent from Mexico by Don Vicente Cervantes; and by those sent by the different members and amateurs throughout the Peninsula. It is in consequence of this that the greater part of the plants of Cuba, Mexico, and South America, reared in the botanical gardens of Europe for the last forty years, were communicated to them through the botanical garden of Madrid: such are, among many others, the *Cobæa*, *Stævia*, many and very beautiful *Sálvia*, *Mimosa*, *Solanaceæ*, *Malvaceæ*, *Compositifloræ*, *Graminææ*, *Onagrariæ*, and *Leguminosæ*. The schools of this establishment have been always very well attended, both by students and hearers; the establishment itself enjoyed great reputation in the nation; its professors having diffused much valuable information, not only in the way above hinted, but the numerous and estimable writings which, during the seventy-one years it existed, have been published, and which amount to more than eighty volumes, including translations. It is to this establishment that the information, not only in botanical matters, but in those of agriculture, and the taste introduced into Spain for the other branches of natural sciences, is owing. The garden of Madrid furnishes the

public gratis with all the medicinal plants which it possesses, and with great quantities of seeds of umbrageous trees, ornamental plants, as well as those of pasturage, and other useful ones both in husbandry and pharmacy; so that three men are continually employed in preparing boxes of seeds to send as presents to private individuals, and to foreign gardens, in the way of exchange. (*Gard. Mag.*, vol. i. p. 243.)

969. *The Madrid garden, at present*, though not positively neglected, is not in such perfect order, or under such excellent management, as it was when under the direction of Señor La Gasca, professor of botany, and member of the cortes; now a resident in England. There is a curious regulation connected with the *entrées* of this garden. Every lady, on entering, must throw aside her mantilla, and walk with her head uncovered. She is not even allowed to let it drop on her neck; it must be carried on the arm. This regulation is almost an order of exclusion to the Spanish women, who consider the proper arrangement of the mantilla no trifling or easy matter; and rarely choose to expose themselves to the risk of appearing afterwards on the Prado with the mantilla awry. (*Inglist's Spain* in 1830, vol. i. p. 102.)

970. *Botanic gardens of Cadiz.* The special school of surgery and medicine at Cadiz, has supported, from its first establishment, a botanical garden, almost as large as that which the Apothecaries' Company of London have at Chelsea. Contiguous to it there is another smaller garden, belonging to the Cadiz Economical Society, intended for the naturalisation of American plants of known utility, and for the propagation of the valuable insect of the cochineal, brought over from Oaxaca. The breed and propagation of this insect is chiefly entrusted to the care of Don Antonio Cabrera, who has also made improvements in this branch. In this garden is cultivated, in the open air, a plant of *Ipomœa Jalapa*, brought over alive from the country of its birth; and a species of downy *Opuntia*, of the *Tina* kind, which was brought over, with others, from Oaxaca, with the cochineal. The first of these two gardens was intended for the instruction of the physicians of the royal marine; but in proportion as the marine disappeared, the garden likewise declined, for want of funds; so that at present (1827) it possesses but few plants. However, there are in the open air some species of aloes and agaves, the *Dracœna Draco*, the *Pomaria glauca* of Cavanilles, *Parkinsonia aculeata*, some species of shrubby *Cápeium*, the *Céstrum nocturnum*, *diurnum*, and *laurifolium*, which can hardly be kept alive in the green-houses of Madrid. In various private gardens, one of the varieties of the plantain tree, the *Musa sapiéntum* of Linnæus, is cultivated, and produces well-matured and exquisite fruit. The celebrated Mutis, who, as well as the patriarch of Roman agriculture, Columella, was a native of Cadiz, received the first notions of botany in this school, under Dr. Castillejos, to whom he afterwards repaid the taste and inclination he inspired him with, by dedicating to him the genus *Castilleja*, which the son of Linnæus published. The library of this establishment possesses a valuable collection of books on natural history, among which are some that are not found in that of the botanical garden of Madrid.

971. *Botanic garden of Lucar de Barrameda.* The garden of botany and naturalisation established in San Lucar de Barrameda, in the year 1805, may be said to have been in an expiring state ever since March, 1808; at which period the stupid populace, led by some fanatical and clerical demagogues, destroyed in an instant all that had been collected there at an immense expense and toil; making the sacrifice in honour of Ferdinand, and in hatred of the favourite Godoy, who had been its principal founder, and had declared himself its strenuous supporter and patron. Many of the exotic trees, which grew up again after the above catastrophe, are still preserved; but such is the neglected state into which this garden has fallen, that it has only one gardener, who is poorly paid, and but moderately well informed.

972. *Botanic garden of Alicante.* The board of commerce of Alicante, established in 1815, with the permission of government, a botanico-agricultural garden, the direction and professorship of which was given to Don Claudio Bouteleu, who filled them till 1819, when he removed to Seville, to direct the cultivation of the Guadalquivir islands, granted to the company of this name. Since that period the garden of Alicante has been neglected.

973. *Botanic garden of Muchamiel.* In the town of Muchamiel, at two short leagues from Alicante, Prince Pio founded, at the beginning of the present century, a superb botanical garden, which was laid out according to the system of Linnæus. La Gasca found in it, in 1810, upwards of 2000 American, African, and Asiatic plants, cultivated in unsheltered ground, and in the open air, as if they were in their native regions. These were, many species of the genera *Sálvia*, *Solanum*, *Céstrum*, *Cactus*, *Aloe*, *Cotylédon*, *Mimdes*, *Pelargonium*, *Mesembryanthemum*, the *Pérsea gratissima*, and the *Andra Chermolia*. It was then tended with sufficient care, a botanical gardener having arrived from Valencia for the purpose, and it possessed a tolerably extensive library. This, and the other botanical and pleasure gardens which are found in the south of Spain, are strong testimonies of the numerous and important acquisitions which might have been made by.

the agriculturists of Spain, if the political institutions had not uniformly endeavoured to impede the progress of the efforts of private individuals desirous of benefiting by them. After the decease of its founder, the garden of Prince Pio began to decline.

974. *Botanic garden of Penacerrada.* The Marquis of Penacerrada founded in 1818 this garden, which, it is asserted, is finer than that of Prince Pio, and in which he has collected not only the rarest plants cultivated in the gardens of the kingdoms of Valencia and Murcia, but likewise many others, which he had caused to be brought over from the gardens of France and Italy, and not a few from the island of Cuba, which were forwarded to him either alive or in seed.

975. *Botanic garden of Valencia.* The botanic garden of Valencia was formed in the latter end of the last century, by the rector of the university in that city, the canon Don Vicente Blasco. It is situated to the north-west of the city, at a short half mile from its walls, and on the banks of the river Turia. It comprises about eighteen fanegadas (twenty-seven acres) of land of excellent quality, and has a great abundance of water for irrigation. Its walks are planted with different varieties of orange, citron, lemon, and bergamot trees, the proceeds of which contribute to its support. Many specimens of plants which were cultivated in the archiepiscopal garden of Fusol, presented by several individuals of that city and its environs, were transplanted thither; it was considerably augmented by the collections of seeds which were transmitted yearly from the botanical garden of Madrid. When we take the fine climate of Valencia into consideration, as well as its fertile soil, and the abundance of water it enjoys for irrigation, this garden ought to be one of the richest in Europe, especially in plants peculiar to warm climates; but, far from improving, it has been decaying from its commencement; and this, simply because its professor of botany, who was the only scientific man in it, was under the immediate control of the general assembly of the university, composed for the greater part of theologians and barristers, who, in Spain, generally speaking, entertain a contempt for the natural sciences, and of a rector, invariably a theologian and a clergyman. The splendid library of this university, the gift of the immortal Don Francisco Bayer, which abounded in books of natural history, became a prey to the flames during the siege of Valencia, in the latter part of 1811, as did also the archiepiscopal library, which was, perhaps, the second in Spain.

976. *Botanic garden at Fusol.* Don Francisco Fabian Fuero, archbishop of Valencia, has a botanical garden in the town of Fusol, three leagues distant from the city, which is one of the most beautiful in Spain. About half of it is appropriated to the cultivation of trees of the families of *Aurantaceæ* and *Asoneæ*, and other exotics; and the other half for shrubs, small trees, bushes, and herbs, also exotics, and mostly American. Its circular or oval beds are distributed in such a manner as to imitate the compartments of a genealogical tree, of the trunk and branches of which are formed the walks. The latter, paved with blue glazed tiles of Valencia, cover the trenches that convey the water for irrigation. Among the plants cultivated in the open air are the *Sálvia tubifera*, *involucrata*, *polystachya*, *leonuroides*, *silicifolia*, *leucantha*, mexicana, two species of *Tournefortia*, *Parkinsonia aculeata*, the *Ruizia fragrans* of Pavon, *Erythrina Coral-lodendrum*, *Berberis pinnata*, *Bignonia stans*, *Pearsea gratissima*, *Andea Cherimolia*, and *Páidium pyriferrum* and *pomiferum*, different species of *Mimosa*, among which there are two forming high and tufted trees, which La Gasca judged to be new. There are also *Cérbera Thevetia* and *ovata*, *Bauhinia latifolia*, *Aralia humilis*, *Septindus asponarius*, *Camellia japonica*, *Antholyza æthiopica*, *Arum Colocasia*, *Amaryllis regina*, *Atamasco*, and another species. The *Cárica Pupaya* yielded excellent fruit by guarding it only with a palm mat in the coolest days of winter. Different American species of *Ipomoea* and *Convolvulus*; the *Tropæolum majus*, *minus*, and *peregrinum*; the *Maurandya semperflorens*, the *Délichos lignosus*, and *Phaseolus Caracilla* climbed and adorned the trees, the walls, and the palings. But this garden, which in so short a time was able to diffuse so much information, and from which issued the *Andea Cherimolia*, *Pearsea gratissima*, and *Arachis hypogæa*, which are now cultivated in Valencia, though not so much as they ought to be, and others which are reared as ornamental plants, was destroyed in 1824, and turned into arable lands, by order of the then archbishop of Valencia. (*Ocios de Españoles Emigrados: Leisure Hours of the Spanish Emigrants*; London, Jan. 1825; art. Barbarism associated to Fanaticism.) What a contrast, indeed, is offered by the dark barbarism of the above archbishop, Simon Lopez, in thus destroying the precious collection of exotics treasured up, during the space of forty years, at so much expense, care, and toil, by his enlightened predecessors, to the diligent endeavours, which at the same time the Canon Cabrera is making to naturalise in the Peninsula the precious insect of the cochineal, the plants which sustain it, and whatever exotics he can obtain!

977. *Botanic gardens of Barcelona.* Lastly, there is in Barcelona, besides the garden belonging to the college of pharmacy, another, supported at the expense of the illustrious Board of Commerce of that city, the direction and professorship of which are entrusted

to the doctor of medicine, Don Francisco Bahi, known by his translation of the *Elements of Botany* by Plenck, and by different valuable memoirs, which he published in the *Journal of Agriculture and Arts*, of which he was the editor, and which commenced in September, 1815, and ended towards the latter part of 1821. This garden, founded in the last century, at the suggestion of the Marquis of Mina, was the property of the Marquis of Sentmanat, who ceded it to the college of surgery of that city, for the erection of a botanical garden, causing an apartment for delivering lectures to be built at his own expense. But the professorship of botany in the school of surgery having been suppressed in 1801, the garden was ceded to the Assembly of the Consulate, under whose auspices it continues till the present time (1827), though the university of Barcelona, erected by virtue of the regulations of public instruction decreed by the cortes, has now ceased to exist. The garden is situated within the city walls, and occupies an extent of about twenty fanegadas (thirty acres) of ground: it is fenced by a handsome iron railing on the eastern side, which borders beautiful garden grounds, and by a high balustrade on the western side, which faces the land wall. The plants chiefly cultivated there are those of known utility in agriculture and the arts, for the promotion of which the instructions given to the pupils are particularly directed. This garden was in correspondence with some of the principal ones of France and Italy, and received every year from that of Madrid whatever seeds it requested to have sent. The practical school, that is, the arrangement of the plants, is laid out according to the sexual system of Linnæus.

978. *The botanical gardens of the four special schools of pharmacy*, founded in the present century at Madrid, Barcelona, Seville, and Santiago in Galicia, are chiefly intended to rear those plants used by the apothecaries, and in the demonstrations of the schools of botany and materia medica. All those who wish to obtain the degree of professors of pharmacy must attend the instructions given in these schools during four years. There are always in these establishments some collections of dried plants, a small cabinet of mineralogy and zoology, and libraries sufficiently well stocked with modern books of all the branches of science that throw any light on pharmacy. The funds for supporting them arise from the degrees and titles conferred in the schools; from the exclusive privilege of selling the *Pharmacopœia Hispana*, and some other books, which every apothecary in Spain must possess; and from the produce which is collected from the biennial visits made to the apothecaries' shops, each of the apothecaries being, on these occasions, obliged to pay 2l. sterling.

979. *Pharmaceutic gardens*. Besides the gardens belonging to the four principal schools of pharmacy already mentioned, most of the general hospitals established in the capital and in the provinces, as well as most of the convents of monks, and various wealthy and enlightened professors of pharmacy, have pharmaceutic gardens more or less extensive. That of the hospital of Valencia, situated within the city walls, is large, and contains a good collection of plants. Among the gardens belonging to the monks, that of Santo Domingo de Silos, in the province of Rioja, is the best. It was for many years under the direction of Father Saracha, corresponding member of the botanic garden of Madrid, and botanical tutor of Don Luis Nee. Don Manuel Rodriguez, professor of pharmacy in the city of Leon, who kept in that city two pharmaceutic gardens, and who enriched himself by the sale of the medicinal plants which are found on the mountains of Leon, but which were, previously to his time, imported from abroad, and sold at exorbitant prices, was also one of the pupils of Father Saracha. Since the death of Don Manuel, this new branch of commerce has been followed by his heirs, and by several other enlightened pharmacopolists, whom he himself had taught, and who have now (1828) similar gardens there. The royal palaces of Aranjuez, Escorial, and San Ildefonso have also their respective gardens for medicinal plants, whence the apothecaries who are attached to these royal establishments are supplied. The one now existing at Madrid was well situated, attended, and provided for, before the war of independence. (*Gard. Mag.*, vol. iv. p. 65.)

980. *A taste for flowers and plants of ornament* is not very general in Spain, though odoriferous flowers, as the jasmine, the orange, &c. are said to be in repute with the ladies; and various sorts are grown in the conventual gardens of the priests, for official decorations in churches and oratories.

SUBSECT. 3. *Spanish Gardening, in respect to its horticultural Productions, and the Planting of Timber Trees and Hedges.*

981. *Horticulture* has made but little progress in Spain; and, though of the highest antiquity in that country, is now practised there with very little attention to art. The earliest of the few Spanish authors who have written on gardens is Don Gabriel Alonso de Herrera (*Libro de Agricultura*, &c., folio, Toledo, 1546), whose book on rural economy appeared early in the sixteenth century. It contains a treatise on gardens (*De las Huertas*), in which he distinguishes only two sorts; one for "delight and provision for the house," and the other for supplying the public market. Private gardens,

he says, need not be extensive; those for selling vegetables and fruits should be near a town or village, and well supplied with water. He gives directions for cultivating the vine, fig, olive, apple, pear, and the common culinary plants. Of these, the soil and climate are peculiarly favourable to the alliaceous and cucurbitaceous tribes, some sorts of which, as the onion and winter-melon, form articles of foreign commerce.

982. *The fruits of Spain* are more numerous than those of any other European country. Besides all those of Italy, native or acclimated, Spain possesses the date, tamarind, and various fruits of the West Indies. The varieties of the grape, fig, melon, and orange are numerous, and many of them excellent. The pine-apple is little cultivated in Spain; but is grown in some parts of the southern provinces in the open air. (Jacob.)

983. *Culinary herbs and roots* are not much attended to in Spain. Onions and garlic are in universal use; and the sweet potato (*Convólulus Batatas*) is cultivated in various places. The British residents import their potatoes from their native country.

984. *Forcing* is unknown in Spain, but in the royal gardens considerable exertions have been made to procure the luxuries common in the courts in the North of Europe, and pine-apples were grown at Madrid, in the garden of La Granja, at least in the year 1806. In the gardens of Aranjuez, a great quantity of vegetables and fruit of all kinds, and of esteemed qualities, are reared for the royal household; not only by the natural and ordinary means, but also by artificial expedients, not much known in Spain, though common in Britain. No expense has been spared to procure such things in abundance, as well from the provinces as from foreign countries, for the purpose of replacing such as have degenerated or been lost. Thus these gardens, considered in this light, are an excellent school of practical gardening. We must, therefore, omit mentioning the many varieties of *Brassica*, *Lepidium*, *Cochlearia*, *Lactuca*, *Cichorium*, *Cynara*, *Tragopogon*, *Scorzonera*, *Chondrilla*, *Allium*, *Beta*, *Spinacia*, *Chenopodium*, *Borago*, *Solanum tuberosum*, *peruvianum*, and *insanum*; *capsicum*, radishes, celery, pompions, melons, water-melons, carrots, parsneps, cucumbers, parsley, coriander, fennel, mint, sorrel, French beans, peas, and beans. But, of all the vegetables reared at Aranjuez, none exceeds the asparagus for size and high flavour. The common fruits in the royal gardens are principally strawberries, pears, apples, peaches, apricots, plums, medlars, azaroles, mulberries, quinces, figs, and gooseberries. Tomatas are cultivated to a very great extent all over Spain, as they are almost as indispensable as garlic in Spanish cookery. Oranges are grown as wall fruit in Valencia.

985. *The vineyard of Mr. Gordon*, a Scottish gentleman, long established at Xeres, and one of the most considerable merchants there, lies a few miles distant from the town, and the ride to it is extremely pretty, through exceedingly narrow winding lanes, enclosed by gigantic hedges of aloe and Indian fig, varied by olive woods; the hills, as well as valleys, being thickly covered with vineyards with white cottages peeping out from each. On reaching this vineyard, which lies in a deep valley, Sir A. Brooke found the labourers busily employed in picking the grapes, and carrying them on their heads in baskets to the press-house. The vines were trained very low, and close to the soil, on account of the greater degree of heat. The vineyard was originally planted with three kinds of vines, calculated to produce the wines desired. Difference of soil, however, and parts more or less exposed to heat, had produced several other varieties: some were nearly black; others white, large, and sweet; while others were tinged with a brownish red, of a dry flavour, and devoid of sweetness. From the last the sherry is produced. (*Brooke's Spain*, &c., p. 68.) The best wine in Spain is made from the Val de Peñas (valley of stones) in La Mancha, ropes are made in Cordova from the fibres of the Agave, and Inglis tells us that the flower-stalks are cut into light beams for constructing cottages. The wood of the wild olive is very hard. About Bilbao, timber is very scarce; though there is an old law which directs that six trees shall be planted for every one cut down.

986. *Planting timber-trees or hedges* is scarcely known in Spain.

SECT. XI. Rise, Progress, and present State of Gardening in Portugal.

987. *Gardening in Portugal* is very little attended to as an art of design and taste. The quintas, or country-seats, of the principal nobility are generally in ruins, and many even of the royal residences have an air of desolation. Some merchants, principally foreigners, have villas in the immediate neighbourhood of Lisbon and Oporto; but these are exceptions to the general rule. The style of all is nearly the same. Every quinta has numerous stone cisterns, or fountains, and most have a small patch of ground lying high among the surrounding crags of rock, where, carefully shaded from the sun by hedges of palm, and sedulously watered every day, the lettuce and other vegetables requiring a cooler climate are cultivated. Carnations are generally grown in antique-shaped earthen pots, or in deep layers of earth, upon the top of the stone walls of the gardens. Open galleries communicating with the sitting-rooms are often carried round the outsides of these

villas, somewhat in the style of the Swiss farm-houses. (*Baillie's Lisbon in 1821, 1822, and 1823.*)

988. *The Prince Regent of Portugal had a palace at Belem, in 1812; but it was then in very bad repair. The gardens were in somewhat better condition, and were laid out in the geometric style. A botanic garden was attached to this palace; among the curiosities belonging to which was an anatomical collection. (Broughton's Letters from Portugal in 1812, 1813, and 1814.)*

989. *The royal palace at Queluz is a neat, agreeable place, surrounded by forests and pasture-land. Part of the road to it from Lisbon is lined with myrtles and geraniums grown wild. The gardens are decorated with a variety of handsome bridges, temples, waterfalls, fishponds, &c. The park, woods, and pleasure-grounds are extensive, and abound in game. The grandees possess the right of shooting in every royal park in Portugal, and can confer that privilege on others. (Baillie's Lisbon in 1821, 1822, and 1823.)*

990. *The grounds of the Marialva palace are always open to the public, and are generally crowded on Sundays and holidays. The palace is celebrated for its magnificence; the grounds are rich, and very extensive; while the prospects they command are extremely beautiful. The garden near the house is laid out in the geometric style, and affords a striking contrast to the wild and picturesque scenery by which it is surrounded. (Ibid.)*

991. *The palace and gardens of the Countess d'A——, near Coimbra, are considered among the wonders of Portugal. The kitchen is of immense dimensions, and a river flows through the middle of it, from which, it is said, the cooks take the fish to be prepared for the table. The Duke of Wellington visited this place when in Portugal. (Ibid.)*

992. *The quinta of the Penha Verde (the green rock) is so called from a lofty mountain rising immediately behind it in the form of a cone covered to the utmost peak with a luxuriant vegetation, that forms a fine contrast to the bare and craggy rocks that surround it. The noble woods belonging to this seat are so umbrageous, and are so constantly refreshed by numerous fountains, that it is possible to wander among them during the most sultry hours of the day without incurring either heat or fatigue. The grounds are not devoid of that constant appendage to every Portuguese quinta, a sort of terrace, accommodated with seats, and shaded by vines, myrtles, or other light foliage, raised upon the wall which overlooks the public road. Here the ladies of the family consume the greater portion of their time watching the passers by. (Ibid.)*

993. *The quinta of Montserrat is situated on very elevated ground in the bosom of a wood of cork trees, surrounded by orange trees and rocky fountains; hemmed in on three sides by mountains, and open on the other to a level champaign country, rich in vineyards and cornfields, which stretches out for about six miles, till it is bounded by the sea. The mansion was built by Mr. Beckford of Fonthill, and is in the English style. When Mrs. Baillie saw it (July, 1821), it was a complete ruin. "Some of the carved doors of the best apartments," says Mrs. Baillie, "brought at a great expense from England,) and some remains of the superb plate-glass in the eight French windows, were yet spared. The hall once opened on a sloping lawn of verdant turf, studded with rare shrubs and flower-beds: it has now been ploughed up, but traces may still be discovered of its original destination." (Ibid.) The garden was laid out in the geometric style, and abounded in inequalities, stairs, terraces, statues, and orange trees. Repton (*Frag. on Lands. Gard.*, 1815) gives an engraving of a plan which he had sent out to Lisbon, for laying out a small garden in the modern style.*

994. *The garden of Reeves's hotel, Buenos Ayres, near Lisbon, Mrs. Baillie informs us, contains pelargoniums, "of great variety and beauty, which grow to the height and size of shrubs; carnations which are very rich and luxuriant, and principally of a light yellow colour; and remarkably fine China roses. Lavender and rosemary grow wild upon every rocky height in the neighbourhood, and in this garden are so plentiful that they might be formed into thick hedgerows: in short, the slightest efforts of industry and activity might soon convert the whole place into a paradise of sweets; but, as it is, it affords nothing but a picture of sloth, neglect, and want of taste." (Ibid.)*

995. *There are public gardens in Lisbon, somewhat resembling those of Lincoln's Inn, near the Roscio, where the fashionables of the town occasionally walk. (Broughton's Letters, &c.)*

996. *The English Cemetery at Lisbon is very picturesque. It contains a handsome chapel, and is of considerable extent. It is planted with pine trees, which give a somewhat melancholy shade: verdant shrubs adorn the avenues, and flowers are planted on the graves. Fielding is buried in this cemetery; but there is no tombstone over his remains. The Dutch have a share in the enclosure, as have the Germans, who have a separate chapel.*

997. *Gardening, in Portugal, as an art of culture. Portugal is adapted by nature for*

easy culture of the vegetable productions of the torrid and temperate zones. But though the first coloniser of India, till within a few years mistress of Brazil, and still retaining extensive African possessions, she has never stood forward as the patroness of botany. Unlike Spain, which, under every disadvantage, has laboured hard for the science, she can boast of but few individuals who, incited either by a laudable curiosity or by more enlightened views, have availed themselves of her natural advantages, to introduce those botanic treasures to which for nearly three centuries there has been access; though, like her, the ignorance, inappetence, and poverty of her legislation, have for years been formidable impediments to the advance of science. An intelligent traveller, speaking on this subject, observes, that "the same want of assiduous industry, which is so apparent in the culture of the vegetable and flower gardens of the Portuguese, is equally visible in regard to the gifts of Pomona, who has been bountiful in the extreme. There are absolutely no such things in Lisbon or its environs as either nursery-grounds, flower-shops, or gardeners regularly bred to the profession, and living upon its resources. If you desire a root of a rare carnation, or a cutting from any other particularly fine plant, you must either purchase it from the gardener of some rich man, and thus give encouragement to dishonesty, or make up your mind to relinquish your wishes."

998. *Botanic gardens.* The royal botanic garden at Lisbon is situated on the side of a hill (*fig.* 210.), sloping with a considerable declivity to the Tagus, a little below the



palace of Ajuda, and enjoys a full exposure to the south. It covers a space of about two acres, surrounded by a high wall, round which, on the inside, and up the centre, is a shady walk of *Laúrus nobilis*, *Cérceis Siliquastrum*, *Ceratônia Siliqua* and *Juglans régia*. The south wall has in front a wide terrace, on which the hot-houses and green-houses are built; a flight of steps leads from these to the pleasure-garden, as it is termed; which, together with the terrace, occupies about one half the space enclosed: the remainder is devoted to walks, and orange, lemon, and citron quarters. Art being the endeavoured object in Portuguese gardening, the eye is offended by the mechanical rigidity of the parterres, the clipped, rectangular, box alleys, and the grotesque embellishments, characteristic of the gardening of the south of Europe, which disfigure the pleasure-garden; but the number of acclimated exotics to be seen there, vigorous and unsheltered, makes it an object of the greatest interest. The plants are grown without reference to their natural orders, or to any system; and have either been casually planted from superfluities that have arisen among those classed, or from their having become too unwieldy for culture in pots or boxes. Of the genera thus cultivated in the open air but few are named, and still fewer have any specific epithet attached. The inscriptions, when they occur, are rarely intelligible, being most frequently in the Portuguese language, and extremely vague and unsatisfactory. For example, in 1829, *Amaryllis reginæ* was marked *Amaryllis vermelha com duas flores do Brasil* (a red two-flowered *Amaryllis* from Brazil). Many genera also were named in honour of their donors, or had had their names changed to commemorate the saint's day on which they had first chanced to flower. The natural orders *Cânneæ*, *Scitamineæ*, *Leguminosæ*, *Bromeliæ*, *Amaryllidææ*, *Laurinææ*, *Leguminosæ*, and *Cictææ* were very rich, and contained most probably many genera, entirely new, particularly *Scitamineæ*, *Amaryllidææ*, and *Cictææ*. It may be necessary here to mention, that the thermometer at Lisbon frequently falls as low as 29° and 27° of Fahr., and the fountains in the royal garden are often covered with a thin coat of ice in the morning, even when the year is as far advanced as April, without the plants appearing to suffer injury; with exception of *Cárica Papaya*, killed, in the winter of 1825, by frost supervening on rain. Growing in an arenaceous soil, the plants, indeed, seemed to be more retarded in their growth by the heat and want of moisture in summer, than by the humidity and cold of winter. *Erythrina cárnea*, *E. fúscæ*, *E. picta*, and

E. Crista-galli, flower well; the latter in autumn, winter, and spring. *E. picta* ripens seed on a tree more than fifteen feet in height. *Páidium pyrifera*, and *P. pomifera* both set their fruit, but they do not attain maturity: were the shrubs grown against a south wall, instead of being in an exposed situation, there is little doubt the fruit would be perfected. *Coffea arabica* fruits freely; the plants flower in October, and the berries ripen in May and June following. (*Gard. Mag.*, vol. v. p. 412.)

999. *The botanic garden of Coimbra* was founded in 1773. It is situated on the summit of a hill; and in the summer of 1831, when it was visited by a friend of ours, it was found in a state of utter neglect; though the Cape and Australian plants, and even some of those from the tropics, were flourishing among weeds.

SECT. XII. *Of the Rise, Progress, and present State of Gardening in European Turkey, including Greece and Albania.*

1000. *Of gardening, in what is now European Turkey*, when that country was under the Romans, nothing is known. The Roman taste would probably pass to Byzantium when the seat of empire was removed thither by Constantine; but as to its history, during the period that the rest of Europe was enveloped in ignorance and superstition, very little has been recorded. The numerous Greek authors on rural matters (*Geoponici*), who wrote between the fourth and the fourteenth centuries, do little more than copy Columella and other Latin georgical writers; they mention very few plants as ornamental, and treat chiefly of agriculture, vineyards, and poultry.

SUBSECT. 1. *Gardening, in European Turkey, Greece, and Albania, as an Art of Design and Taste.*

1001. *The modern taste for gardens in Turkey* is materially influenced by the national character, and the nature of the climate. Gardens of taste are considered places of shade, repose, and luxurious enjoyment; not of active recreation, or a varied display of verdant scenery. "For some miles round Adrianople," Lady M. W. Montagu observes, in 1717, "one sees nothing but gardens. The rivers are bordered with fruit trees, under which the citizens divert themselves in the evenings; not in walking, which is not a Turkish pleasure, but in seating themselves on a carpet spread on the turf, under the thick shade of a tree; there they take coffee, and smoke, amidst vocal or instrumental music, groups of dancing females, and other sports." (See *Olivier*.)

1002. *The gardens at Adrianople*, Hobhouse observes, are filled with poplars and fruit-trees, and rise in terraces on the sides of hills mixed with flat-roofed houses. (*Travels in Albania*, &c. p. 135.)

1003. *The gardens of the sultan, at Constantinople*, acquired a degree of celebrity through the letters of Lady M. W. Montagu, to which, it appears from subsequent authors who have examined them, they are by no means entitled. These gardens were visited by Dr. Pouqueville in 1798; and it is generally allowed that he has described them with as little imagination, and as much accuracy, as any writer. The grand signior's gardener was then a German, a native of Rastadt, by name Jacques, whose salary was 6000 piastres a year. He conducted Dr. Pouqueville and his companion between the first and second ramparts of the town, which form the natural fortifications of the seraglio on the side to the sea. We conversed with this gardener in 1828; he being then returned to his native town, and he confirmed to us the statements made in Pouqueville's book.

1004. *The palace* is, properly speaking, a town within itself, having its walls crowned with battlements; and its bastions and its gates, like an old fortified place. Dr. Clarke says that the seraglio occupies the whole site of the ancient Byzantium; and Pouqueville, that the present *manège* is placed where there was a hippodrome at the time of the lower empire; so that the destination of the place has not been much altered for the last fifteen hundred years. The first garden seen by Dr. Pouqueville and his companion was enclosed on three sides with a palisade, the fourth side being formed by the rampart. It was filled with shrubs; such as early roses, heliotropes, and others, distributed in clumps, with several beams, and a great deal of rubbish lying about. At last they arrived at the entrance of the sultan's garden.

1005. *The gateway to this garden* is of white marble, about fifteen feet high by four wide, decorated with columns, in a very bad taste. A treillage, twenty-five feet high and fifteen wide, extremely massy, forms a cross, running each way, from one side to the other of the garden, separating it into four equal divisions. In the centre of the cross, it forms a dome over a small basin of white marble, in which is a jet d'eau. Jacques ordered some of the men to make it play; but the water did not rise above six feet. It was, indeed, an exhibition much below mediocrity. The four squares formed by this cross are planted with flowers, and in the middle of each are basins again, with jets d'eau quite in miniature. That to the left, as we entered, says Dr. Pouqueville, "appeared the most singular of them. After the water has risen to the height of about four feet, it divides like a parasol, and each stream falls upon a shell, on the circuit of the basin, which again

divides it into still smaller streams, scarcely bigger than threads. We contemplated this *chef d'œuvre* for some minutes, and thought it very pretty for amusing children."

1006. *The treillage*, "a work truly German, seems, from its solidity, calculated to brave the injuries of time for a long series of years. It is covered with jasmine, which perfumes the whole garden; and, to say the truth, it has no difficult task to perform; for the enclosure is so small, that there can hardly be said to be sufficient space for the air to circulate freely. To the right, which is the side towards the sea, the treillage leads to the kiosque of the grand signior, called *Jeni-kiosque*, the new pavilion. Three circular steps lead up to it, which occupy, in the semicircle they form, the portion of the kiosque that projects into the garden."

1007. *A number of cages, with canary-birds*, "were hanging about: these little creatures sang charmingly, and had been taught to draw water. About fifteen paces from this kiosque, running along the same rampart, is a terrace of about fifty feet in length, and twelve in breadth, adorned with flowers, which has lately been turned into a conservatory."

1008. *The largest garden*, to which the doctor descended from the terrace, was a hundred and twenty paces long, and fifty broad. At the eastern extremity was a hot-house, where Jacques was cultivating a number of foreign plants and flowers with great care. The hot-house was little better than a shed; under it were a number of benches, rising in a stage one above the other, with the flower-pots ranged upon them. Among the plants, some from Abyssinia and the Cape held a distinguished rank for their superior fragrance. Another garden, or rather a terrace, raised five and twenty feet high, which looked down upon the garden below, contained nothing but a red and parched soil, with a few withered plants.

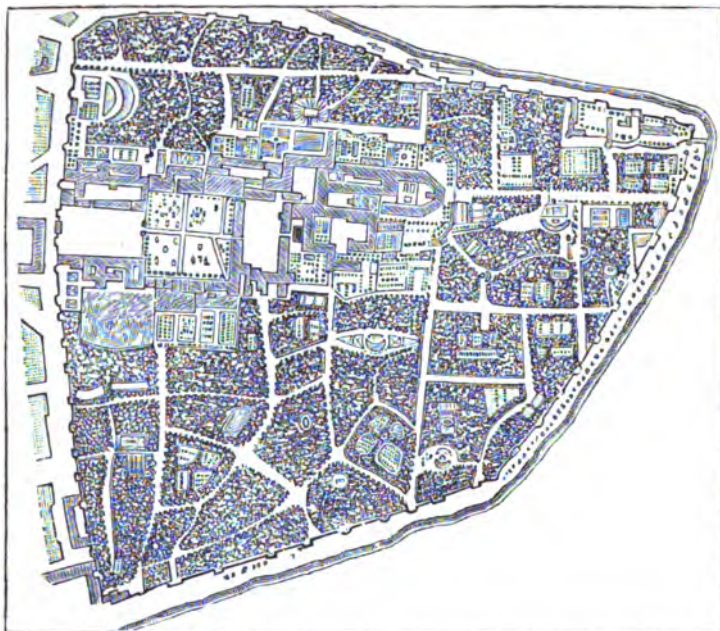
1009. *An aviary* had been made by order of the Sultana Valide; and this, according to the ideas of the Turks, is the most curious thing upon the terrace. "I quitted this dismal garden," says Dr. Pouqueville, "this kiosque of Hassan Pacha, perfectly free from the chimeras with which my imagination had been previously filled. I had formerly read the letters of Lady Montagu, and I seriously believed that I was to find walls incrustured with emeralds and sapphires; parterres enamelled with flowers; in short, the voluptuous palace of Armida: but her account is drawn from the sources furnished by her own brilliant imagination. We quitted the burning garden to visit the haram; the haram of the sultan; the promised paradise. Lady Montagu was now about to triumph."

1010. *The garden of the haram* is a square very ill kept; it is divided from east to west by a terrace. It was here that the feast of tulips was formerly held; but this has been long abolished. According to all appearance it must have been a very poor thing; but the pens of romance-writers can embellish objects the most ordinary, and make them appear of prodigious importance. Some clumps of lilacs and jasmine, some weeping willows hanging over a basin, and some silk trees, are the only ornaments of this imaginary Eden; and these the women take a pleasure in destroying as soon as the flowers appear, by which their curiosity is excited.

1011. *A plan of these gardens* is given by Kraft (*fig.* 211.), from which little can be gathered but that they abound in trees and buildings, and are surrounded by a formidable wall.

1012. *Various opinions have existed as to the sultan's garden*. Thornton, author of a late work on Turkey, arraigns Dr. Pouqueville for not being more dazzled with the magnificence of the haram, and for thinking that Lady Mary Wortley Montagu has rather, in her descriptions of Eastern luxury and splendour, painted from a model formed by her own brilliant imagination, than from reality. But it is certain, H. M. Williams observes, that Dr. Clarke's testimony is a strong confirmation of Dr. Pouqueville's. Indeed, there is so striking a similarity in the accounts given by the two doctors, that each strongly supports the truth of the other, and both lessen extremely the ideas we have hitherto been led to entertain of the luxury and magnificence that reigns in the grand signior's seraglio. (*Pouqueville's Travels, translated by Anne Plumptre.*) It has not been at all times impossible to penetrate into the gardens of the seraglio, by the assistance of a foreigner employed in their superintendence; but the time chosen for the enterprise must be when the khâduns and odalisques have been removed to their summer palaces; and even the adventurous Pouqueville beheld only an empty dormitory. When any of the ladies walk in the gardens with the sultan, or move from the different dwellings of the seraglio, the black eunuchs precede them; and at the redoubtable cry of "Heleot!" any gardeners who may be within the walls abandon their work, and flee to the gates; even the white eunuchs are excluded. A loiterer would at once be cut in pieces by the sabres of the blacks. "Qui est ce qui voudrait mourir pour un coup d'œil si mal employé?" (*Tournefort, Voyage du Levant, lettre xiii. vol. iii. p. 20. edit. Paris, 1717. Hobhouse's Travels in Albania, &c., vol. ii. p. 856.*)

1013. *The English palace, or Ingles-scrui, at Constantinople*, is a large stone building, surrounded by a piece of waste ground enclosed by a high wall, and stands on the very edge of Pera, on the verge of an extensive burying-ground. (*Hobhouse's Travels in Albania, vol. ii. p. 837.*)



1014. *Buyuk-dere* contains the country-houses of the Franks of Pera, and of most of the European ministers. The façades of these mansions are most of them in the European taste, and range along an extensive strand, a mile and a half long, in front of the sea. This strand is the evening promenade of the inhabitants and visitors. Behind the mansions are large gardens; with groves of plane, lime, and walnut-trees, overshadowing parterres of flowers and valuable plants. The meadow or plain (the *kalos ághros* of the Byzantines, which lies at the bottom of the bay) is mown into a smooth turf, and is a favourite resort of parties from the village, who take coffee and sherbet under the shade of a large plane, or rather a clump of seven of these trees growing from one root, commemorated in *Les Jardins* of Delille. On every side this fine valley is embanked by high and wavy acclivities covered with verdure; and on the west and north it is enclosed with the woods of Belgrade, running like a park plantation to the water's edge. (*Hobhouse's Travels in Albania, &c.*, vol. ii. p. 868.)

1015. *The tower of Kiskar Bornou* is built on the exact spot where the army of Xerxes crossed the Bosphorus, and is in the midst of a thick grove. At this spot the Bosphorus appears like a majestic river winding between banks, as high and woody as those of the Wye, and not less lively and cultivated than those of the Thames. Nearly opposite the tower, in the midst of a green meadow watered by two rivulets, and shaded by clumps of trees, which give it the appearance of a park, stands a large country-seat, the property of the grand signior, but inhabited by the *bostandge bashi*, with a centre and wings like a European mansion-house. (*Ibid.*, p. 865.)

1016. *Willis's garden, on the shore of the Hellespont.* In a narrow valley in Thrace, about eight miles from the Dardanelles, Mr. Hobhouse and his party proceeded up the valley along a beaten path, by the side of a brook, through a grove of thickset trees, the hills impending on each side, and with their woody summits almost closing over their heads. After a short walk, they came in sight of a *chiflik*, or country-house, surrounded by a small pleasure-ground, and gardens, laid out in the Frank taste, and adorned with clumps of trees evidently not natives of the soil. On approaching the spot, their surprise was increased by the sight of a neat building, with attached offices, and a court-yard, fitted up with many of the implements and appurtenances of an English farm; and they were at a loss to account for so many exotic elegances, until they learnt that the place had been made by Mr. Richard Willis, an English gentleman, who, having chosen this valley for his retreat, purchased the land; and who, by transporting some fruit-trees and ornamental shrubs from England, and employing an English gardener, created on the shores of the

Hellaspoint a country-seat not to be rivalled by any villa on the banks of the Thames. Mr. Hobhouse was, however, further informed, that neither Mr. Willis's attachment to the spot, nor the pains which he had bestowed upon its embellishment, prevented the Turks, who did not choose to have a Frank holder among them, from obliging him to part with his purchase; and some signs of approaching waste and desolation observed by Mr. Hobhouse were sufficient to convince him that it had reverted to a Mahometan master. (*Ibid.*, vol. ii. p. 800.)

1017. *The country-house of the English consul* is at Bounabat, and is distinguished at a distance by a large grove of cypresses. The mansion, fitted up altogether in the English taste, has an excellent garden and vineyard attached to it, and is inhabited by the family of the owner every year, from June till the end of September. (*Ibid.*, p. 642.)

1018. *The country-house of M. Pisani* is situated on a green knoll, in the village of Belgrade, embosomed in the depth of a forest. It was built by Sir Robert Ainslie, on the site, as some assert, of the residence of Lady Mary Wortley Montagu.

1019. *There are numerous villas on the banks of the Bosphorus*, on the Thracian border of the strait, and from Tophana there is a succession of villages, or rather streets of wooden houses, skirting the water's edge, the intervals between which are occupied with royal palaces and their surrounding domains. The Bosphorus receives thirty rivers, and has fifty valleys. The banks are every where high, and their declivities above the dwellings are covered with wood, interspersed with vineyards and hanging gardens. Beyond the village of Fondonkle are the gardens of Dolma Baktche, or the Kiosque of Melons. Many of the serais and summer-houses have rather fantastic names; one is the Pearl Pavilion; another, the Star Palace; and a third, the Mansion of Looking-glasses. The imperial palace, beyond Dolma Baktche, at the village of Beshik-Tash, is also a favourite retreat of the grand signior. Mr. Melling, who was employed in fitting up the interior of this mansion, gave no favourable report of it to his friend Dr. Pouqueville; nor is there any magnificence in the exterior appearance of the building. The white panels, and coloured pents with gilded lattices, are, however, of a character more suitable to every surrounding object, than the domes and colonnades which an European taste might have substituted for them. (*Ibid.*, p. 863.) Behind the point anciently called Heræum, are some gardens, at the back of which is a raised terrace, overshadowed by tall venerable trees, and containing two reservoirs of water about four feet deep, with a jet playing in the midst of each. One of these is used as a bath, and is made private by a canvass screen, or curtain. They are the remains of the baths of Justinian. The grove of Fanar Baktchesi is one of the many resorts of the Franks, Greeks, and Turks of the capital. (*Ibid.*, p. 880.)

1020. *The gardens of the vizier, at Joannina*, communicate with the palace through a court furnished with orange and lemon trees. The summer residence of the vizier is built in the midst of a garden, which was in a wild and tangled state when Mr. Hobhouse saw it in 1809, but which abounded with orange, lemon, and fig trees; and, in short, with every kind of fruit which flourishes in that favoured climate. In a field adjoining the gardens, surrounded with high walls, were a few large deer and antelopes. The air of the whole bespeaks a taste quite different from that of the country, and the vizier was probably indebted for his elegant retirement to his French prisoners. (*Ibid.*, vol. i. p. 69.)

1021. *The gardens belonging to the citizens of Joannina* have most of them a summer-house. (*Ibid.*, p. 70.)

1022. *Laconia* is susceptible of the greatest improvements. The land there is extremely productive; though, from being badly managed, all kinds of agriculture and gardening are in a state of infancy, and the fruits and herbage of every description are of a very inferior quality. When it is considered, however, that the unwholesomeness of the marsh lands may be removed by draining, and that the defects in the vegetable productions may easily be remedied by bringing to Laconia a considerable number of exotic plants, of which the inhabitants at present do not know even the names, it may be imagined of what great importance any political commotion which could effect a change in the usages of the country would be to this part of Greece, and, indeed, to the general interests of humanity. (*Report of the French Expedition sent to Greece.*)

1023. *Public walks and promenades.* The higher classes of females in Constantinople may and do walk in disguise, not only in the Armenian burying-ground, but in the sloping gardens of Dolma Baktche, a mile beyond on the shore of the Bosphorus. These gardens are frequented by many parties of ladies, who seat themselves on silken cushions and rich carpets, the furniture of their houses, and view the djerid playing in the flat below, or the humours of a Jewish mountebank under a spreading mulberry tree. A little boy called a Dolop-oglassi, generally accompanies them, and plays on a mandoline, while they are sipping their coffee and sherbet, and attending to the gambols of their infant children. (*Hobhouse's Travels in Albania, &c.*, vol. ii. p. 848.)

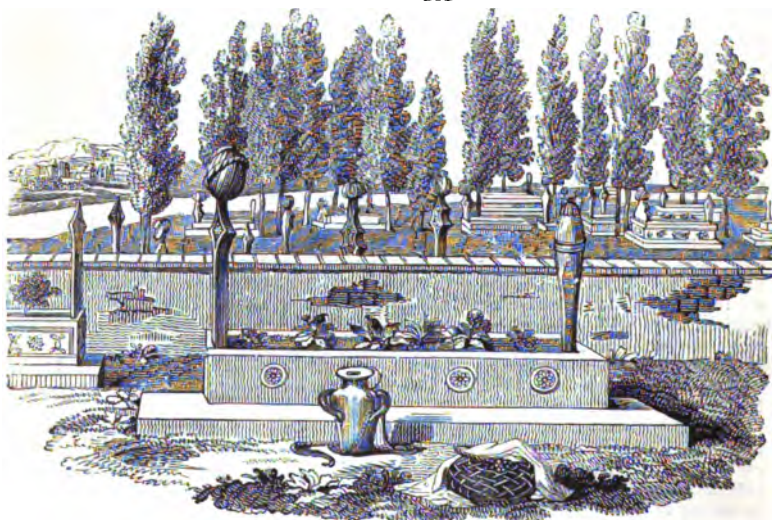
1024. *In the valley of Sweet Waters, near Kiat-Hana*, are the pleasure grounds and kiosque of the sultan Achmet III., which were constructed by a Frenchman on the plan of the

gardens at Fontainebleau and Versailles. The river is there converted into a straight canal, running between avenues of tall trees. At the kiosque the stream runs over two flights of marble steps. Near the cascade is a grove of tall trees, which is the resort of parties from Pera and Constantinople. In this garden the French sit taking refreshments, and amusing themselves with the Jew conjurors, &c. ; but the Turks generally place themselves in two little lattice-work boxes built as namasgahs, or places of prayer, contemplating the scene with countenances of invincible gravity. Strings of females promenading between the avenues, sets of dancing girls, and horses superbly caparisoned, add to the beauty and singularity of the spectacle, which is to be seen on any fine day in the valley of the Sweet Waters. (*Hobhouse's Travels in Albania*, vol. ii. p. 858.)

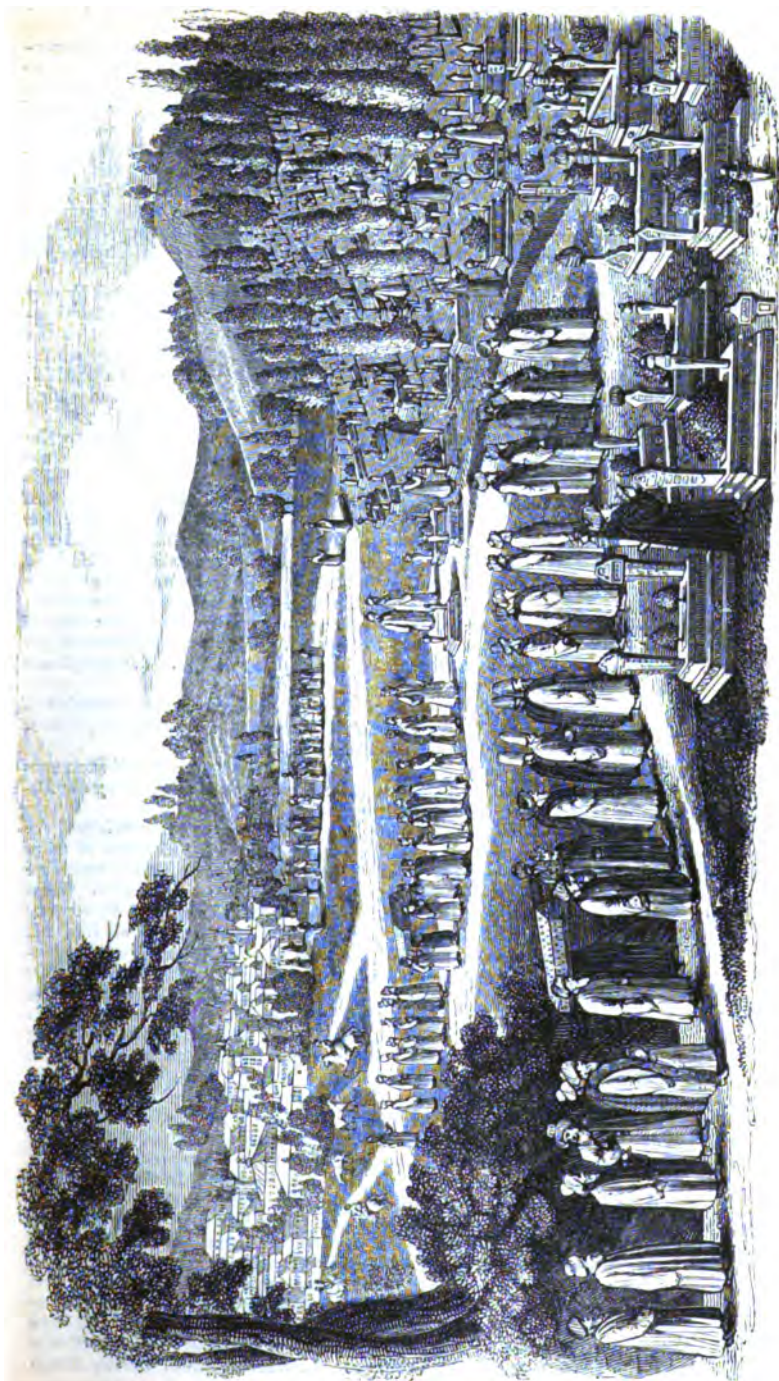
1025. *At Sultanie Baktchesi*, near the village of Beicôs, are the ruins of a magnificent kiosque, the gardens of which still remain. In the garden belonging to the Tekeh, or dervise's chapel, on the mountain above Magia Bornou, Mr. Hobhouse was shown a flower-bed more than fifty feet long, rimmed round with stone, and having a sculptured turban at each end, which, after having been called the tomb of Anycus, and the bed of Hercules, is still named the Giant's Grave. (*Ibid.*)

1026. *Cemeteries.* The Turkish burying-grounds are generally favourite places of public resort. The principal promenade in the evening, for the inhabitants of Pera, is a very extensive cemetery, which slopes to the harbour, is planted with noble cypresses, and is thickly set in many places with Turkish monuments. The opulent Turks have their graves railed in, and often a building over them, in some of which lights are kept constantly burning. The inscription on the headstones is usually a sentence from the Koran, written in letters of gold. The Turks, like the Welsh, adorn the graves of their friends by planting flowers upon them, generally the myrtle, but sometimes the amaryllis (*fig. 212*).

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(*Williams's Travels*, &c., p. 201.) The vicinity of a cemetery is not in the capital of Turkey judged by any means disagreeable, and no spot is so lively and well frequented as the Armenian and Frank burying-ground, at the outskirts of Pera, called Muenmata, or the tombs. It is shaded by a grove of mulberry trees, and is on the edge of some high ground, whence there is a magnificent view of the suburb of Scutari and a great portion of the Bosphorus. (*Hobhouse's Travels in Albania*, vol. ii. p. 837.) The cemetery of the Turks, at Constantinople, is the fashionable quarter of the Franks, and the pleasure-ground of the Levantines. It is the only place of recreation in Pera. (*Madden's Turkey*, p. 204.) The Turkish cemeteries are generally out of the city, on rising ground, planted with cedars, cypresses, and odoriferous shrubs, whose deep verdure and graceful forms bending in every breeze, give a melancholy beauty to the place, and excite sentiments very congenial to its destination. (*Eustace's Travels*, &c., p. 513.) The cemetery of Eyub, near Constantinople, is crowded with graves; those which contain males have generally a turban at the head of the flat tombstone, and nearly all have plants growing from the centre of the stones. (*fig. 213.*) The magnificent burial-ground of Scutari extends for miles in length, and among high and turbaned tombstones, with gold-



lettered inscriptions, mournful cypresses are thickly planted. (*Alexander's Travels from India*, p. 240.)

1027. *A very large burying-ground*, shaded by an extensive forest of cypresses at Bournabat, a village of elegant country houses built in the European fashion, belonging to the merchants of Smyrna. (*Hobhouse's Travels in Albania*, vol. i. p. 640.) The hills on the side of the modern Chrysopolis are, for some height, one cemetery, or forest of cypresses. The prediction which foretells the subjection of Constantinople to a white or yellow-haired nation has gained credit during the last century; and the Mussulmans who choose a more secure repository for their ashes prefer the burying-grounds on the Asiatic banks of the Bosphorus to those of the capital. On the top of the hill Bongalon is a fountain of clear water, much esteemed at Constantinople, and the country upon the declivity of the hill is covered with gardens, melon-grounds, and vineyards, supplying the capital with fruit. Northwards the ground is also well cultivated, and divided by hedge-rows, frequent avenues, and clumps of trees. (*Ibid.*)

1028. *The Jewish burying-ground*. There is a considerable space, unoccupied by any houses, between the suburbs and the summit of the hill, and this is allotted for a burying-ground to the Jews, who have nearly covered it with their tombstones, lying flat on the ground, and not raised in the manner usual in our churchyards. A little to the north-east of the Jews' burying-ground, and also on the side of the castle hill, is a Turkish cemetery, which Mr. Hobhouse declares to be the most crowded he ever saw, and which is walled in, and shaded by a thick forest of cypresses. (*Ibid.*, p. 623.)

1029. *The Necropolis of the ancient city of Byzantium* was near the Bosphorus, on the north and north-west of the buildings, which do not ever appear to have extended close to the water in that direction. There are here still remaining many ancient sepulchres hewn out of the rock. These are descended to by flights of steps, like those south of Tartoose, when a square and sometimes an arched door leads to dark chambers, in which the sarcophagi were deposited in cells in the usual way. The rocks here seem also to have formed the quarries for the buildings of the living, as appearances of that kind are seen all around. The environs of Ladakea have many olive-grounds, gardens, little country retreats, and places of pleasure; the inhabitants are all fond of rural recreation; and those who cannot find time for a longer excursion, seat themselves along the sides of the public roads, both in the morning and in the evening, to enjoy the freshness of the air, and, as they themselves say, to lengthen out their days by delight. (*Buckingham's Travels among the Arab Tribes*, p. 535.)

1030. *Ancient tombs at Athens*. The work of Pausanias informs us that a number of tombs of the illustrious dead were in the vicinity of Athens; many of them in the gardens. Very few, however, still remain. (*Hobhouse's Travels in Albania*.)

1031. *The burial-places of the Turks at Smyrna* are varied by cypresses, and anemones and other gay flowers are frequently planted on the graves. (*Swan's Voyage up the Mediterranean*, p. 132.)

1032. *The cemeteries of countries such as Turkey* may, in one sense, be considered the most interesting of their gardens. To botanists and refined horticulturists of other parts of the world, there may be a great deal of interest in seeing the plants which are rare in their own countries, common in the neighbourhood of Constantinople. Even the want of fences, and of trees and shrubs, and regular plantations, may, by contrast with what is common in cultivated countries, be a source of interest; but all this says nothing for the gardening of Turkey. In order to form an estimate of the state of horticulture, or of any other branch of gardening, in any country, we must not compare that country with other countries, but compare the garden productions raised there by art, with those spontaneously produced by nature. The finest garden productions in the world are to be found in a wild state in Persia and India, countries where gardening is at its very lowest ebb. The name of Jacques, who was gardener to the sultan when Pouqueville was in Constantinople, has been mentioned, § 1003; and we have already said that we conversed with him on the state of our art in Turkey, when we met with him at his native town of Rastadt, in November 1828. The account which he gave us of the state of gardening in the neighbourhood of Constantinople, when he left it, about 1816, was such as might be conceived by any reflecting mind, acquainted with the low degree of civilisation which then existed in that part of the world. In short, it may be said that there was no gardening in Turkey, scarcely even excepting the grounds of the grand signior. In horticulture no productions were raised but what were indigenous to the soil and climate; and what were grown were neither forced nor retarded by art. It is clear, therefore, that the horticulture of Turkey was then, as we believe it is now, of the very simplest kind. With respect to floriculture, some few showy flowers from Persia and Syria, not natives of the shores of the Bosphorus, were to be found in some gardens; but, beyond the tulip and the polyanthus narcissus, there were few. The rose and the jasmine, which are the favourite flowers among the Turks, are indigenous, or so common as to be believed to be so. With respect to the arboriculture of Turkey, though

the greater part of the boxwood on which wood cuts are generally engraved is imported from that part of the world, it does not appear that a single timber tree is planted with a view to profit. The box (*Buxus balcanicus*) grows wild on all the rocky surfaces of the country, both on the European and on the Asiatic shores, and may be said to correspond to the holly in the woods of Europe. Landscape-gardening cannot be expected to be practised in such a country; because the grand signior has no country residences, with parks and pleasure grounds attached; and there is no aristocracy, or wealthy commercial or manufacturing class. The insecurity of the higher classes from the military despotism of the government, and the frequency of insurrections, to which the wealthy and powerful generally fall victims, are also great bars to any extensive improvements in landed property. The only scene in Turkey where the landscape-gardener can display his art is the burial ground; and here his resources are limited to the indigenous trees of the country, and the prescribed forms of its religion. On the whole, therefore, whatever may be the excellence of the native productions of Turkey, and however much they may be admired by the gardeners and botanists of other countries, it is evident that, speaking technically, that part of the world is as far behind in our art, as it is in every other.

SUBJECT. 2. *Gardening in European Turkey, Greece, and Albania, as to Flowers, Plants of Ornament, and Botanic Gardens.*

1033. *Flower-gardening.* "When the Turks," observes Deleuze, "by the taking of Constantinople, had given stability to their empire, they devoted themselves particularly to the culture of flowers." Belon, in 1558, speaks with admiration of the gardens which he saw among them. "There are no people," he says, "who delight more to ornament themselves with beautiful flowers, nor who praise them more, than the Turks. They think little of their smell, but delight most in their appearance. They wear several sorts singly in the folds of their turban; and the artisans have often several flowers of different colours before them, in vessels of water. Hence gardening is in as great repute with them as with us; and they grudge no expense in procuring foreign trees and plants, especially such as have fine flowers." Busby, ambassador at Constantinople in 1550, has the same remarks; and adds, that they frequently give flowers in presents; and that, though very avaricious in other things, they do not hesitate to pay dear for them.

1034. *The botany of the neighbourhood of Constantinople* has been examined and remarked upon, in a very interesting manner, by the Rev. Dr. Robert Walsh; and the result was communicated to the Horticultural Society of London in 1824. The following is the essence of Dr. Walsh's very interesting paper:—

1035. *Céris Siliquastrum*, but not the *kerkis* of Theophrastus, is found clothing the shores of the Bosphorus and Mount Libanus: the flowers burst out from every part of the branches and trunk, nearly down to the root, and they are gathered and used in salads.

1036. *Ceratonia Siliqua*, described by Dioscorides and Pliny; almost the only tree that grows at Malta; also in the islands of the Archipelago, and in great abundance in the wilderness of Palestine, where its produce is at this day used for food. The substance of the pod is thick, and the pulp within is remarkably sweet and nutritious, resembling manna in taste and consistence. It is sent from Palestine to Alexandria in ship-loads, and from thence over the Mediterranean, and as far as Constantinople, where it is sold in all the shops. It is occasionally to be bought in London, under its Spanish name of Algaroba bran.

1037. *Celtis australis*; common; conjectured by Sibthorp to be the lotos of Dioscorides, which Homer says has so sweet a taste, that those who eat it forget their own country. "It bears a berry of a light yellow, which changes to dark brown: it has a sweet pleasant taste, and the modern Greeks are very fond of it."

1038. *Cupressus horizontalis* "was supposed by Pliny to be the male of *C. sempervirens*, and modern botanists consider it only a variety, but undoubtedly it is a different species. The character of the whole tree is distinct and permanent, the branches project as horizontally as those of the oak, and the tree more resembles a pine than a cypress. It is in great abundance, mixed with the *C. sempervirens* in all the Turkish cemeteries. Wherever a Turk of respectability buries one of his family, he plants a young cypress at the head of the grave, as well because its aromatic resin qualifies the putrid effluvia of the place, as because its evergreen foliage is an emblem of immortality. It is never planted in the cemeteries of the modern Greeks, though it was from them, perhaps, the Turks adopted the practice."

1039. *Diospyros Lótus* is not described by the ancients, but is found every where along the Bosphorus. "It was originally brought from the country between the Euxine and Caspian seas; and is therefore called the date of Trebisond. It bears abundantly a light blown fruit, nearly as large as a walnut, which is sometimes sold in the markets under the name of Tarabresan Curmasal. The recent fruit is austere, but would make a good conserve."

1040. *Elaëagnus angustifolia*, the wild olive of Theophrastus, Dioscorides, and Pliny,

is common about Constantinople, in low moist situations. "The fruit is sold in the markets under the name of Ighidé agéghi, and is usually brought from the low grounds about Scutari and other similar places on the Asiatic shore. It abounds with a dry, mealy, saccharine substance, which is sweet and pleasant, and has the property of retaining a long time its usual size and form."

1041. *Zizyphus vulgaris*. "This tree has excited great controversy among botanists; and Linnæus, Willdenow, Michaux, and Persoon, all differ in their description of it. Shaw supposes it was like the lotus of Theophrastus and Pliny, and Sir James Smith, that it was the *paliurus*. What is certain, however, is, that it is the tree which produces the fruit sold in abundance in the markets of Constantinople, under the name of Hunnab agaghi, and which has for a long time been imported into the west of Europe under the name of Jujube. It is minutely and accurately described by Pomet, Lemery, and Tournefort, and forms an article in the old pharmacopœias. I met with it frequently in the Ionian Islands; and the Turks of Constantinople plant it before their coffee-houses, with other trees, to enjoy the shade and fruit in their season."

1042. *Paliurus aculeatus* forms the hedges of Asia, which are most impassable fences. "I am disposed to think that this is the real Christ's Thorn, rather than that called Spina Christi. The seeds are sold in the herb-shops of Constantinople, and the native hakims, or doctors, prescribe them in many complaints, under the name of Xallâ. They are also used as a dye."

1043. *Melia Azédarach* was not known to the ancients, though found "abundantly all through the Mediterranean and the Archipelago, in Europe, Asia, and Africa. It is always planted in the area of a monastery; and the caloyers, or Greek monks, form the furrowed seeds into beads, and hence it is called the bead tree. The white pulpy exterior of the seeds is said to be highly poisonous, and Avicenna, the Arabian physician, cautions people even against the leaves and wood: hence the Arabs call it *zederaot*, which signifies poison; the seeds are never eaten by birds. It is, however, a very beautiful tree, with large, compound, pinnate foliage, and rich spikes of lilac flowers."

1044. *Aecia Julibrissin*; an exceedingly beautiful tree, and the largest of the genus: that in the British palace garden at Constantinople has a trunk of a foot in diameter. The foliage is highly susceptible of the variations of the atmosphere; it affords a thick shade on a bright day, but when it threatens rain, or when a cloud obscures the sun, the leaflets immediately close their under surface together, till the sun again appears. "The flowers consist of large pencils or clusters of stamens, of a bright pink hue, and rich silky texture; and hence the Turks, who are particularly fond of the tree, have given it the soft and fanciful name of gul-ibrisim, the silk-rose, and hence is derived its specific name with botanists. It is now found in all the gardens of the Bosphorus, but it is not a native, nor is it described by the ancients."

1045. *Pistacia Terebinthus*, known and described by Dioscorides, Theophrastus, and Pliny. Gnat-like insects breed in the leaves, the cuticles of which, by being punctured, become fungous, and swell into fleshy follicles, of a bright scarlet hue, strong resinous odour, and clammy feel, full of turpentine. "These are so abundant, sometimes, as to cover the whole surface of the tree, and give it the appearance of bearing rich flowers or fruit. The trunk of the tree, when perforated, yields abundantly that fine resinous oil called Cyprus turpentine. For its aromatic quality, the Greeks and Armenians plant the tree in their cemeteries, as they do cypress. Here the Turks make them butts to discharge their topeks or pistols at: the stems, therefore, are all perforated, and continually, in the season, stream with turpentine. There is one in the British palace garden, which has been noticed, by Sestini and others, for its size and remarkable beauty: it measures twelve feet in circumference, rises nearly as high as the top of the palace, and shades a circle of one hundred and eighty yards. Notwithstanding their size, they are sometimes epiphytical, growing out of other trees. A phenomenon of this kind exists at the promontory of Chalcedon, where an enormous pistacia is growing out of a more enormous cypress; and this is noticed by Andreossi in his work on the Bosphorus. They grow every where among the ruins of the walls of Constantinople, particularly in the breach where the Turks entered, "marking," as Clarke says, "the spot where the last of the Palæologi fell."

1046. *Pistacia Lentiscus*; common in the days of Theophrastus and Dioscorides, as at present, in the island of Scio, and producing then, as now, great abundance of the transparent gum called mastic. It is much used by Turkish women to preserve their teeth and improve their breath.

1047. *Smilax aspera* and *excelsa*; described by Theophrastus; common in the woods and hills of the Bosphorus; and the roots are used in decoctions as a substitute for sarsaparilla. "*S. excelsa* climbs to the top of the highest trees, and, descending in streaming branches, forms a lofty green wall by the roadside, which looks curious; and, when covered with a profusion of rich red berries, in autumn, is very beautiful. It is well adapted for forming arbours."

1048. *Euonymus europæus* var. The arillus is of a rich scarlet, which, when the capsule opens, becomes conspicuous and remarkable.

1049. *Cássia* sp. ? The leaves are used for those of senna, to which they have a strong resemblance.

1050. *Hédéra chrysocarpa*. Yellow-berried ivy. Dioscorides and Pliny. Rare, seeds medicinal.

1051. *Prúnus Cérasus*, two varieties. "The first of these varieties is a cherry of enormous size, which grows along the northern coast of Asia Minor, from whence the original cherry was brought to Europe. It is cultivated in gardens, always as a standard, and by a graft. The gardens there consist wholly of cherry trees, and each garden occupies several acres of ground. You are permitted to enter these, and eat as much fruit as you please, without payment; but, if you wish to take any with you, you pay ten paras an oke, about a halfpenny per pound. The second variety is an amber-coloured transparent cherry, of a delicious flavour. It grows in the woods, in the interior of Asia Minor, particularly on the banks of the Sakari, the ancient Sangarius. The trees attain a gigantic size; they are ascended by perpendicular ladders, suspended from the lowest branches. I measured the trunk of one: the circumference was five feet; and the height, where the first branches issued, forty feet; the summit of the highest branch was from 90 to 100 feet; and this immense tree was loaded with fruit."

1052. *Phœnix dactylifera*. "A fruit-bearing branch of this tree was sent to me from Damietta, in Egypt, as a kind which is rare, and highly prized. The fruit was not ripe; but I was directed to cover the end of the branch with a piece of bladder, and hang the branch against the wall: the fruit, by this process, gradually ripened, was of a large size and a good flavour."

1053. *Plátanus orientális*. "The Turks, on the birth of a son, plant a platanus; as they do a cypress on the death of one. In the court of the seraglio is a venerable tree of this species, which, tradition says, was planted by Mahomet II. after the taking of Constantinople, to commemorate the birth of his son, Bajazet II., the trunk of which is fifty feet in circumference. There is another, of more enormous size, at Buyuk-dere, on the Bosphorus: it stands in a valley, and measures forty-five yards in circumference! It, in fact, now consists of fourteen large trees, growing in a circle from the same root, but separating at some distance from the ground. The Turks sometimes encamp here; and the Ben Beehee pitches his tents in the centre of this tree of trees. The immense size to which the platanus attains has been the wonder of antiquity: Pliny describes several, in one of which Lucinius Mucianus gave a supper to a company of twenty-two friends."

1054. *Rícinus communis*. Called Krotón, and Ricinus, from the resemblance of the seeds to the tick insect, which fastens on dogs' ears. Seeds taken as pills for a purgative; abundant on the rock of Gibraltar, but does not ripen its seeds on the Bosphorus.

1055. *Cistus crispus*, *créticus*, and *salsifolius*, "cover all the hills in the islands of the Archipelago and Sea of Marmora: they are gummiferous; and, in June and July, secrete copiously a very fragrant gum, which adheres to the goats' beards that browse on the plant, and is combed off, like the ladanum, for which it is sometimes substituted. They are all distinguished by hypocistis, a succulent parasitic, of a rich red colour, which I found growing from the roots, as described by Dioscorides."

1056. *Potérion spinosum*; common among the above-named Cisti, with prickly branches, like furze in England; known to the ancients, but whether under the name of stoebe or poterion is uncertain.

1057. *Vítex Ágnus cístus*; found on the banks of all the rivers of Greece and Asia Minor, along with *Nérion Oleánder*. It was called agnos (lamb) by the ancients, because carried by the priestesses in the feast of Ceres, a lamb being the usual animal sacrificed.

1058. *Quérus Ægilops*, *coccifera*, and *pubescens*; common in the islands of the Archipelago.

1059. *Pinus marítima* and *Pínea*; common in the islands of the sea of Marmora. "The cones of *P. Pínea* are gathered and sold in the markets. When exposed to the fire, they open, and the seeds, as large as hazel-nuts, then drop out; they are eaten like nuts, and called by the Turks fistik."

1060. *Lavándula Sta'chas*; the latter name by Dioscorides from the Stœchades, now the Hières Islands, near Marseilles, from whence it first came. It is very difficult to cultivate in a garden. It covers the hills in all the islands of the Archipelago and Sea of Marmora.

1061. *Rúscus racemósus*, the *Dáphne alexándria*, or Alexandrian laurel of Dioscorides, found in the islands of the Archipelago.

1062. *Kabréutéria paniculáta*; a native of China. A plant remaining in what was Sherad's garden at Tedikui, about ten miles from Smyrna.

1063. *Artemisia* sp. Pretty, aromatic; produced spontaneously in gardens, and used in salads.

1064. *Ertgeron grævolens*. The conyza of Dioscorides; stinking; used against the bite of all manner of vermin; found in large patches in the islands of Marmora.

1065. *Panerditium maritimum*, called pancration, or all-excelling, by Dioscorides. "Forskål found it in great abundance in Palestine, and supposes it was the lily of the Scripture, like to which, our Saviour said, Solomon in all his glory was not arrayed. It grows in all the sandy plains of Asia Minor, and is propagated by seed as well as bulbs. I found it among the ruins of Teos, and am disposed to think it was the lily of Anacreon."

1066. *Arum Dracunculus*. Dioscorides. Found in the plains of Brusa.

1067. *Férula* sp.: eight feet high; covers the islands of Marmora like a forest of young trees; the narther of Dioscorides, and ferula of Pliny.

1068. *Phytolacca decandra*; introduced to Constantinople from America, along with tobacco; now common in humid situations. "The berries yield a rich purple juice, which was formerly used to colour red wine, but is now confined to sherbet sugar, which the Turks manufacture of a rich red colour."

1069. *Cypérus esculentus*. The tuberous knobs of the roots are sold in the markets. The manna of the Greeks, abdalassis of the Turks, and kuperios of Dioscorides.

1070. *Centaurea solstitialis*; pretty; found sparingly on the hills about Constantinople.

1071. *Momordica Elatérium*. Pliny. The capsule is a tube, "without valves, from whence the seeds seem to be projected by a process similar to that of shot from an air-gun, namely, the expansion of some elastic fluid within the tube." It is abundant around Constantinople; used in medicine, as in England, and for jaundice by the Turks, as it was in the time of Dioscorides.

1072. *Solanum aegyptiacum*, *sodomæum*, and *ovigerum*, were not known to the ancients. "The first of them bears a bright scarlet fruit; and is a rare plant at Constantinople, never sold in the markets, and seldom met with in private gardens. It is used in soups. The second bears a large, rich, dark purple fruit, which looks very inviting. It is sometimes punctured by a species of cynips, which gangrenes the fruit, and converts the interior into a dry powder like ashes, while the outside retains its plump and beautiful aspect; and hence it is called the apple of Sodom. Hasselquist found it on the shores of the Dead Sea. It is distinguished by spines on the stem and calyx. The third bears a long black fruit, of which there are several varieties in shape and colour. It is sold in the markets in almost as great abundance as gourds and melons, and used in the same manner in soups. It is called by the Turks patindjam; and its first appearance in the markets is always attended with a strong north-east wind, which for that reason is called, in the Armenian Almanack, patindjam melkem; and all the ships bound for the Black Sea hasten to sail before the fruit appears in the market and the wind sets in, as it continues several weeks."

1073. *Brassica gongylodes* and *ErUCA sativa*. "The first of these has a protuberant swelling of the stem, from whence the leaves issue, and this is the only part of the plant used. The second is a fetid, offensive plant, but highly esteemed by the Greeks and Turks, who prefer it to any other salad, perhaps for its aphrodisiac properties."

1074. *Hibiscus esculentus*. The unripe pod is stewed with sauce; sold in the markets green, for immediate use, and dry on strings.

1075. *Onopordum elatum* adorns all the hills about Constantinople.

1076. *Papaver somniferum*; the Opon of Dioscorides.

1077. *Cicer arietinum* and *Ervum Lens*. Dioscorides and Pliny. The first "is used in great quantities in Constantinople, and mixed with all their dishes and pilafs, where it is always whole, and never bruised. It is also used in great abundance parched, when it is called leblevi. This operation is performed by Arabs, who have a peculiar skill in detaching it from the cuticle while toasting it. When prepared in this way, it is sold about the streets in sieves, by the Arabs, who are called Leblevigé, and form a numerous body. The practice of parching this pea is of great antiquity; it is not only mentioned by Plautus and Aristophanes, but Shaw supposes it to be the 'parched pulse' mentioned in Scripture. The second species is not so abundant: it is called by the Turks mergiméta. It is flattish on one side, and convex on the other, and hence called lens."

1078. *Phaseolus nanus* and *chonda*; "sold in great abundance in the markets, and called by the Turks beyas fasiula, or white bean, to distinguish them from scarlet runners."

1079. *Láblab vulgáris*; cultivated in all the gardens, but not sold in the markets.

1080. *Ipomœa purpurea*, *villœa*, and *coccinea*. "These grow in Constantinople with great luxuriance and beauty; they twine round poles and climb up trees, forming with their rich and varied flowers the brightest wreaths."

1081. *Amaránthus híbridus* and *caudatus*. "The first is a native, and grows spontaneously; the second is exotic: they both attain to a great size, altogether uncommon in England. The *A. caudatus* is trained to a pole, and rises to the height of six or seven feet, from whence the pendent spikes of flowers hang down with great beauty, and are so long as sometimes to trail upon the ground."

1082. *Cucúrbita lagenária* and *claviformis*. "These are varieties of the same gourd: the first exactly resembles a bottle; the second a club, which sometimes attains the

length of six or seven feet. The ancients were fond of cultivating this gourd; and Pliny is minute in describing the mode and uses, which are the same nearly as at the present day. I imagine this to have been the real gourd of Jonas. They grow rapidly when well watered, and wither immediately when left dry; in a few weeks forming dense shady arbours, under which the people of the East sit and smoke. When the fruit is young, it hangs down inside the arbour like candles: in this state it is cut, and boiled with forced meat, stuffed in the hollow part with rice; it is then called *dolma* by the Turks; and is in such general use, that a large district in the vicinity of Pera is called *Dolma Bakché*, or Gourd Gardens, from the cultivation of these plants."

1083. *Cucúrbita cidariformis*. "The production of this gourd, as given by the ancient writers, is curious: a gourd was planted in Campania, in the vicinity of a quince, and it immediately adopted its form in addition to its own. In fact, it resembles a large quince, laid on the top of a flat melon. This curious fruit is called here the Turk's turban, which it resembles in shape and vivid colours. It is too rare to be sold in the markets, but is cultivated in private gardens, and used in soups."

1084. *Cucúrbita aurántia* and *pyriformis*. "These exactly resemble the fruit after which they are named; the one an orange, and the other a pear."

1085. *Cucúrbita Potira*. "The gourd most in use in Constantinople; the fruit is heaped up in large piles, and kept under tents in the markets for six months in the year. There are two kinds or varieties: one long, with orange-coloured fruit; the other round, with white-coloured fruit. They are called by the Turks *bál cabaghi*, and used in all their soups."

1086. *Cucúrbita* sp. (*Evadghi cavac*, *Turkish*); by far the largest gourd in these countries; it is quite white, and in the markets resembles huge snow-balls, particularly so, as it is in season in winter."

1087. *Cucumis Citrullus*. The famous water-melon, so highly prized and universally used all over the East: it is the great luxury of the common people in Constantinople, and refreshes the hammals, or porters, like ale in England, and tea in China. Strangers are warned by writers against the intense cold of this fruit; but the people of Constantinople devour it alone, without pepper, or any other aromatic, in the hottest weather, with perfect impunity. The Turks call it *carpoos*; and give the same name to their artificial globes, from their resemblance to this fruit, which is a perfect sphere.

1088. *Cucumis Melo*; several varieties. "Six varieties of melon are cultivated in Asia Minor, particularly about Angora. There is one variety so very delicate, that the seeds were given to me carefully sealed up in a bottle, with directions that it should not be opened till the seeds were about to be sown, lest the essence should evaporate. The following directions were also sent as to the time and manner of cultivation:—In the beginning of May the seeds are thrown into water; those that float are thrown away, and those that sink are suffered to remain twelve hours. The ground is chosen rich, and manured with pigeons' dung. A small cavity is made, in which several seeds are sown together: when they come up, three or four only of the most vigorous plants are suffered to remain; the rest are pulled up and thrown away. The fruit ripens in August, and is so rich that no sugar or other seasoning is ever used with it. The other kinds of melons cultivated about Constantinople, and sold in the markets, are called by the general name of *cavun*; and, when they are larger or longer than usual, *vodinà cavun*. They generally sell for about twenty paras the oke, or about a penny per pound. One variety is called *kiskaduo* by the Turks, and is much esteemed."

SUBSECT. 3. Gardening in European Turkey, Greece, and Albania, as to its Horticulture.

1089. *Horticulture at Athens*. The district watered by the Cephissus, on the side of Athens nearest to Thebes, is divided into those extensive grounds which are particularly allotted for supplying the city with fruit and vegetables, and are for the most part not cultivated by their owners, but let out to the peasants of the villages. A large garden of an acre and a half was pointed out to me as being let annually for 250 piastres. The olive groves of Athens are also on this side of the city. They must have increased since the time of Chandler, if the description of that traveller is, as usual, correct, since they now extend in a curved line of seven or eight miles in length, and from one to three miles in breadth. Mr. Hobhouse was told that the trees planted of late years had been too thickly set, and had much injured the old wood. Besides this large olive-wood in the plain of Athens, there are other groves in the neighbourhood of several of the villages; and, besides eight in other parts of Attica, there are thirty-six olive presses in the capital. The Cephissus, a sort of ditch stream, almost dry in summer, and in winter only a torrent, flowing from Cephissia, under Mount Pentelicus, passes through the extent of olive-groves and gardens, each of which it serves, by turns, to water. The watering of the olive-groves commences September 24. and ends April 6., and is effected by raising a low mound round eight or nine trees, and then introducing the stream through dikes, so as to keep the roots and part of the trunks under water for the necessary length

of time. Each owner waters his grove for thirty or forty hours, and pays a para a tree to the waiwode, or to him who has farmed the revenue from that officer. During this period, the peasants construct huts with boughs, and are mutually watchful, both day and night, neither to lose their own portion, nor to allow others an unfair abundance of the valuable streams. Mr. Hobhouse observes that he has often seen their fires among the trees; and, as they watch in parties, and mix, as usual, much mirth with their employment, heard the sound of their voices, and the tinkling music of their guitars, when returning to Athens from an evening's ride. The water of the Cephissus is the property of the waiwode only during the season of watering the olive woods: during the remaining months, the owners of the gardens, in a proportion settled by long usage, divert the stream into their grounds for one, two, or three hours in a week or fortnight, according to the bargain at which they have hired or purchased their land. The same jealousy is manifested on this as on the other occasion. The instant that the stream is turned into the required channel, a public inspector, who is called "Dragatis too nero," and is always in attendance, turns his hour glass, and the gardener also measures the time in the same manner; other Greeks frequently being present, to prevent collusion, and cut off the rivulet immediately on the expiration of the stipulated hour. Besides this periodical irrigation of the gardens, those who can afford to procure such an advantage, buy water from the owners of several reservoirs, which have been constructed amongst the gardens, and on the banks of the Cephissus. Throughout the whole range of the olive groves and gardens are to be seen, small remains, sepulchral memorials, shafts of columns, and particularly the marble mouths of ancient wells, which retain the deeply indented marks of the rope used in letting down and raising the buckets. A very beautiful specimen of one of them is now in a large garden on the side of the river, twenty minutes' walk beyond the Colonus Hippius. It is a foot and a half high, and, near the rim, ornamented with festoons in elegant sculpture, and serves for the mouth of a well; perhaps the same for which it was originally constructed. The bucket lying by it is a dried gourd, scooped out, and attached to a rope of twisted hay. (*Hobhouse's Travels in Albania, &c.*, vol. ii. p. 358.)

1090. *The corn in the plain of Athens*, which is cut in May, is very high at the beginning of March: in this month, also, the vines begin to sprout; the olive groves to bud; and the almond trees, of which there is a great number in the neighbouring gardens, are so covered with their white and purple blossom, as to impart their varied hues to the face of the whole country. The spring vegetables, especially lettuces, may also be procured at that season. There are nearly a thousand gardens in the neighbourhood of Athens, to many of which are attached kiosques, or country-houses, ill constructed, the lower part being of mud, and the upper of badly jointed planks. Gardens and vineyards round Athens are all enclosed with mud walls. (*Ibid.*)

1091. *Horticulture in the central part of Greece*. The country abounds with corn, barley, and linseed; the gardens are full of vegetables, and peaches, olives, mulberries, and grapes. There is an abundance of honeysuckles. The country round Athens is partly waste and covered with heath, and partly enlivened with groves of olives, interspersed with fields of barley and vineyards. The residence of Signor Lusieri, an artist of distinguished talents, is delightfully situated under the rocks of the Acropolis. The terrace in the garden commands one of the finest views of Athens and its environs. (*Bremsen's Letters, &c.*) Dr. Clarke informs us that the vineyards of Arracovia, upon the south side of Parnassus, are managed with as much skill and labour as the finest vineyards on the banks of the Rhine. (*Travels, &c.*, vol. vii. p. 254.) The gardens about Athens abound in lizards, as well as the houses, and storks are encouraged to feed on them. (*Hobhouse's Travels in Albania, &c.*) Mr. Hobhouse adds that he found only two stands of beehives on Mount Hymettus; and that very little of the honey is now to be had in Athens, though in its neighbourhood there is still abundance of wild thyme. (*Ibid.*, vol. ii. p. 388.) The hills on the Thracian side are a continued vineyard. (*Ibid.*)

1092. *Of the horticulture of Turkey* little is known, or how far the use of gardens is general. "The capital of the Turkish empire," T. Thornton observes (*Present State of Turkey*, 1822), "though the soil in its immediate vicinity is barren and ungrateful, receives from the neighbouring villages, and from the surrounding coasts of both the seas which it commands, all the culinary herbs and fruits of exquisite flavour which the most fastidious appetite can require. On the shores on both sides of the Bosphorus the ground forms a chain of schistous hills, covered with vineyards and gardens, and beautiful trees and shrubs; and the valleys, which are exceedingly fertile, are in the highest state of cultivation."

1093. *Of the botany and gardening of the Morea* some account is given by Dr. Pouqueville. (*Travels in 1798.*) "This country, formerly a part of Greece, is rich in vegetable productions, but at present proportionably poor in cultivation. There is no great variety cultivated in the gardens; the ground in general is ill prepared; the Greeks are unacquainted with the spade, and only use a mattock for turning it. Spinach and artichokes,

which will even grow naturally without cultivation, are among the best culinary vegetables. Cabbages and cauliflowers grow to a prodigious size; they have also very good carrots, road and kidney beans are produced in such abundance, that they might become an object of exportation; but the seeds of both are much smaller than those in France. The lettuces are small; and the celery never will be good while, as at present, they do not earth it up. The tomatoes are very fine, as is the fruit yielded by the egg plant. The melons, water-melons, and gourds, are not to be exceeded in any part of the world. Mint, balm, fennel, parsley, and other herbs, abound in the gardens. The orchards are well furnished with almonds, oranges, lemons, citrons, peaches, pears, apricots, quinces, cherries, pomegranates, medlars; they have also the arbutus, the service-tree, and the carob-tree: all these might be improved, if more pains were taken in cultivating them." (p. 204.) The account which this author, and also Dr. Holland (*Albania and Greece, &c.*, 1812 and 1815), gives of the plants, the timber, and the fruit-trees, natives of the Morea, is highly interesting; he regrets that he could not occupy himself more with the subject, adding, that a botanist might compose a work worthy of the age in which we live, by undertaking a complete *Flora Peloponnesica*.

CHAP. IV.

Of the Rise, Progress, and present State of Gardening in the British Isles.

1094. That gardening was introduced into Britain by the Romans; there can be but little doubt. According to Strabo, writing early in the first century, "The people of Britain are generally ignorant of the art of cultivating gardens, as well as of other parts of agriculture" (lib. iii. p. 200.); though it would appear from the same author, that some of them in the southern parts had gardens round their houses. Tacitus, towards the end of the same century (A. D. 79), informs us, that "the soil and climate were very fit for all kinds of fruit-trees, except the vine and the olive; and for all plants and edible vegetables, except a few, which are peculiar to hotter countries." (*Vita Agric.*, cap. xiv.) The Romans afterwards found different parts of the country not unfit for the vine; and wine, it is conjectured by some, was made in England towards the end of the third century, under the emperor Probus. Vineyards are mentioned by Bede, in the beginning of the eighth century. They are also noticed in the descriptive accounts of Doomsday; and William of Malmesbury commends the county of Gloucester, in the twelfth century, as excelling all the counties of the kingdom in the number and goodness of its vineyards. (See *Barrington and Pegge, in Archaeologia*.) The remains of Roman villas discovered in different parts of the country, may be considered as existing evidence that gardening was established, both as an art of taste and of vegetable culture, by the Roman generals and other members of the government. Pliny expressly states, that cherries were introduced into Britain about the middle of the first century: they had been brought to Italy by Lucullus only a century before.

1095. *Modern British gardening* seems to have received its first stimulus during the reign of Henry VIII.; a second powerful impulse was given to it in the time of Charles II., by the introduction of the splendid style of Le Nôtre; it changed again, with the introduction of the modern style during the reign of George II.; next, in the early part of the reign of George III. with the plants of North America; and finally through

1096. *The following outline of gardening history* might have been illustrated by numerous notices of British country seats, and by numerous engravings of them; but as this would have swelled our volume to an inconvenient size, we content ourselves by referring to the *Beauties of England and Wales*, and *Patterson's Book of Roads*.

SECT. I. *British Gardening, as an Art of Design and Taste.*

1097. *Of British gardening, as an art of taste*, nothing is known for the first thousand years of our era. With the eleventh century commence some notices as to England; with the fifteenth, a few indications as to Scotland; and with the seventeenth century, some hints as to the state of our art in Ireland.

SUBJECT. 1. *Gardening in England, as an Art of Design and Taste.*

1098. *Roman landscape-gardening was lost in England* when that people abandoned Britain to the Saxons, in the beginning of the fifth century; but, as it had revived in France under Charlemagne, it would probably be re-introduced into England with the Norman Conqueror, in the end of the eleventh century.

1099. *Henry I.* (1100 to 1135), the third king after William the Conqueror, had, according to Henry of Huntingdon (*History*, lib. 7.), a park (*habitatio ferarum*) at

Woodstock; and it may not be too much to conjecture, that this park was the same which had surrounded the magnificent Roman villa, whose extensive ruins, occupying nearly six acres, have been recently dug up on the Duke of Marlborough's estates in that neighbourhood. Blenheim, the first residence in Britain, or perhaps in Europe, in respect to general grandeur, may in this view be considered as the most interesting in point of its relation to antiquity. Hehtzner mentions this park as being enclosed by a wall; and says, that, "according to John Rosse, it was the first park in England."

1100. *In the time of Henry II.* (1154 to 1189), Fitzstephen, it is observed by Daines Barrington, states, that the citizens of London had gardens to their villas, "large, beautiful, and planted with trees." In De Cerceau's *Architecture*, published in the time of Henry III., there is scarcely a ground-plot not laid out as a parterre or a labyrinth.

1101. *In the reign of the first Edward* (1272 to 1307), the cultivation of the garden was extended even to the more curious and delicate productions; but it was neglected afterwards during the contention of the houses of York and Lancaster (which began 1448 and lasted till 1486), when horticulture, as well as the other arts of peace and polished life, gave way to the havoc and devastation of civil war; nor did they recover in any considerable degree till the time of Elizabeth (1558 to 1603). This we learn from the description of England prefixed to Holinshed's *Chronicle*, published in 1587.

1102. *During the reign of Edward III.* (1327 to 1377), Sir William de Middilton possessed the manor of Mendham in Suffolk; and in the thirty-second year of this king's reign (1359), on a survey thereof, it is said, the house was furnished with a pigeon-house, three gardens, and two court-yards. The luxury of three gardens, at this early period, must at first appear very remarkable, when it is known at how low an ebb horticulture was at the beginning of even the sixteenth century. In 1512, the opulent Earl of Northumberland, whose household consisted of 160 persons, had but one gardener, who attended "hourely in the garden for setting of erbis and clipping of knottis and sweeping the said garden clene." Nay, it should seem as if sometimes there was not even one: for among the workmen of the household, as a painter, a joiner, and a milnar, is mentioned "the gardener of the place where my Lord lyeth, if there be one." (*Northumberland Household Book*, p. 42., and Cullen's "*Hawkesley*," p. 108.)

1103. *During Henry V.'s reign* (1413 to 1422), in the beginning of the fifteenth century, King James I. of Scotland was a prisoner in Windsor castle for several years. In the poem written by that monarch, he gives the following account of a royal garden there:—

"Now was there maide fast by the touris wall
A garden faire, and in the corneris set
Ane herbere grene, with wandis long and small
Rallit about, and so with treis set
Was all the place, and hawthorn hedges knet,
That life was non, walkyng there for bye
That myght within scarce any wight espye.

"So thick the bewis and the leves grene
Beschudit all the alleys that there were,
And myddis every herbere might be sene
The scharp grene swete jenever,
Growing so fair with branches here and there,
That as it semyt to a lyfe without,
The bewis spred the herbere all about."

The Quair, by King James I. of Scotland, published by Lord Woodhouselee.

1104. *Towards the end of the fifteenth century*, Leland, in his *Itinerary*, states, that at "Wresehill Castelle, in Yorkshire, the gardeins within the mote, and the orchardes without, were exceeding fair. And yn the orchardes were mountes, *opere topiarii*, writhen about with degrees like cokil shelles, to com to the top without payn." (*Itinerary*, &c., p. 60.) Such a mount still exists at the Castle inn at Marlborough, not ascended by steps or degrees, but by a winding path. It is covered with ancient yew-trees, no longer *opere topiarii*. Leland also mentions the gardens at Morli, in Derbyshire, and some others of less note in the northern counties.

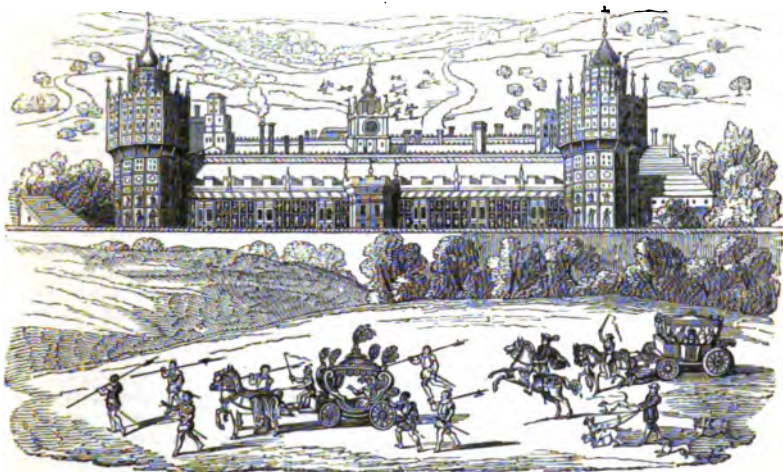
1105. *During the reign of Henry VII.* (1485 to 1509), Holinshed informs us, that large parks, or circumscribed forests, of several miles in circumference were common. Their number in Kent and Essex alone amounted to upwards of a hundred. (p. 204.) The Earl of Northumberland had, in Northumberland, Cumberland, and Yorkshire, twenty-one parks, and 5771 head of red and fallow deer. He had also parks in Sussex, and other southern counties. These parks were formed more from necessity than luxury; tenants for land being then not so readily obtained as in later times.

1106. *During the reign of Henry VIII.* (1509 to 1547), the royal gardens of Nonesuch were laid out and planted. "Nonesuch," says Hehtzner, "was built by Henry VIII. with an excess of magnificence and elegance even to ostentation; as one would imagine every thing that architecture can perform to have been employed in this one work. There are every where so many statues that seem to breathe, so many miracles of consummate art, so many casts that rival even the perfection of Roman antiquity, that it may well claim and justify its name of Nonesuch, being without an equal; or, as the poet sung,

'This, which no equal has in art or fame,
Britons deservedly do Nonesuch name.'

The palace itself is so encompassed with parks full of deer, delicious gardens, groves ornamented with trellis-work, cabinets of verdure, and walks so embowered by trees, that it seems to be a place pitched upon by Pleasure herself to dwell in along with Health. In the pleasure and artificial gardens are many columns and pyramids of marble, two fountains that spout water one round the other like a pyramid, upon which are perched small birds that stream water out of their bills. In the grove of Diana is a very agreeable fountain, with Actæon turned into a stag, as he was sprinkled by the goddess and her nymphs, with inscriptions. There is, besides, another pyramid of marble full of concealed pipes, which spirt upon all who come within their reach." Lysons, in his *Enviros of London*, informs us, that "in Sebastian Braun's work, entitled *Civitas Orbis Terrarum*, there is an engraving of Nonesuch Palace," from which he gives a plate. (fig. 214.) There is also a small engraving of the same palace, with part of its

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gardens, in the corner of Speed's Map of Surrey. Braun, speaking of Nonesuch, says, that by a contrivance of the architect, an echo was made at the entrance of the palace, which repeated the sound distinctly five or six times. (*Lysons*.) These gardens are stated, in a survey taken in the year 1650, above a century after Henry's death, to have been cut and divided into several alleys, compartments, and rounds, set about with thorn-hedges. On the north side was a kitchen-garden, very commodious, and surrounded with a wall fourteen feet high. On the west was a wilderness severed from the little park by a hedge, the whole containing ten acres. In the privy-gardens were pyramids, fountains, and basins of marble, one of which is "set round with six lilac trees, which trees bear no fruit, but only a very pleasant smell." In the privy-gardens were, besides the lilacs, 144 fruit-trees, two yews, and one juniper. In the kitchen-garden were seventy-two fruit-trees and one lime tree. Lastly, before the palace, was a neat handsome bowling-green, surrounded with a balustrade of freestone. "In this garden," observes Daines Barrington, "we find many such ornaments of old English gardening, as prevailed till the modern taste was introduced by Kent." It is singular that Nonesuch, so celebrated as an example of the ancient style of gardening, in the sixteenth century, should have been changed to the modern style in the eighteenth century by the first and the best of all the writers on this style, Thomas Whately, Esq. author of *Observations on Modern Gardening*, to whose brother Nonesuch belonged in 1786. (See *Gard. Mag.*, vol. vii. p. 490.)

1107. In a garden adjoining Whitehall Palace, Hentzner found "a *jet d'eau* with a sundial, which while strangers are looking at, a quantity of water, forced by a wheel, which the gardener turns at a distance, through a number of small pipes, plentifully sprinkles those that are standing round." (*Travels*, &c. Strawberry Hill edition, p. 24.)

1108. Hampton Court was laid out, about the middle of this reign, by Cardinal Wolsey. When visited by Mandelso, in the reign of James I., these gardens were "*très-beaux, et très-bien entretenus*." The labyrinth, one of the best which remains in England, occupies only a quarter of an acre, and contains nearly half a mile of winding walks. There is an adjacent stand, on which the gardener places himself, to extricate the adventuring

stranger by his directions. Switzer condemns this labyrinth for having only four stops, and gives a plan for one with twenty. Daines Barrington says (*Archæology*.) that he got out by keeping close to the hedge.

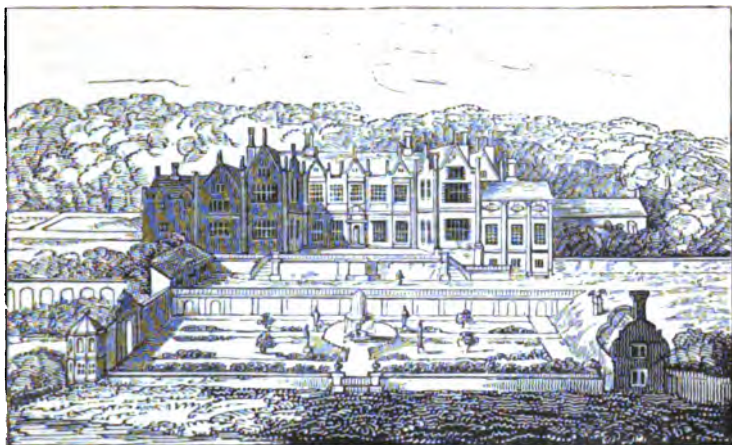
1109. *During Elizabeth's reign* (1558 to 1603), Hatfield, Lord Treasurer Burleigh's, Holland-house, and some other old seats, were laid out. Of Hatfield, Hentzner says, the "gardens are surrounded by a piece of water, with boats rowing through alleys of well-cut trees, and labyrinths made with great labour; there are *jets d'eau*, and a summer-house, with many pleasant and fair fishponds." Statues were very abundant. Prince Pückler Muskau, speaking of Hatfield, as he found it in 1830, says, "Hatfield House is poor in works of art, and the park is rich only in large avenues of oaks, and in rocks; otherwise dreary, and without water, except a nasty green standing pool near the house." (*Tour, &c.*, vol. iv.) Hyll, or Hill, a London citizen, who published the *Profitable Art of Gardening* in 1563, gives a cut "for a knot, proper by gardens;" and the *Gardener's Labyrinth*, published by Didymus Mountain (1571), contains plates of "knots and mazes cunningly handled for the beautifying of gardens." Lawson's *New Orchard* was published in 1597: he gives directions also for parterres and labyrinths. A curious idea is given of the taste of these times in what he says of the latter. "Mazes well framed a man's height may, perhaps, make your friend wander in gathering berries, till he cannot recover himself without your help."

1110. *During the reign of James I.* (1603 to 1625), the gardens of Theobalds and Greenwich were formed or improved. The garden at Theobalds, Mandelso, a traveller who visited England about 1640, describes as "a large square, having all its walls covered with phillyrea, and a beautiful *jet d'eau* in the centre. The parterre hath many pleasant walks, part of which are planted on the sides with espaliers, and others arched over. Some of the trees are limes and elms, and at the end is a small mount, called the Mount of Venus, which is placed in the midst of a labyrinth, and is upon the whole one of the most beautiful spots in the world." (*Voyages de Mandelso*, tom. i. p. 598.) The same author, speaking of the garden of St. James's Palace, says "il n'est pas fort grand, et n'a rien de remarquable, si ce n'est qu'au milieu on voit dans une grande pierre carré et creusé au milieu cent dix-sept quadrans. Il est accompagné d'un verger d'arbres fruitiers plantés en échiquier, ayant au milieu un gros piller de bois qui jette de l'eau, et d'un petit bois qui forme quelques allées assez agréables, et qui nourrit quelques cerfs daims et chevreuils." The garden of the queen's palace in St. James' Park, he describes as having, "une grotte, faite de tous sortes des esquillages (what in modern times would be called a rockwork of shells), représentant le Parnasse, en sorte néanmoins que l'été elle ne laisse pas de pousser toutes sortes de fleurs et d'herbes, qui font un très-bel effet. La véritable grotte est du côté du palais, d'où on voit Apollon et les Muses, et sur la haut de la montagne un Pégase de bronze doré. Au pied on trouve quatre petites voûtes, qui couvrent autant des statues de marbre, tenant chacune une corne d'abondance, et sous le bras une cruche dont elles versent de l'eau dans un bassin qui baigne le pied de la montagne. L'une de ces statues qui est de marbre noir représenté la Tamise, et se fait connoître par un distique Latin." (*Mandelso's Voyages and Travels*, &c., folio edit. 1719, tom. ii. p. 751.) Lord Bacon attempted to reform the national taste during this reign, but apparently with little immediate success. He wished still to retain shorn trees and hedges; but proposed winter or evergreen gardens, and rude or neglected spots, as specimens of wild nature. "As for the making of knots or figures," says he, "with divers-coloured earths: they be but toys. I do not like images cut out in juniper or other garden-stuff: they are for children." (*Essay on Gardens*.) Sir Henry Wotton says, "the garden at Lord Verulam's was one of the best he had seen, either at home or abroad." Ormead Hall (*fig. 215.*) is a fine specimen of a nobleman's seat in this age.

1111. *During the Commonwealth* (1649 to 1660), a *Janna Trilinguis* was published at Oxford, in which we are informed, that "gardening is practised for food's sake in a kitchen-garden and orchard, or for pleasure's sake in a green grass-plot and an arbour." As to the formation of the latter, the author adds, "the pleacher (*topiarius*) prepares a green plat of the more choice flowers and rarer plants, and adorns the garden with pleach-work; that is, with pleasant walks and bowers, &c. to conclude with purling fountains, and waterworks." (chap. 32.) We learn also from this comprehensive author (Commenius) the ancient use of parks. We are told, "the huntsman hunteth wild beasts, whilst he either allureth them into pitfalls, and killeth them, or forceth them into toils: and what he gets alive he puts into a park." (chap. 37.)

1112. *During the reign of Charles II.* (1660 to 1685) landscape-gardening received a great impulse. This monarch, we are informed by Daines Barrington, sent for Perault and Le Nôtre: the former declined coming to England, but the latter planted Greenwich and St. James's Parks. Charles planted the semicircle of Hampton Court; the beginning, as Switzer informs us, of a grand design never completed. Lord Capel and the Earl of Essex are mentioned by Switzer as eminent encouragers of gardening during

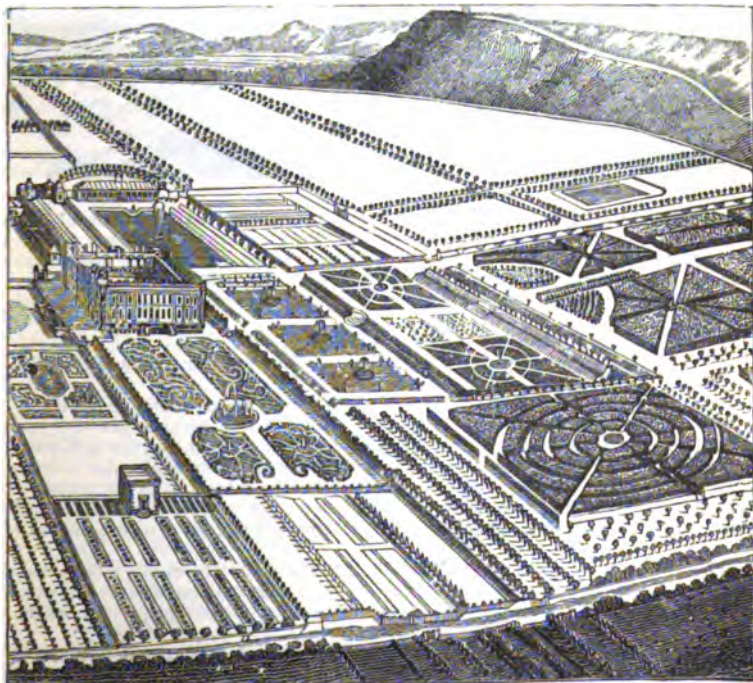
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this reign. The latter sent his gardener, Rose, to study the much celebrated beauties of Versailles; and on his return he was appointed royal gardener.

1113. *Chatsworth* (fig. 216.), the magnificent seat of the Duke of Devonshire, was laid

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out in this reign; and, it is conjectured, from a design by the same artist. (*Beauties of England and Wales: Derbyshire.*) Waller the poet formed his residence at Beaconsfield about the same time. The grounds there being very irregular, he has been at consider-

able labour in reducing the parts near the house and banquetting-room to regular slopes and levels, harmonising with an oblong basin or canal. It is but justice to the memory of this amateur, who was undoubtedly a man of taste in his day, that, in the more remote scenes, no appearance of art is discernible, or seems ever to have been intended. Their dry, ragged-edged paths, conducted through the natural woods, form a fine contrast to the artificial scenes at Prior's Park.

1114. *Garden-buildings*, Daines Barrington conjectures, were first erected in England during this reign by Inigo Jones, at Beckett near Farringdon. There a banquetting-room is placed on a point of land projecting into a lake, and is surrounded with a broad base, or platform, protected by a parapet-wall, and shaded by the far-projecting eaves of the building. It consists of one apartment with a cellar below; and the covered platform or base is supposed to be for the purpose of angling.

1115. *Evelyn*, the well-known author of *Sylva* and other gardening books, flourished during this reign. In his *Memoirs* by Bray, published in 1818, are the following remarks on the gardens of England, in respect to taste and style:—

1116. *Evelyn*, in 1652, describes Wooton in Surrey, the residence of his father, as being, for woods and waters, among the most natural and magnificent examples which England afforded, "till this late and universal luxury of the whole nation since abounding in such expenses."—"Gave my brother some directions about his garden, which he was desirous to put into some form, for which he was to remove a mountain overgrown with large trees and thickets, and a moat within ten yards of the house:" this his brother "succeeded in doing, by digging down the mountain, and flinging it into a rapid stream, which carried away the sand, filled up the moat, and levelled that noble area where now the garden and fountain is." In Bray's *Memoirs* an engraving is given of these gardens, said to be taken from one by Evelyn himself. (*fig.* 217.) We visited Wooton in the

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autumn of 1830, and were struck with the close resemblance the ground then bore to the general features which they appear from this figure to have exhibited two centuries ago. The cause is, the main features of the place are natural ones, and these neither time nor art (at least as ordinarily exerted) can entirely obliterate. Groomsbridge, near Tunbridge, Evelyn saw the same year, and describes as "a pretty melancholy place."

1117. *Evelyn*, in 1654, visited the following parks and gardens:—

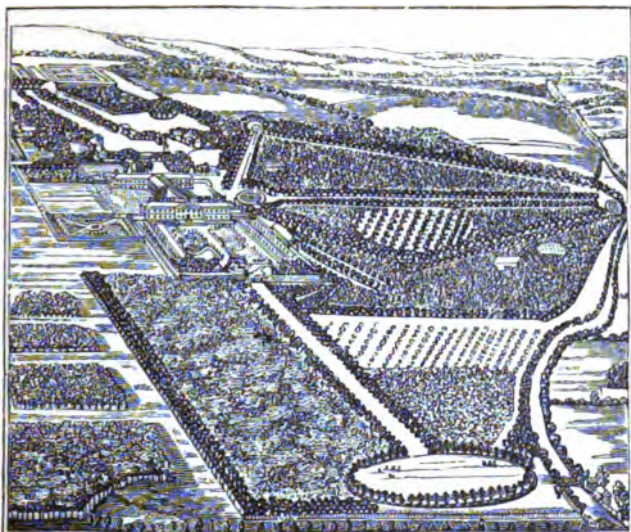
1118. *Lady Brook's garden at Hackney*, "one of the neatest and most celebrated in England."

1119. *Caversham*, Lord Craven's, Berkshire. "Goodly woods felling by rebels."

1120. *Cashiobury* (*fig.* 218.), Lord Essex, Hertfordshire. "No man has been more industrious than this noble lord (Essex) in planting about his seat, adorned with walks, ponds, and other rural elegancies."—"The gardens are very rare, and cannot be otherwise, having so skilful an artist to govern them as Cooke, who is, as to the mechanical part, not ignorant in mathematics, and pretends to astrology. There is an excellent collection of the choicest fruit. My lord not illiterate beyond the rate of most noblemen of this age."

1121. *Wilton*, Lord Pembroke's, Wiltshire. "The garden, heretofore esteemed the noblest in England, is a large handsome plain, with a grotto and waterworks, which might be made much more pleasant were the river that passes through cleansed and raised; for all is effected by mere force," &c.

1122. *Hampton Park*, Middlesex, "formerly a flat naked piece of ground, now planted with sweet rows of lime trees, and the canal for water now near perfected; also the hare-park. In the garden is a rich and noble fountain, with syrens, statues, &c. cast in copper by Fanelli, but no plenty of water. The cradle-walk of hornbeam in the garden is, for the perplexed twining of the trees, very observable. There is a parterre which they call Paradise, in which is a pretty banquetting-house set over a cave or cellar."

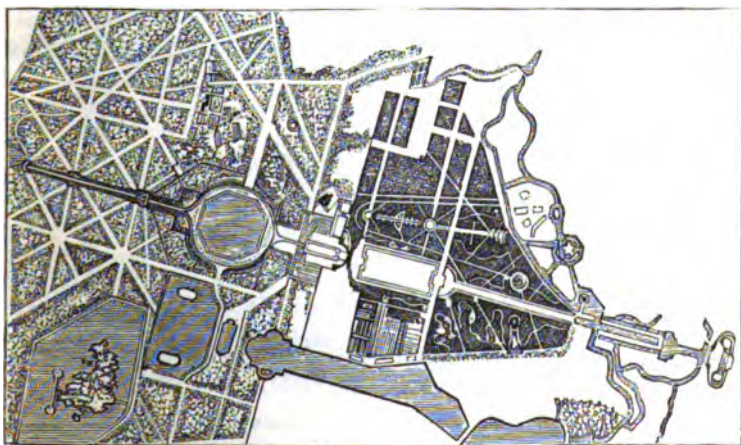


1123. *Evelyn in 1663 mentions the following gardens as having been visited by him in that year : —*

1124. *A citizen's garden.* "One Loader, an anchormith in Greenwich, grew so rich, as to build a house in the street, with gardens, orangeries, canals, and other magnificence, on a lease. His father was of the same trade, and an anabaptist."

1125. *Bushnell's Wells at Enstone.* "This Bushnell had been secretary to Lord Verulam. It is an extraordinary solitude. There he had two mummies, and a grot, where he lay in a hammoc like an Indian. Hence we went to Ditchley, an ancient seat of the Lees," &c. — Bushnell's gardens and waterworks still exist, and are shown is curiosities to strangers.

1126. *Ham House, and garden of the Duke of Lauderdale, Middlesex,* "inferior to few of the best villas of Italy itself, the house furnished like a great prince's; the parterres, flower-gardens, orangeries, groves, avenues, courts, statues, perspectives, fountains, aviaries, and all this at the banks of the sweetest river in the world, must needs be admirable."



1127. *Wanstead House, Essex (fig. 219.),* "I went to see Sir Josiah Child's prodigious cost in planting walnut-trees about his seat, and making fishponds some miles in circuit in

Epping Forest in a barren spot, as oftentimes these suddenly monied men for the most part seat themselves."—In 1822 this magnificent seat was reduced to a mere mass of materials, through the improvidence of Wellesley Long Pole Long Wellesley, who became possessed of it by marriage. The house was sold in lots, and the ground let in small portions on building leases.

1128. *Sir Henry Capel's orangery and myrtetum at Kew*, "most beautiful and perfectly well kept. He was contriving very high palisades of reeds to shade his oranges during the summer, and painting these reeds in oil."

1129. *Althorp*, Lord Spencer's, Northamptonshire. "The iron gate opening into the park of very good work, wrought in flowers, painted in blue, and gilded."

1130. *Beddington*, the seat of the Carews, Surrey, now decaying, "heretofore adorned with ample gardens, and the first orange trees that had been seen in England, planted in the open ground, and secured in winter only by a tabernacle of boards and stoves, &c. standing a hundred and twenty years. Large and goodly trees, and laden with fruit, now in decay, as well as the grotto and fountains; the cabinets and other curiosities in the house and abroad being now fallen to a child under age, and only kept by a servant or two from further dilapidation. The estate and park about it also in decay." Aubrey says the orange trees mentioned by Evelyn were planted by Sir Francis Carew at Beddington, and were brought by him from Italy: but the editors of the *Biogr. Britan.*, edit. 1748, art. *Raleigh*, speaking from a tradition preserved in the family, say they were raised by Sir Francis Carew from the seeds of the first oranges which were imported into England by Sir Walter Raleigh; who had married his niece, the daughter of Sir Nicholas Throckmorton. See an account of this garden in 1691, in *Archæologia*, vol. xii. The orange trees at Beddington were destroyed by the hard frost in 1739–40. Queen Elizabeth visited Sir F. Carew in Aug. 1599; and Sir Hugh Plat, in his *Garden of Eden*, relates a curious anecdote of his keeping back the ripening of a cherry tree, for one of her visits.

1131. *Marden*, Surrey. "Originally a barren warren, bought by Sir Robert Clayton, who built there a pretty house, and made such alteration by planting, not only an infinite store of the best fruit, but so changed the natural situation of the hills, valleys, and solitary mountains about it, that it rather represented some foreign country which could produce spontaneously pines, firs, cypress, yew, holly, and juniper: they were come to their perfect growth, with walks, &c. among them."

1132. *Alburie Howards*, Surrey. "Found the garden exactly done to the design and plot I had made, with the crypt through the mountain in the park, 30 perches in length. Such a Pausilippe (alluding to the grot of Pausilippo at Naples) is nowhere in England besides. The canal was now digging, and the vineyard planted."—We visited Albury in 1831, and found a part of the crypt still remaining, though stopped up at the farther end. A view of Albury is given in Aubrey's *Surrey* (fig. 220.), as it existed

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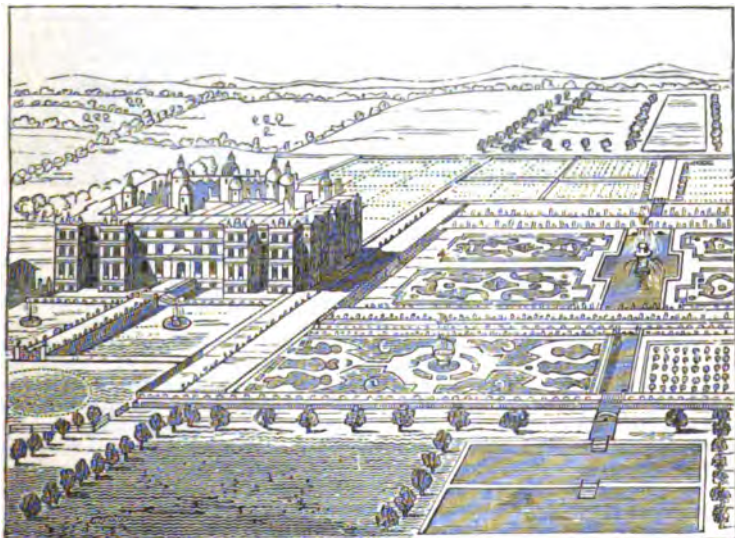
in Evelyn's time. A new house has been since built, and the gardens have been entirely altered. (See *Gard. Mag.*, vol. vii. p. 364.)

1133. *Swallowfield*, Lady Clarendon, Berkshire. "Lady C. skilled in the flowery part, my lord in diligence of planting. Water flagged with calamus, all that can render

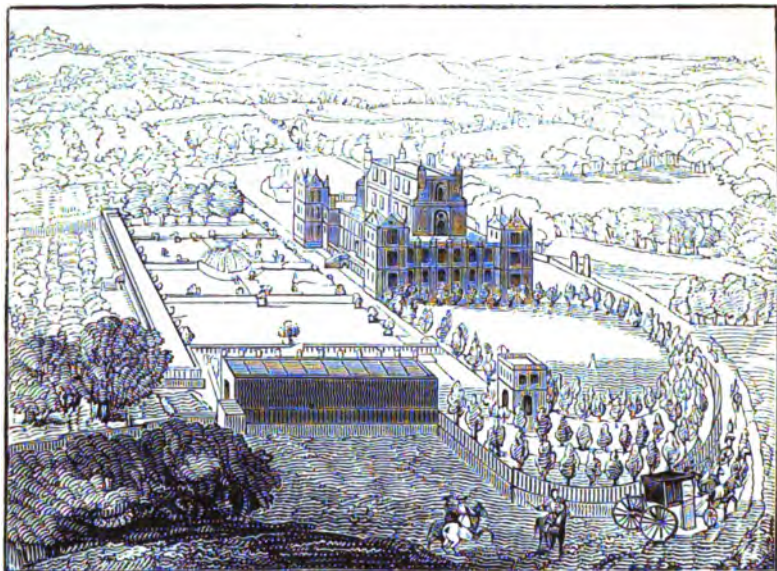
a country-seat delightful, and a well-furnished library in the house." (*Mem. by Bray*, i. 432.)

1134. *During the reign of William and Mary* (1689 to 1702) gardening, Switzer says, arrived at its highest perfection. King William, Daines Barrington informs us, gave vogue to clipped yews, with magnificent gates and rails of iron, not unfrequent in Holland, and about this time (see *Huetiana*) introduced into France, and, in reference to the opaque stone-walls which they supplanted, called there *clairs-voyées*. The most extensive iron screens of this sort in England, next to those of Hampton Court, were formed by Switzer, at Leeswold, in Flintshire, laid out by that artist in a mixed style, or what is called Bridgeman's first manner. Hampton Court being at this time the actual residence of the royal family, the gardens underwent considerable improvement. An elegant alcove and arched trellis were added at the end of one of the alleys, and four urns placed before the principal part of the house, supposed by Daines Barrington (*Archæologia*) to be the first that were thus used in England. Towards the end of this century, vegetable sculptures and embroidered parterres were probably in their highest vogue; a conjecture confirmed by the works of Le Blond, James, Switzer, &c. published during this and the following reign. Longleat, the magnificent seat of the Marquess of Bath (*fig. 221.*), belongs to this period.

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1135. *Notes were made on some of the gardens round London* by J. Gibson, in the year 1691, which have been subsequently published in the *Archæologia*. (vol. xii.) Many of those mentioned by Evelyn are included, and spoken of in nearly the same terms by Gibson. Terrace-walks, hedges of evergreens, shorn shrubs in boxes, and orange and myrtle trees are mentioned as their chief excellences. The parterre at Hampton Court is said to resemble a set of lace patterns. Evelyn himself is said to have a "pleasant villa at Deptford, a fine garden for walks and hedges, and a pretty little green-house with an indifferent stock in it. He has four large round phillyreas, smooth-clipped, raised on a single stalk from the ground, a fashion now much used. Part of his garden is very woody and shady for walking; but, not being walled, he has little of the best fruits." Sir William Temple's *Essay on the Gardens of Epicurus* appeared about the same time. His picture of a perfect garden is that of a flat, or gentle declivity, of an oblong shape, lying in front of the house, with descent of steps from a terrace extending the whole length of the house. This enclosure is to be cultivated as a kitchen-garden and orchard. Such a garden he found at Moor Park, Hertfordshire, laid out by the Countess of Bedford, celebrated by Dr. Donne, "the sweetest place, I think, that I have seen in my life, before or since, at home or abroad." Lord Walpole, in his enthusiasm for the modern style, observes on this description, that any man might form as sweet a garden, who had never been out of Holborn. — It has long since been destroyed, and its place occupied by lawn and trees. *Fig. 222.* is a view of Wollaton Hall and gardens, near



Nottingham, as they appeared in 1696. The gardens are extensive and laid out in the Italian style, with terraces, statues, fountains, urns, orange trees in boxes; and, what is more remarkable, an orangery with a glass roof, which must have been one of the first of that description erected in England. The designers of this structure, and, probably, also of part of the gardens, must have been London and Wise, the great nurserymen and garden architects of that day. The architecture of the house, which was built in the time of Queen Elizabeth, was reckoned the *chef d'œuvre* of Thorpe, who was the architect of Holland House and Burleigh. (*Gard. Mag.*)

1136. *During Queen Anne's reign* (1702 to 1714), the principal alteration mentioned by Daines Barrington, as having taken place in the royal gardens, was that of covering the parterre before the great terrace at Windsor with turf. Switzer mentions that her majesty finished the old gardens at Kensington, begun by King William. Wise, who had been apprentice to Rose, and succeeded him as royal gardener, turned the gravel-pits into a shrubbery, with winding walks, with which Addison was so struck, that he compares him to an epic poet, and these improved pits as episodes to the general effect of the garden. Wise and London afterwards turned nurserymen, and designers of gardens, in which last capacity they were nearly in as great demand as was afterwards the celebrated Brown. To London and Wise, as designers, succeeded Bridgeman, who appears to have been a more chaste artist than any of his predecessors. He banished vegetable sculpture, and introduced wild scenes and cultivated fields in Richmond park; but he still clipped his alleys, though he left to their natural growth the central parts of the masses through which they were pierced. Blenheim, Castle Howard, Cranbourne, Bushy Park, Edger, Althorp, New Park, Bowden, Hackwood, Wrest, and indeed almost all the principal noblemen's seats in the ancient style, were laid out during this, the preceding, and part of the latter reigns, or between the years 1660 and 1713. Blenheim was laid out by Wise in three years; Wanstead in Essex, and Edger in Hertfordshire, were the last of London's designs. (*Switzer.*)

1137. *During the reign of George I.* (1714 to 1727), nothing of consequence appears to have been done to the royal gardens; though, near the end of it, Vanbrugh was appointed surveyor of the waters and gardens of the crown, June 21, 1715, but continued only a year or two in office.

1138. *During the reign of George II.* (1727 to 1760), Queen Caroline enlarged and planted Kensington Gardens, and formed what is now called the Serpentine River, by uniting a string of detached ponds. This was a bold step, and led the way to subsequent changes of taste. Lord Bathurst informed Daines Barrington, that he was the first who deviated from the straight line in pieces of made water, by following the natural lines of a valley, in widening a brook at Ryskins, near Colnbrook; and that Lord Strafford,

thinking that it was done from poverty or economy, asked him to own fairly how little more it would have cost him to have made it straight. It appears, however, that Christopher Wren, chaplain to King Charles I., dean of Windsor, and father of Sir Christopher, the architect, claimed the origin of serpentine rivers as his invention. In a marginal note affixed to Sir Henry Wotton's *Elements of Architecture*, published in 1624, he says, "For disposing the current of a river to a mightie length in a little space I invented the serpentine, a form admirably conveying the current in circular and yet contrary motions upon one and the same level, with walks and retirements betweene, to the advantage of all purposes, either of gardenings, plantings, or banquetings, or aery delights, and the multiplying of infinite fish in a little compass of ground, without any sense of their being restrained. In brief, it is to reduce the current of a mile's length into the compass of an orchard." (*Gard. Mag.*, vol. iii. p. 480.) Kensington Gardens were originally only twenty-six acres in extent; Queen Anne added thirty acres, which were laid out by her gardener, Henry Wise. The principal additions were made by Queen Caroline, by whose directions nearly three hundred acres were taken out of Hyde Park, and laid out by Bridgeman. (*Lysons's Environs.*) Bickham, who wrote in 1742, says, "The gardens of Kensington Palace, which are three miles and a half in circumference, are very fine; and have been much improved and enlarged since his present Majesty came to the throne, under the care and management of the late ingenious Mr. Bridgeman. They are kept in the greatest order; and in the summer time when the court is not there, are resorted to by a vast concourse of the most polite company." (*Delicia Britannice*, p. 32.) From Horace Walpole's correspondence (published 1819) we learn that Queen Caroline proposed to shut up St. James's Park, and convert it into a noble garden for the palace of that name. When her majesty asked Horace Walpole's father what it might probably cost, he answered "only three crowns." Batty Langley, who wrote in this reign (1728), says, "The regular gardens were first taken from the Dutch, and introduced into England in the time of the late Mr. London and Mr. Wise, who being then supposed to be the best gardeners in England (the art being in its infancy to what it is now), were employed by the nobility and gentry of England to lay out and plant their gardens, in that *regular, stiff, and stuck-up manner* in which many yet appear." Yet Batty Langley's style was not much better; a clear proof that the modern style was not general in England in 1728.

1139. *Canons, the magnificent seat of the Duke of Chandos*, is one of the principal places laid out in the ancient style during this reign. The artist who gave the design both for the house and gardens was, we believe, James, the translator of *Le Blond's Théorie et Pratique du Jardinage*; and the execution of at least the gardening and planting departments was superintended by Dr. Blackwell, a physician and agriculturist of some note. The Duke is mentioned by Miller as one of the principal encouragers of gardening. As far as we have been able to learn, the last extensive residence laid out in the ancient style, in England, was Exton Park, in Rutlandshire, by Kent; then the property of the Earl of Gainsborough, the *Mécènes* of his age. It was finished about the year 1730. Kent had already returned from Italy, and been employed as a painter and architect, and he began to display his genius a few years afterwards as a landscape-gardener.

1140. In this brief outline of the rise, progress, and decline of the ancient style of gardening in England, we have chiefly confined our notices to the gardens of the court; because in every country, during the earlier stages of civilisation, these may be considered as setting the fashion, and consequently as indicating the taste of a nation. Men in time, however, as they become more enlightened, begin to think for themselves; the influence of fashion gradually gives way, and that of native feeling and reason preponderates. In no country has reformation of any kind originated with the court of that country; because a courtier is by habit a creature of imitation, accustomed to mould his actions, and even thoughts, on the model afforded by his superiors; and, of course, incapable of acting for himself. Nature, however, is essentially the same in every age, and now and then a germ of genius, or original thinking, which under happier circumstances of society would be developed by education, breaks forth by accident. But it is only in important matters which concern the passions or vital interests of mankind, that these germs burst forth so suddenly, and with such force, as to enable us to name the precise period in which, or even the individual by whom, any given revolution was effected. In matters relating merely to taste and convenience, these changes proceed more slowly; because the passions and feelings which are engaged in them are less violent. Hence, though we have a Luther in religion, and a Washington in politics, we are unable to name any individual as the first who adopted the modern style of gardening as such. But let us see what authorities state on this subject.

1141. The continental authors in general assert that we borrowed the modern style from the Chinese; or, with Gabriel Thouin and Malacarne, deny us the merit of being the first either to borrow or invent it, by presenting claims of originality (124.) for their respective countries. Gabriel Thouin asserts (*Plans Raisonnés*, preface, &c.) that the

first example was given by Dufresnoy (335.), a Parisian architect, in the Faubourg Saint Antoine, in the beginning of the eighteenth century. The claims of Malacarne of Padua, in behalf of Charles I. duke of Savoy, about the end of the sixteenth century, have been already referred to. In as far as literature is concerned, we think that Tasso's claim to priority is indisputable. (See *Dissertazione su i Giardini Inglesi*, by Hippolyto Pindemonte, Verona, 1817; or a translation of part of it by us, in the *New Monthly Magazine*, Feb. 1820.) Deleuze, the historian of botany and ornamental plants (*Annales de Muséum*, tom. viii. 1806), endeavours, at some length, to prove that the new style of gardening arose from the necessity of finding room for the great number of ornamental shrubs and trees introduced from America, during the first half of the eighteenth century. Böttinger, in his *Racemazionem zur Gartenkunst der Alten*, &c. carries us back to the descriptions of the grotto of Calypso by Homer, the vale of Tempe by Ælian, and of Vaucluse by Petrarch. The anonymous author of the *Description of the Gardens of Würkitz* (together with the editor of *Walpoliana*), date the origin of English gardening from the artificial deserts created by Nero, as described by Tacitus (see § 52.).

1142. *British authors are of various opinions as to the origin of the modern style.*

1143. *The poet Gray (Life and Letters, &c. : Letter to Mr. How, dated 1763) is of opinion, that "our skill in gardening, or rather laying out grounds, is the only taste we can call our own; the only proof of original talent in matters of pleasure. This is no small honour to us; since neither France nor Italy have ever had the least notion of it."*

1144. *Dr. Joseph Warton and Horace Walpole, the former in his Essay on Pope, and the latter in his History of Modern Gardening, agree in referring the first ideas to Milton; and Warton adds, that the Seasons of Thomson may have had a very considerable influence.*

1145. *The author of a Biographical Sketch of Horace Walpole (Pinkerton), prefixed to Walpoliana, states, that he "suggested to Mr. Walpole a singular passage in Tacitus (already quoted, § 52.), which loudly indicates Nero as the founder of modern gardening." He says that "Mr. Walpole seemed much struck with it, and said he would insert it in the next edition of his Essay on Modern Gardening; but he changed his mind, probably not liking such a founder." (Walpoliana, preface, p. 30.)*

1146. *George Mason, the author of an Essay on Design in Gardening, which appeared in 1768, and is one of the earliest prose works on the modern style, states, that "were only classical authorities consulted, it would hardly be supposed that even from the earliest ages any considerable variation in taste had ever prevailed." (Essay on Design, &c., p. 27.) Speaking of the Chinese style, he says, "Little did Sir William Temple imagine, that in not much more than half a century, the Chinese would become the nominal taste of his country; or that so many adventurers in it would do great justice to his observation, and prove by their works, how difficult it is to succeed in the undertaking. Yet to this whimsical exercise of caprice, the modern improvements in gardening may chiefly be attributed." (Essay on Design, &c., p. 50.) No man could be a more enthusiastic admirer of the classics, a warmer patriot, or a more rigid critic, than this author; and it appears from another part of his work (Discussion on Kent, p. 105.) that he was well aware, when he wrote the above passage, that the origin of the modern style was generally traced to Kent. That he should derive it from our attempt at the Chinese manner, we consider as a proof of candour and impartiality.*

1147. *Mason the poet states, in a note to the English Garden, that "Bacon was the prophet, Milton the herald, of modern gardening; and Addison, Pope, and Kent, the champions of true taste." The efficacy of Bacon's ideas, G. Mason considers to have been "the introduction of classical landscapes," though this does not very clearly appear from his essay, the object of which seems to be, to banish certain littlenesses and puerilities, and to create more variety, by introducing enclosures of wild scenery, as well as of cultivation. The title of champion, applied to Addison, alludes to his excellent paper in the Spectator, No. 414. "On the causes of the pleasures of the imagination arising from the works of nature, and their superiority over those of art," published in 1712; and when applied to Pope, it refers to his celebrated Guardian, No. 173., published the following year. Böttinger, however, affirms that the bishop of Avranches had thrown out similar ideas previously to the appearance of the Spectator. (See Huetiana, Pensées 51. "Beautés naturelles préférables aux beautés de l'art;" and p. 72., "Des jardins à la mode.")*

1148. *The Rev. Dr. Alison, author of the Essay on the Nature and Principles of Taste, seems to consider the modern style as derived from our taste for the classic descriptions of the poets of antiquity. "In this view," (alluding to the progress of art from the expression of design to the expression of variety and natural beauty,) he observes, "I cannot help thinking that the modern taste in gardening (or what Walpole very justly, and very emphatically, calls the art of creating landscape,) owes its origin to two circumstances, which may, at first, appear paradoxical: viz., to the accidental circumstances of our taste*

in natural beauty being founded upon foreign models; and to the difference or inferiority of the scenery of our own country to that which we were accustomed peculiarly to admire."

1149. *Eustace*, the Italian tourist, considers Tasso's garden of Armida as more likely to have given rise to the English style than any classical work, or even the Paradise of Milton.

1150. *Our own opinion* inclines to that of G. Mason, without doubting that examples of wild scenery, with walks, have existed and been admired, not only long before the time of Tasso, both in Italy and in this country, but from the earliest ages. In fact, it is impossible to doubt that beautiful scenery was admired by minds of refinement in all times and places, and that the wealthy would frequently endeavour to create them. Semiramis (if such a person ever existed) imitated nature 2000 years before Nero, and Nero nearly as long a period before Pope or Shenstone. The general progress of ideas in matters of taste and refinement, in England, required the creation of such a style, at the time it became national; and the highly cultivated state of the country, the accounts of Chinese gardens, and the descriptions of the poets, would all conspire to its production.

1151. *The principles of modern landscape-gardening* were unquestionably first laid down by English writers. It is allowed on all sides that Addison and Pope "prepared for the new art of gardening the firm basis of philosophical principles." Addison's paper on *Imagination* was published so early as 1712; and Pope's celebrated *Guardian* on Verdant Sculpture, in 1713. Pope attacked the verdant sculpture and formal groves of the ancient style, with the keenest shafts of ridicule; and, in his *Epistle to Lord Burlington*, laid down the justest principles of art; — the study of nature, of the genius of the place, and never to lose sight of good sense.

1152. *Among the first examples of modern landscape-gardening* were those given by Pope and Addison. In so far as was practicable on a spot of little more than two acres, Pope practised what he wrote; and his well known garden at Twickenham contained, so early as 1716, some highly picturesque and natural-looking scenery; accurately described by various contemporary writers. Only the soil of Pope's garden now remains. (See *Beauties of England and Wales*.) Addison had a small retirement at Bilton, near Rugby, laid out in what may be called a rural style, which still exists, with very little alteration besides that of time.

1153. *The first artists who practised in the modern style* were Bridgeman and Kent. Bridgeman was the fashionable designer of gardens in the beginning of the eighteenth century, and may be considered as having succeeded to London and Wise, London having died in 1713. Horace Walpole conjectures Bridgeman to have been "struck and reformed" by the *Guardian*, No. 173. He banished verdant sculpture, and introduced morsels of a forest appearance in the gardens at Richmond; "but not till other innovators had broken loose from rigid symmetry." It was, however, reserved for Kent, the friend of Lord Burlington, says Daines Barrington, to carry Pope's ideas more extensively into execution. It was reserved for him "to realise the beautiful descriptions of the poets, for which he was peculiarly adapted by being a painter; as the true test of perfection in modern gardening is, that a landscape-painter would choose it for a composition." Kent, according to Horace Walpole, appeared immediately after Bridgeman began to make innovations on the old style. Among these innovations the capital stroke was the destruction of walls for boundaries, and the introduction of bahus: the harmony of the lawn with the park followed. Kent appeared at this moment, and saw that all nature was a garden: "painter enough to taste the charms of landscape, bold and opinionative enough to dare and to dictate, and born with a genius to strike out a great system; from the twilight of imperfect essays, he realised the compositions of the greatest masters in painting." "Kent," continues his lordship, "was neither without assistance nor without faults. Pope contributed to form his taste; and the gardens at Carlton House were probably borrowed from the poet's at Twickenham."

1154. *The origin and establishment of the modern style of landscape-gardening in England* appears thus to have been effected by Addison, Pope, Bridgeman, and Kent.

1155. *The various deviations from rigid uniformity*, or, more correctly, the various attempts to succeed in the Chinese manner, appear to have taken a new and decisive character under the guidance of Kent; a circumstance, in our opinion, entirely owing to his having the ideas of a painter: for no mere gardener, occupied in imitating the Chinese, or even Italian manner, would ever have thought of studying to produce picturesque effect. Picturesque beauty, indeed, we consider to have been but little recognised in this country, except by painters, previously to the time of Pope, who was both a painter and a poet. The continued approbation of the modern style, as purified from the Chinese absurdities, originally more or less introduced with it, and continued in many places long after Kent's time, we consider to be chiefly owing to the circumstance of the study of drawing and landscape-painting having become a part of the general system of education; and thus, as Alison observes, our taste for natural beauty was awakened; "the

power of simple nature was felt and acknowledged, and the removal of the articles of acquired expression led men only more strongly to attend to the natural expression of scenery, and to study the means by which it might be maintained or improved."

1156. *The adoption and extension of the modern style in England* may next be considered. The means which led to its popularity in Britain, and, indeed, over the whole of Europe, were the examples of artists and authors, to which it gave rise.

1157. *The country-seats in which the modern style was first employed* are described by Shenstone, G. Mason, and Whately, in their works on gardening, and incidentally by some other authors.

1158. *Stowe* appears to have been the first extensive residence in which the modern style was adopted. Lord Cobham seems to have been occupied in re-modelling the grounds at Stowe, about the same time that Pope was laying out his gardens at Twickenham. His lordship began these improvements in 1714, employing Bridgeman, whose plans and views for altering old Stowe from the most rigid character of the ancient style to a more open and irregular design, are still in existence. Kent was employed a few years afterwards, first to paint the hall, and afterwards in the double capacity of architect and landscape-gardener; and the finest buildings and scenes there are his creation. The character of Stowe is well known: nature has done little; but art has created a number of magnificent buildings, by which it has been attempted to give a sort of emblematic character to scenes of little or no natural expression. The result is unique; but more, as expressed by Pope, "a work to wonder at," than one to charm the imagination. The friends of Lord Cobham seem to have considered him as the first who exhibited the new style to his country, if we may judge from the concluding lines of an epitaph to his memory, placed in the garden,—"ET ELEGANTIORI HORTORUM CULTU HIS PRIMUM IN AGRIS ILLUSTRATO PATRIAM ORNAVIT, 1747." We visited these gardens in 1831, and found them considerably extended, and greatly improved by the present gardener; who, singularly enough, bears the same name as his great predecessor, Brown: for Launcelet Brown, the landscape-gardener, was originally the head gardener at Stowe.

1159. *Woburn Farm*, near Weybridge, in Surrey, is supposed to have been one of the first small places where the new system struck out by Kent was adopted. Southcote, says G. Mason, possessed a genius in many respects well suited to the purpose, but was rather too lavish of his flowery decorations. The extent of the grounds was 150 acres, thirty-five of which were ornamented to the highest degree; two thirds of the remainder were in pasture on rising grounds, and the rest in tillage. The decorations consisted in having a broad margin of shrubbery and gravel-walk to almost every fence, but varied by difference of style, views, buildings, &c. It is minutely described in Whately's *Observations*, as an example of an ornamented farm. G. Mason thinks the decorated strip often too narrow, and sometimes offensive, from the impossibility of concealing the fence. To this bordering walk, he thinks, may probably be attributed the introduction of the belt. His remarks refer to the year 1768. We visited Woburn in 1830, and found the principal walks still existing, but the shrubberies overgrown, or gone. There are many fine specimens of exotic trees; more especially the hemlock, spruce, liquidambar, tulip tree, catalpa, cedar, pine, &c.

1160. *Pain's Hill*, the creation of the Hon. Charles Hamilton, ninth son of James sixth earl of Abercorn, is supposed to have been one of the next specimens exhibited of the modern style. Hamilton is said to have studied pictures with a view to the improvement of his grounds. Pain's Hill was formed from a common, having an undulating surface, and a dry gravelly soil, fortunately accompanied by a small stream of water. It has been planted with admirable taste, and its merits in this and other respects will be found done ample justice to in Whately's *Observations*. We have frequently visited this place, and always with renewed pleasure. When we last saw it in 1831, it was, as it had been for many years before, in a state of neglect and decay; but the beautifully varied surface, and the tasteful disposition of the trees, remained. The property has since changed its proprietor.

1161. *Hagley* seems to have been improved about the same time as Pain's Hill; in effecting which, Lord Lyttelton might probably receive some hints from the poet Thomson, who was then his guest. The grounds are much varied, and the distant prospects picturesque. A very small rill, which passed through the grounds in a sort of dell, was surrounded with shrubbery and walks, from which the park scenery formed a sort of foreground, and sometimes a middle distance, to the offstage; thus, in the language of Whately, "blending the excellencies of the park and the garden." The fine trees, the distant prospects, and the principal buildings, still remain; but the garden scenery has been long since choked by the growth of the forest-trees; and some years ago the fence was removed, and the whole thrown into the park. In 1831, we found the park in tolerable order.

1162. *South Lodge* comes next in time. Soon after the improvements of Hamilton and Lyttelton, "the great Pitt," G. Mason informs us, "turned his mind to the embellish-

ment of rural nature," and exercised his talent at the South Lodge upon Enfield Chase. "The first ground surrounding the enclosure was then wild and woody, and is diversified with hill and dale. He entertained the idea (and admirably realised it) of making the interior correspond with the exterior scenery. His temple of Pan is mentioned in *Observations*. But the singular effort of his genius was a successful imitation of the picturesque appearance of a by-lane, on the very principles Price supposes it might be practicable."

1163. *The Leasowes* were improved about the same time. This place was literally a grazing farm, with a walk, in imitation of a common field, conducted through the several enclosures. Much taste and ingenuity were displayed in forming so many points of view in so confined an extent, and with so few advantages in point of distance. But root-houses, seats, urns, and inscriptions were too frequent for the whole to be classed with a common, or even an improved or ornamented, English farm. It was, in fact, intended as an emblematical scene, in which constant allusion was made to pastoral poetry; and if we consider it in this light, viz., that of a sentimental farm, it was just what it ought to have been. Shenstone is said to have broken his heart in consequence of pecuniary embarrassments; a salutary warning to men of great taste and small fortunes. We regret to find that Repton should attack the taste of this amiable man, from a misconception, as we presume, of his intentions, by blaming him for not "surrounding his house with such a quantity of ornamental lawn or park only as might be consistent with the size of the mansion, or the extent of the property." We fear that, if Shenstone had adopted this mode of improvement, the Leasowes never would have been distinguished from places got up by the common routine of professorship. The last time we visited the Leasowes was in 1831; when we found it in a state of indescribable neglect and ruin. Could the shade of poor Shenstone return to earth, we doubt the possibility of his recognising his once beloved abode.

1164. *Claremont and Esher* are well known. Both were laid out by Kent; and Claremont was afterwards enlarged, and the house and kitchen-garden added, by Brown. Walpole and Whately have celebrated both, and also Garth. Esher is praised by Warton, in his poem, *The Enthusiast, or Lover of Nature*, 1740. Esher no longer exists; but Claremont is kept up in good style for Leopold king of the Belgians, by his head-gardener, Mr. McIntosh, author of the *Practical Gardener*, &c.

1165. *Percefield* was laid out so late as 1750. It is a small park, with an interesting walk, carried along the brow of a romantic rocky bank of the river Wye, perhaps as faultless as the nature of the place admits of. "I cannot recollect," says G. Mason, writing of this place in 1768, "that any of the scenes on the Wye are the least adulterated by the introduction of any puerile appendage whatever."

1166. *The artists or professors who established the modern style* were Bridgeman, Kent, Wright, Brown, and Emsay.

1167. *Of Bridgeman* we have been able to procure no information. In the *Gentleman's Magazine* for 1737, the death of William Bridgeman, Esq., 17th August, in that year, occurs in the obituary; but whether this be the landscape-gardener is uncertain.

1168. *Kent* was born in Yorkshire, and apprenticed to a coach-painter in 1719. He soon afterwards came to London, discovered a genius for painting, was sent to Italy, patronised there by Lord Burlington, returned with his lordship, and lived with him in Burlington House till 1748, when he died, at the age of sixty-three years. On his first return, he was chiefly employed to paint historical subjects and ceilings; and the hall at Stowe is from his pencil. Soon afterwards he was employed as an architect; and, lastly, as a landscape-gardener. It is not known where he first exercised his genius as a layer-out of grounds; probably at Claremont and Esher, two of his designs, both minutely described by Whately, and, judging from the age of the trees, laid out some time between 1725 and 1735. Kent was also employed at Kensington Gardens, where he is said to have introduced dead trees to heighten the allusion to natural woods. Mason the poet mentions Kent's Elysian scenes in the highest style of panegyric; and observes, in a note, that he prided himself in shading with evergreens in his more finished pieces, in a manner described in the fourteenth and fifteenth sections of Whately's *Observations*. "According to my own idea," adds G. Mason, "all that has since been done by the most deservedly admired designers, by Southcote, Hamilton, Lyttelton, Pitt, Shenstone, Morris, for themselves, and by Wright for others; all that has been written on the subject, even the *Gardening Didactic Poem* and the *Didactic Essay on the Picturesque*, have proceeded from Kent. Had Kent never exterminated the bounds of regularity, never actually traversed the way to freedom of manner, would any of these celebrated artists have found it of themselves? Theoretical hints from the highest authorities had evidently long existed without sufficient effect. And, had not these great masters actually executed what Kent's example first inspired them with the design of executing, would the subsequent writers on gardening have been enabled to collect materials for precepts, or stores for their imaginations?" (*Essay*, &c., p. 112.)

1169. *Wright* seems to have been in some repute at the time of Kent's death. "His birth and education," G. Mason informs us, "were above plebeian; he understood drawing, and sketched plans of his designs; but never contracted for work, which might occasion his not being applied to by those who consider nothing so much as having trouble taken off their hands." At Becket, the seat of Lord Barrington, he produced an admired effect on a lawn; and at Stoke, near Bristol, he is supposed to have decorated a copse-wood with roses, in the manner advised in the fourth book of the *English Garden*, and as afterwards extensively displayed at Fonthill Abbey by Mr. Beckford, the celebrated author of *Vathek*. He also designed the terrace-walk and river at Otlands, both deservedly admired; the latter being not unfrequently mistaken for the Thames itself.

1170. *Brown* is the next professor, in the order of time. He was a native of Kirkharle in Northumberland, filled the situation of kitchen-gardener at a small place near Woodstock, in Oxfordshire; and was afterwards head-gardener at Stowe till 1750. He was confined (see *Beauties of England and Wales: Bucks*) to the kitchen-garden, by Lord Cobham, who, however, afterwards recommended him to the Duke of Grafton, at Wakefield Lodge, Northamptonshire, where he directed the formation of a large lake, which laid the foundation of his fame and fortune. Lord Cobham, it is said by some authors, afterwards procured for him the situation of royal gardener at Hampton Court, and it was he who planted the celebrated vine there. Brown was now consulted by the nobility, and among other places at Blenheim. There he threw a dam across the vale; and the first artificial lake in the world was completed in a week. By this he attained the summit of his popularity. The fashion of employing him continued, says G. Mason, not only to 1768, but to the time of his death, 1783. Repton has given a list of his principal works, among which Croome and Fisherwicke were the two largest new places which he formed, including at Croome the mansion and offices, as well as the grounds. The places he altered are beyond all reckoning. Improvement was the passion of the day; and there was scarcely a country-gentleman who did not, on some occasion or other, consult the gardening idol of the day. Mason the poet praises this artist, and Horace Walpole apologises for not praising him. Daines Barrington says, "Kent hath been succeeded by Brown, who hath undoubtedly great merit in laying out pleasure-grounds; but I conceive that, in some of his plans, I see rather traces of the kitchen-gardener of old Stowe, than of Poussin or Claude Lorraine. I could wish, therefore, that Gainsborough gave the design, and that Brown executed." The works and memory of Brown have been severely attacked by Knight and Price, and strenuously defended by Repton, who styles him "his great self-taught predecessor." "Brown," observes G. Mason, "always appeared to myself in the light of an egregious mannerist; who, from having acquired a facility in shaping surfaces, grew fond of exhibiting that talent, without due regard to nature, and left marks of his intrusion wherever he went. His new plantations were generally void of genius, taste, and propriety; but I have seen instances of his managing old ones much better. He made a view to Cheney's church, from Latimer (Bucks), as natural and picturesque as can well be imagined. Yet at the same place he had stuffed a very narrow vale, by the side of an artificial river, with those crowded circular clumps of firs alone, that Price attributes to him. The incongruity of this plan struck most of the neighbouring gentlemen, but was defended by the artist himself, under shelter of the epithet 'playful,' totally misapplied." (*Essay on Design*, p. 130. 2d edit. 1795.)

1171. *That Brown must have possessed considerable talents*, the extent of his reputation abundantly proves; but that he was imbued with much of that taste for picturesque beauty which distinguished the works of Kent, Hamilton, and Shenstone, we think will hardly be asserted by any one who has observed attentively such places as are known to be his creations. Whatever be the extent or character of the surface, they are all surrounded by a narrow belt, and the space within is distinguished by numbers of round or oval clumps, and a reach or two of a tame river, generally on different levels. This description, in short, will apply to almost every place in Britain laid out from the time (about 1740) when the passion commenced for new-modelling country-seats, to about 1785 or 1790, when it in a great measure ceased. Mr. Price observes, alluding to Brown's mannerism, that, had the landscape-gardeners of his day been incorporated, a clump, a belt, and a piece of made water would have served for a model as well as for a seal. The leading outline of this plan of improvement was easily recollected and easily applied; the great demand produced abundance of artists; and the general appearance of the country so rapidly changed under their operations, that in 1772, Sir William Chambers declared, that if the mania were not checked, in a few years longer there would not be found three trees in a line from the Land's End to the Tweed. Brown, it is said, never went out of England, but he sent pupils and plans to Scotland and Ireland; and Paulowsky, a seat of the emperor Paul, near Petersburg, is said to be from his design. Brown, as far as we have learned, could not draw, but had assistants, who

made out plans of what he intended. He generally contracted for the execution of the work. He amassed a handsome fortune, and his son Launcelot, a landed proprietor in Huntingdonshire, has sat in several parliaments.

1172. *The immediate successor of Brown* was his nephew, Henry Holland, who was chiefly employed as an architect, though he generally directed the disposition of the grounds when he was employed in the former capacity. Holland built Carlton House, and the Pavilion at Brighton, and died about 1806.

1173. *Emes* is the next artist that deserves notice: of him, however, we know little more than that he is mentioned in terms of respect by G. Mason. He died 13 March, 1803.

1174. *The authors who established the modern style*, are Addison, Pope, Shenstone, G. Mason, Whately, and Mason the poet. Addison's *Spectators* have been already referred to, Pope's *Epistle to Lord Burlington* has also been noticed, as well as Shenstone's *Unconnected Thoughts*; the former published in 1716, the latter in 1764. G. Mason's *Essay on Design in Gardening*, from which we have so frequently quoted, was first published in 1768, and afterwards greatly enlarged in 1795. It is more a historical and critical work than a didactic performance. Mason was the eldest son of a distiller at Deptford. He was an excellent classical scholar; lived much alone, and almost always in London, being connected with the Sun Fire Office. He died at Aldenham, in Herts, in 1806, aged seventy-one.

1175. *Whately's Observations on Modern Gardening*, published in 1770, is the grand fundamental and standard work on English gardening. It is entirely analytical; treating, first, of the materials, then of the scenes, and, lastly, of the subjects, of gardening. Its style has been pronounced, by the learned Ensor, inimitable; and the descriptions with which his investigations are accompanied, have been largely copied and amply praised by Alison, in his work on taste. The book was soon translated into the continental languages, and is judiciously praised in the *Mercur de France*, *Journal Encyclopédique*, and *Wieland's Journal*. G. Mason alone dissents from the general opinion, enlarging on the very few faults or peculiarities which are to be found in the book. Whately was the brother of the then proprietor of Nonesuch Park, near Epsom, in Surrey, which place, as has been already mentioned (§ 1106.), he mainly assisted in laying out. He was for a short time secretary to the Earl of Suffolk. He published only this work, and two anonymous political pamphlets; soon after which, in 1772, he died. After his death, some remarks on Shakspeare, from his pen, were published, in a small 12mo volume, in 1785, by his brother, the Rev. J. Whately, and afterwards a second edition was printed in 1808, by his nephew, Dr. Whately, who in 1831 was made Archbishop of Dublin.

1176. *The English Garden*, a poem by W. Mason, was published in four different books, the first of which appeared in 1772, and the last in 1782. With the exception of the fourth book, it was received with very great applause. The precepts for planting are particularly instructive. On the whole, the work may be classed with the *Observations* of Whately; and these two books may be said to exhibit a clear view of the modern style, as first introduced and followed by liberal and cultivated minds; while the *Dissertation on Oriental Gardening*, by Sir William Chambers, published in 1772, holds up to ridicule the absurd imitations of uncultivated amateurs and professors, who have no other qualifications than those acquired in labouring with the spade under some celebrated artist. Mason was a clergyman, resident in Yorkshire, and died in 1797.

1177. *The partial corruption of the modern style* took place as soon as it became fashionable. Though it may be true that, "in all liberal arts, the merit of transcendent genius, not the herd of pretenders, characterises an era," yet in an art like that of laying out grounds, whose productions necessarily have such an influence on the general face of a country, it is impossible to judge otherwise of the actual state of the art, than from the effect which is produced. This effect, about forty years ago, when clumps and belts blotted every horizon, could never be mistaken for that intended to be produced by such professors as Kent, or such authors as Whately and Mason. The truth is, such was the rage for improvement, that the demand for artists of genuine taste exceeded the regular supply; and, as is usual in such cases, a false article was brought to market, and imposed on the public. A liberal was thus for a time reduced to a mechanical art, and a new character was given to modern improvements, which, from consisting in a display of ease, elegance, and nature, according to the situation, became a system of set forms, indiscriminately applied in every case. This system was in fact more formal, and less varied, than the ancient style to which it succeeded, because it had fewer parts. An ancient garden had avenues, alleys, stars, *pattes d'oie*, pelotons or platoons (square clumps), circular masses, rows double and single, and strips, all from one material, wood; but the modern style, as now degraded, had only three forms, a clump, a belt, and a single tree. Place the belt in the circumference, and distribute the clumps and single trees within, and all that respects wood in one of these places is finished. The professor required no further examination of the ground than what was necessary to take the levels for forming

a piece of water, which water uniformly assumed one shape and character, and differed no more in different situations than did the belt or the clump. So entirely mechanical had the art become, that any one might have guessed what would be the plan given by the professor before he was called in; and Price actually gives an instance in which this was done. The activity of this false taste was abated in England before our time; but we have seen in Scotland, between the years 1795 and 1805, we believe, above a hundred of such plans, in part formed by local artists, but chiefly by an English professor, who was in the habit of making annual journeys in the north, taking orders for plans, which he got drawn on his return home, not one of which differed from the rest in any thing but magnitude. These plans were, in general, mounted on linen, which he regularly purchased in pieces of some hundreds of yards at a time, from a celebrated bleachingfield adjoining Perth.

1178. *The monotonous productions of this mechanical style* soon brought it into disrepute; and proprietors were ridiculed for expending immense sums in destroying old avenues and woods, and planting in their room young clumps, for no other reason than that it was the fashion to do so.

1179. *The first symptoms of disapprobation* that were ventured to be uttered against the degradation of the new taste appear to be contained in an epistolary novel, entitled *Village Memoirs*, published in 1775, in which the professors of gardening are satirised under the name of Layout. A better taste, however, than that of Mr. Layout is acknowledged to exist, which the author states "Shenstone and nature to have brought us acquainted with." Most of the large gardens are said to be laid out by some general undertaker, "who introduces the same objects at the same distances, in all." (p. 143.) The translation of Gerardin, *De la Composition des Paysages, ou des Moyens d'embellir la Nature autour des Habitations, en joignant l'agréable à l'utile, &c.*, accompanied with an excellent historical preface, in 1783, must have had considerable influence in purifying the taste of its readers. A poem in Doddsley's collection, entitled *Some Thoughts on Building and Planting*, addressed to Sir James Lowther, Bart., published in the same year, and in which the poet recommends that

"Fashion will not the works direct,
But reason be the architect,"

must also have had some effect. But the *Essay on Prints*, and the various picturesque tours of Gilpin, published at different intervals from 1768 to 1790, had the principal influence on persons of taste. The beauties of light and shade, outline, grouping, and other ingredients of picturesque scenery, were never before exhibited to the English public in popular writings. These works were eagerly read, and brought about that general study of drawing and sketching landscape among the then rising generation, which has ever since prevailed; and will do more, perhaps, than any other class of studies, towards forming a taste for the harmony and connection of natural scenery; the only secure antidote to the revival of the monotony which characterises that which we have been condemning.

1180. *The monotonous style has been ably exposed by Price and Knight.* The *Essays on the Picturesque* of the former, and the poem of the latter, though verging on the opposite extreme of the evil they wished to remove, have greatly improved the taste of proprietors and patrons. The object of *The Landscape*, a didactic poem, is to teach the art of creating scenery more congruous and picturesque than what is met with in that "tiresome and monotonous scene called Pleasure-ground." Price's *Essay on the Picturesque, and on the Use of studying Pictures, with a View to the Improvement of real Landscape*, are written with the same intention; but, as might be expected from a prose work, enter on the subject much more at length. In order to discover "whether the present system of improving is founded on any just principles of taste," Price begins by enquiring "whether there is any standard, to which, in point of grouping and of general composition, works of this sort can be referred; any authority higher than that of the persons who have gained the most general and popular reputation by their works, and whose method of conducting them has had the most extensive influence on the general taste?" This standard (which, it will be recollected by the candid reader, is desired only for what relates to grouping and composition, not to utility and convenience, as some have unfairly asserted) Price finds in the productions "of those great artists, who have most diligently studied the beauties of nature, both in their grandest and most general effects, and in their minutest detail; who have observed every variety of form and of colour; have been able to select and combine; and then, by the magic of their art, to fix upon the canvass all these various beauties." Price recommends the study of the principles of painting, "not to the exclusion of nature, but as an assistant in the study of her works." He points out, and illustrates, two kinds of beauty in landscape: the one, the picturesque, characterised by roughness, abruptness, and sudden variation; the other, beauty in the more general acceptation of the word, characterised by smoothness, undulations, intermixed with a certain degree of roughness and variation, producing intricacy and variety.

Such beauty was made choice of by Claude in his landscapes, and such he thinks particularly adapted to the embellishment of artificial scenery. These principles are applied by Price, in his celebrated *Essays on the Picturesque*, in a very masterly manner, to wood, water, and buildings.

1181. *The reformation in taste contended for by Price and Knight* was, like all other proposals for reform, keenly opposed by professors, by a numerous class of mankind who hate innovation, and with whom "whatever is, is right," including perhaps some men of taste, who had no feeling for the picturesque, or had mistaken the object of the book. The first answer to Price's work was a letter by Repton, in which candour obliges us to state that the latter has misrepresented his antagonist's meaning, by confounding the study of pictures with that of the study of the principles of painting. Price published an able answer to this production, which, he informs us, was even more read than the original essays. Two anonymous poems of no merit made their appearance, as satires on *The Landscape*, and, indirectly, on the *Essays on the Picturesque*. The *Review of the Landscape, and of an Essay on the Picturesque, &c.*, by Marshall, was published in 1795. There can scarcely be any thing more violent than this publication. The periodical critics brought forward all sorts of reasons against the use of the study of pictures, and deny (perhaps with truth, as to their perception of it) the distinct character of the picturesque. Mr. Price they treat as "a mere visionary amateur," and Knight as "a Grub-street poet, who has probably no other garden than the pot of mint before his windows." The increased liberality which has taken place in the minds of literary men since that period is perhaps as great as the improvements which have taken place within the same period in the application of science to the useful arts.

1182. *The vague opinion of a great mass of country gentlemen, tourists, and temporary authors, may be also included.* These, taking the word "picturesque" in its extreme sense, and supposing it intended to regulate what was useful, as well as what was ornamental, concluded that Price's object was to destroy all comfort and neatness in country-seats, and reduce them to mere portions of dingle or jungle scenery. Such opinions we have frequently heard expressed by men in other respects of good sense. Even continental authors have imbibed and disseminated similar exaggerations. "Egarés par Gilpin," says one of the writers alluded to, "qui a cherché par ses voyages en diverses parties de l'Angleterre et de l'Ecosse à donner des règles pour y assujeter le genre pittoresque et romantique, ils ont pris l'occasion pour demander que l'art fût totalement banni des jardins. Ils adoptent le pittoresque d'un Salvator Rosa dans les paysages, comme le vrai nature dans l'art de faire des jardins, et on rejette comme un asservissement à ce même art, toutes les règles qu'un Bridgewater [Bridgeman] et un Brown avoient publiées [neither of these artists ever published any thing] dans ce genre." (*Description Pittoresque des Jardins du Gôût le plus moderne*. Leipzig, 1820. See also Tübinger's *Taschenbuch für Natur- und Garten-freunde*, 1798, p. 194.)

1183. *Of enlightened and liberal minds, who have in some degree opposed Price's principles, we can only instance the late W. Windham, who, in a letter to Repton, (Repton was at one period secretary to Windham, when that gentleman was in office,) written after the publication of his defence, combats, not the works of Price, but the popular objections to the supposed desire of subjecting every thing to the picturesque.* "The writers of this school," he observes, "show evidently that they do not trace with any success the causes of their pleasure. Does the pleasure that we receive from the view of parks and gardens result from their affording, in their several parts, subjects that would appear to advantage in a picture? What is most beautiful in nature is not always capable of being represented in a painting; as prospects, moving flocks of deer. Many are of a sort which have nothing to do with the purposes of habitation; as the subjects of Salvator Rosa. Are we therefore to live in caves? Gainsborough's *Country Girl* is more picturesque than a child neatly dressed. Are our children to go in rags? No one will stand by this doctrine; nor do they exhibit it in any distinct shape at all, but only take credit for their attachment to general principles, to which every one is attached as well as they. It is contended that, in laying out a place, whatever is most picturesque is most conformable to true taste. If they say so, they must be led to consequences which they can never venture to avow. If they do not say so, the whole is a question of how much or how little, which, without the instances before you, can never be decided." "Places are not to be laid out with a view to their appearance in a picture, but to their use, and the enjoyment of them in real life; and their conformity to these purposes is that which constitutes their true beauty. With this view, gravel walks, and neat mown lawns, and, in some situations, straight alleys, fountains, terraces, and, for aught I know, parterres and cut hedges, are in perfect good taste, and infinitely more conformable to the principles which form the basis of our pleasure in those instances, than the docks and thistles, and litter and disorder, that may make a much better figure in a picture." (*Letter from Windham*, published by Repton, in a note to his *Observations on the Theory and Practice of Landscape-Gardening*.)

1184. *The opinion of Professor Dugald Stewart, as given incidentally in his Philosophical Disquisitions on the Beautiful (Essays, p. 285. 1810, 4to edit.), is of great value. He says:—"As to the application of the knowledge thus acquired from the study of paintings, to the improvement of natural landscape, I have no doubt that, to a superior understanding and taste, like those of Price, it may often suggest very useful hints; but, if recognised as the standard to which the ultimate appeal is to be made, it would infallibly cover the face of the country with a new and systematical species of affectation, not less remote than that of Brown from the style of gardening which he wishes to recommend. Let painting be allowed its due praise, in quickening our attention to the beauties of nature; in multiplying our resources for their further embellishment; and in holding up a standard, from age to age, to correct the caprices of fashionable innovations: but let our taste for these beauties be chiefly formed on the study of nature herself; nor let us ever forget so far what is due to her indisputable and salutary prerogative, as to attempt an encroachment upon it by laws, which derive the whole of their validity from her own sanction."* (p. 287.)

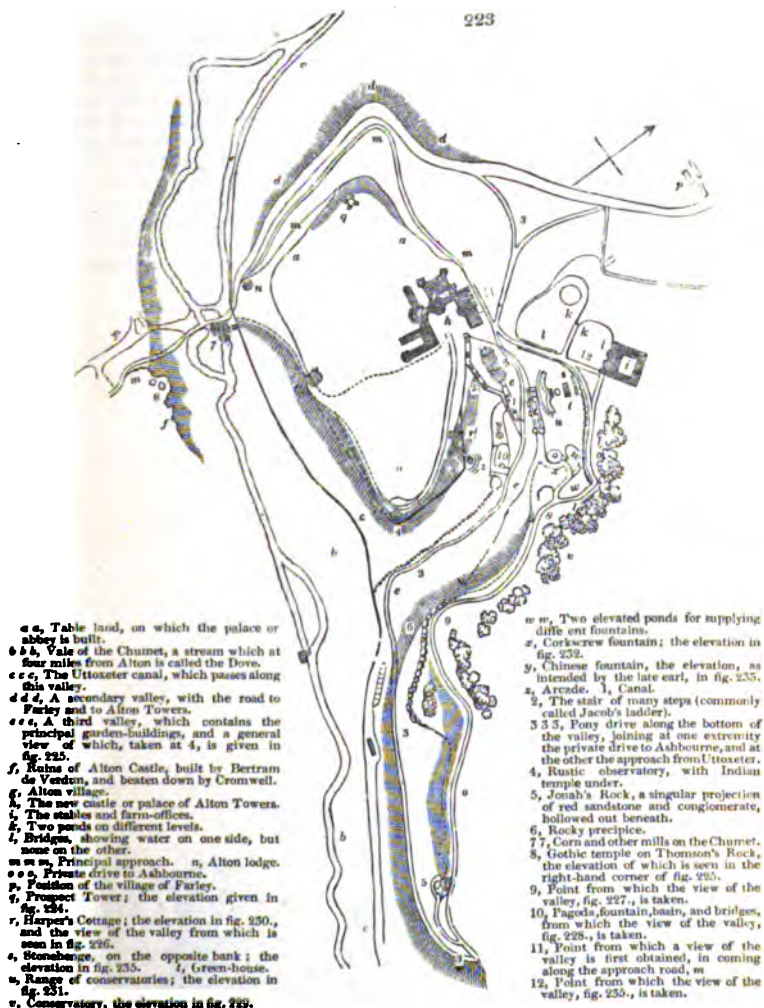
1185. *To draw a fair conclusion from these different opinions, it is necessary to take the whole of them, and the general scope of the authors, into view. From the vein of excellent sense which pervades Windham's letter, and particularly the latter part of it, which we have extracted entire, it is impossible to avoid suspecting, either that there is a culpable obscurity in the works referred to, or that Windham had not sufficiently, if at all, perused them. We are inclined to believe that there is some truth in both suppositions. We have no hesitation, however, both from a mature study of all the writings of these gentlemen relating to this subject, as well as a careful inspection of their own residences, in saying, that there is not an opinion in the above extract, to which Price and Knight would not at once assent. Knight's directions, in regard to congruity and utility, are as distinct as can well be expected in a poem. Price never entered on the subject of utility. His works say, "Your object is to produce beautiful landscapes; at least this is one great object of your exertions. But you produce very indifferent ones. The beauty of your scenes is not of so high a kind as that of nature. Examine her productions. To aid you in this examination, consult the opinions of those who have gone before you in the same study. Consult the works of painters, and learn the principles which guided them in their combinations of natural and artificial objects. Group your trees on the principles they do. Connect your masses as they do. In short, apply their principles of painting whenever you intend any imitation of nature; for the principles of nature and of painting are the same."*—"Are we to apply them in every case? Are we to neglect regular beauty and utility?" Certainly not; that would be inconsistent with common sense.

1186. *The taste of the present day in landscape-gardening may be considered as comparatively chastened and refined by so much discussion, so many errors and corrections, and by a great many fine examples. It is also more liberal than it was half a century ago; admitting the use of the beauties of every style, even the geometric, as occasion requires; in short, considering beauty as always relative to the state of society; and, in gardening, even to the state of the surrounding country. The principal artist of the period which has intervened since the death of Brown and Emes was the late H. Repton, Esq. This gentleman, from being an amateur, began his career as professor of landscape-gardening about 1788; and, till a sort of decline or inactivity of taste took place, from 1800 to 1810, he was extensively consulted. Though at first an avowed defender and follower of Brown, he gradually veered round with the change effected in public opinion by the *Essays on the Picturesque*; so that, comparing his earlier works of 1795 and 1805 with his *Fragments on Landscape-Gardening* published in 1817, he appears by the latter much more a disciple of Price, than a defender of his "great self-taught predecessor." Repton was a beautiful draughtsman, and gave, besides plans and views, his written opinion in a regular form, generally combining the whole in a manuscript volume, which he called the *red book* of the place. He never, we believe, undertook the execution of his plans; nor was he, as far as we are aware, ever employed out of England; but Valleyfield, in Perthshire, was visited by his two sons, and arranged from their father's designs. The character of this artist's talents seems to have been cultivation rather than genius; he was more anxious to follow than to lead; and to gratify the preconceived wishes of his employers, and improve on the fashion of the day, rather than to strike out grand and original beauties. This, indeed, is perhaps the most useful description of talent both for the professor and his employers. Repton's taste in Gothic architecture, in terraces, and architectural appendages to mansions, was particularly elegant. His published *Observations* on these subjects are valuable; though we think otherwise of his remarks on landscape-gardening, which we look upon as puerile, wanting depth, often at variance with each other, and abounding too much in affectation and arrogance. On the whole, however, we have no hesitation in asserting, that, both by his splendid volumes, and extensive practice among the English nobility, he has supported the credit of this country for taste in laying out grounds. One of his earliest scenes of action was Cobham Hall,*

in Kent, where, as Prince Pückler Muskau observes, there is an inscription to his memory by Lord Darnley. Repton was born near Felbrig, in Norfolk, and died at Hare-street, in Essex, in 1817.

1187. *The principal country-seats which display the modern taste of laying out grounds*, will be found arranged in the order of the counties in the *Beauties of England and Wales*, already referred to; but, as a relaxation to the reader, we shall here present him with some graphic sketches of by far the most remarkable country residence in England, in the year 1832; viz., Alton Towers.

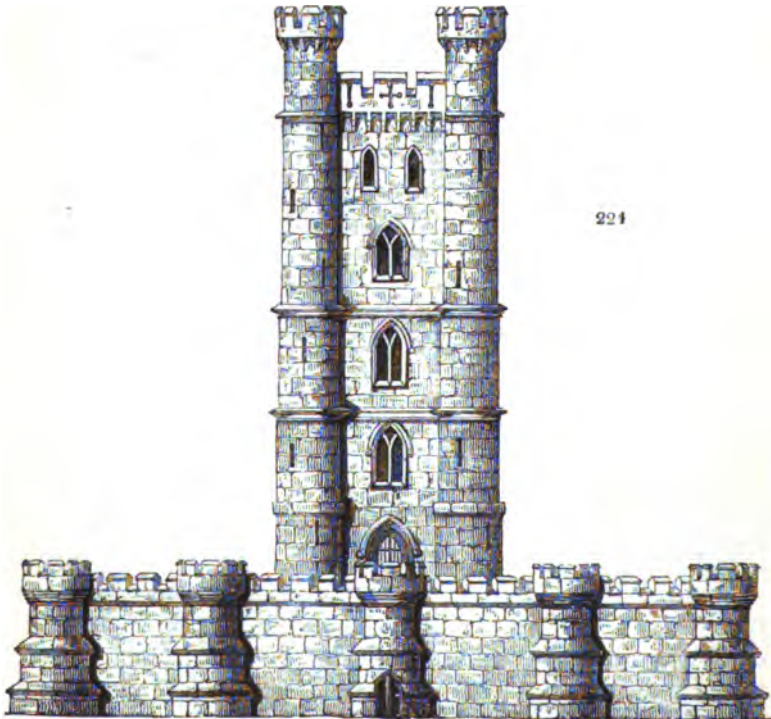
1188. *Alton Towers*, the seat of John, the seventeenth earl of Shrewsbury, near Cheadle, in Staffordshire, is a very singular place both in its geology, which is peculiarly adapted for grand and picturesque effects, and what has been done to it by Charles the late earl. The house, or abbey, stands on a piece of table-land, of fifty or sixty acres in extent (fig. 223. *a a a*); and this table-land is bounded on three sides by two valleys (b and c),



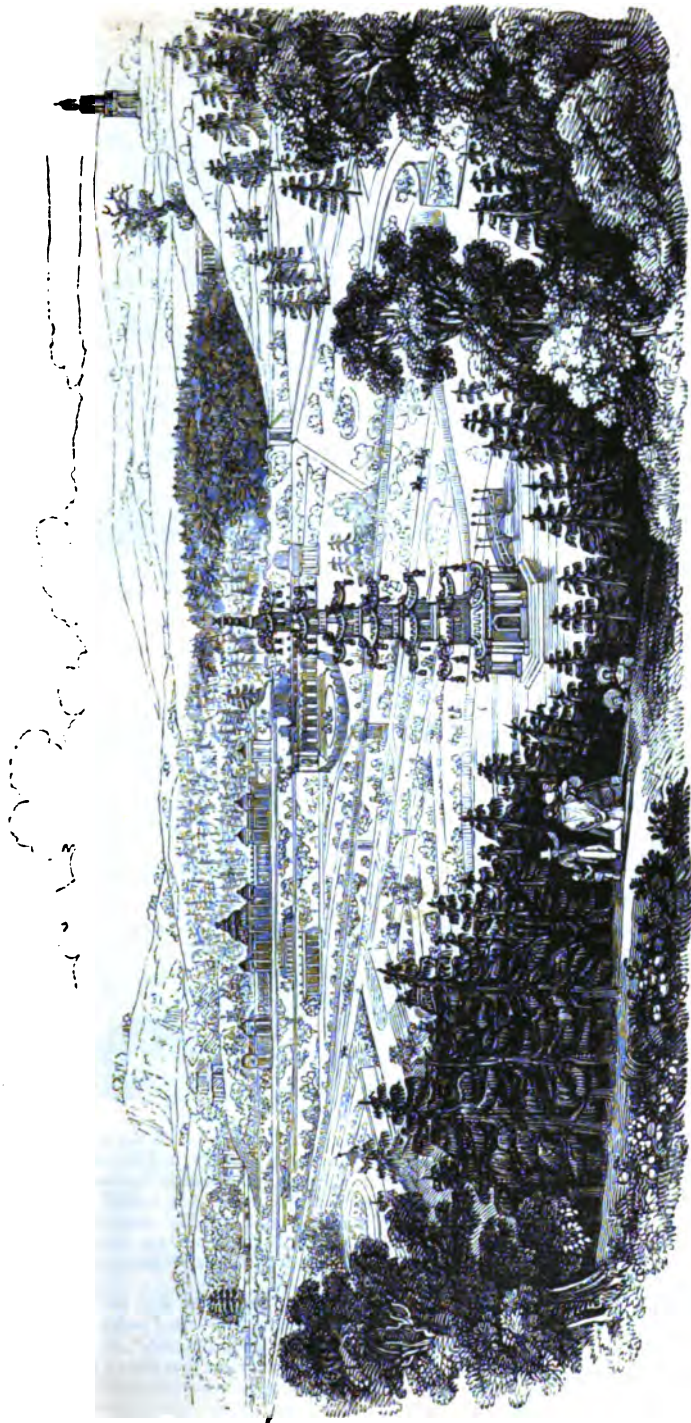
which commence in a gentle hollow near the abbey (*h*), and lose themselves in a third broad and deep valley in an opposite direction (*d*). The surrounding country is composed of similar valleys, among portions of table land or hills. The surface of both hills and valleys is generally in pasture, with very few human dwellings; or in plantations of

pinces and larch firs, from ten to thirty years' growth. The rock is every where red sandstone, and conglomerated; often protruding from the sides of the valleys in immense stratified masses, the exposed parts of which are in some places worn by the weather into anomalous shapes; but, at a little depth underground, affording excellent stone for building. The natural character of this part of the country is grand and picturesque, with a solitary and wild air, approaching to the savage. The remains of a very old castle belonging to the Shrewsbury family (*f*) exist on a rock, protruding into the largest of these valleys; but the site of the present abbey (*h*) was, twenty years ago, nothing more than a farm-house. Here Charles, the late Earl of Shrewsbury, commenced his operations about 1814; and employed hundreds of labourers, mechanics, and artisans, from that time till his death in 1827.

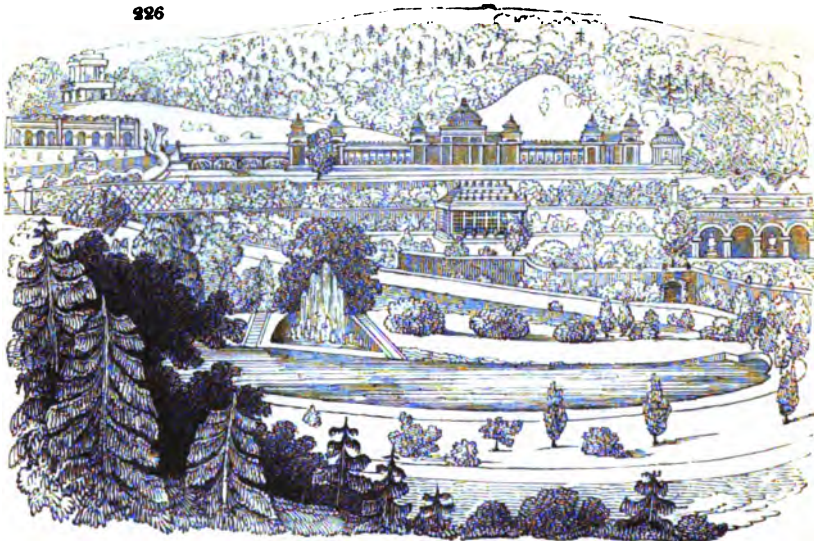
1189. *Charles, the sixteenth Earl of Shrewsbury*, abounding in wealth, always fond of architecture and gardening, but with much more fancy than sound judgment, seems to have wished to produce at Alton Towers, in his time called Alton Abbey, something different from every thing else. Though he consulted almost every artist, ourselves among the number, he seems only to have done so for the purpose of avoiding whatever an artist might recommend. After passing in review before him a great number of ideas, that which he adopted was always different from every thing that had been proposed to him. His own ideas, or his variations of a plan that he had procured, were transferred to paper by an artist, or clerk of the works, whom he kept on purpose; and often, as we were informed by Mr. Lunn, the gardener there, in 1826, were marked out on the grounds by his own hands. The result, speaking of Alton as it was at the time of the late earl's death in 1827, and as we saw it shortly before, viz., in October, 1826, was one of the most singular anomalies to be met with among the country residences of Britain, or, perhaps, of any other part of the world. An immense pile of building in the way of house, with a magnificent conservatory and chapel, but with scarcely a habitable room; a lofty prospect tower (*fig. 224.*), not built on the highest part of the ground; bridges



without water underneath; ponds and lakes on the tops of the hills; a quadrangular pile of stabling in the midst of the pleasure ground; and, what may be said to have eclipsed, and still to eclipse, every thing else a valley (*figs. 226. 227. and 232.*), naturally in a

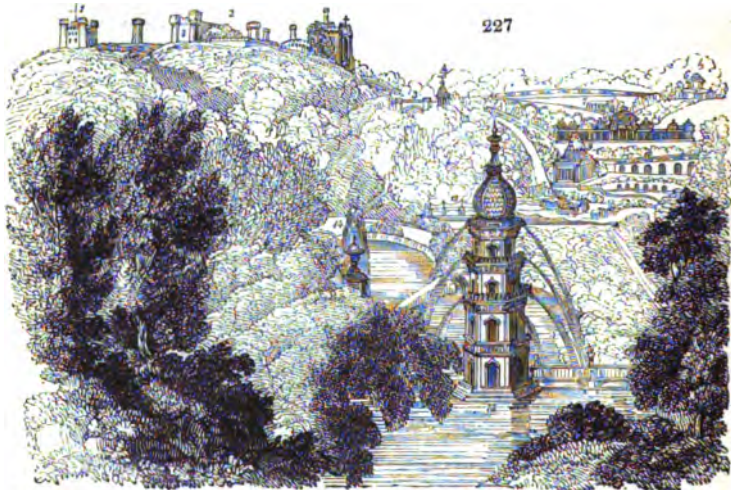


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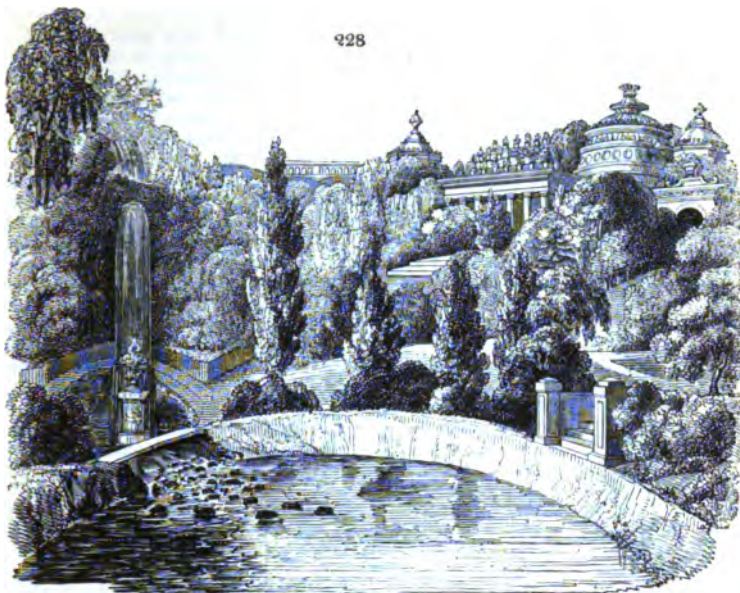
high degree romantic with wood, water, and rocks, filled with works of the highest degree of art in architecture and gardening. (*figs.* 231. 229. 230. 224. and 233.) A

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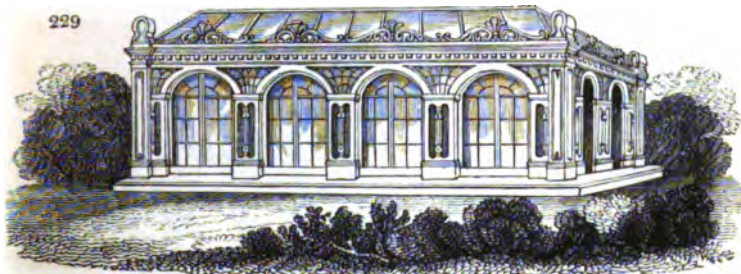


large drawing of the north side of the valley, as seen from a point on the south side, was taken for Mr. Abraham, one of the late earl's architects, in 1827, and the designer of the magnificent range of conservatories just mentioned; and Mr. Abraham has kindly permitted us to give an engraving of it (*fig.* 225.), to show the valley as it existed at that time; while to the present earl, and his very ingenious and obliging clerk of the works, Mr. Fradgely, we are indebted for the map (*fig.* 223.) the view of the house (*fig.* 234.) and most of those of the grounds, and the various structures they contain. (*figs.* 224. to 235.)

1190. *The private approach roads to Alton Towers* (*fig.* 223. m, n, o) are several miles in length: they are conducted along the bottoms and sides of winding rocky valleys, more or less wooded; and through one of which runs the river Chumet. It is difficult to decide whether the best approach be that from Uttoxeter, or that from Chedale. We

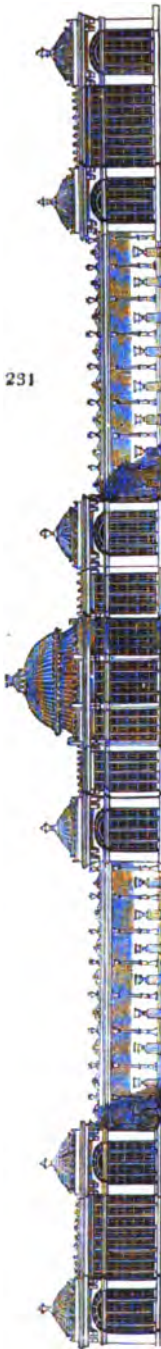


arrived from the former town in 1826, and from the latter in 1831. By the road leading from Uttoxeter, we came unexpectedly close to the house, and near the head of the north

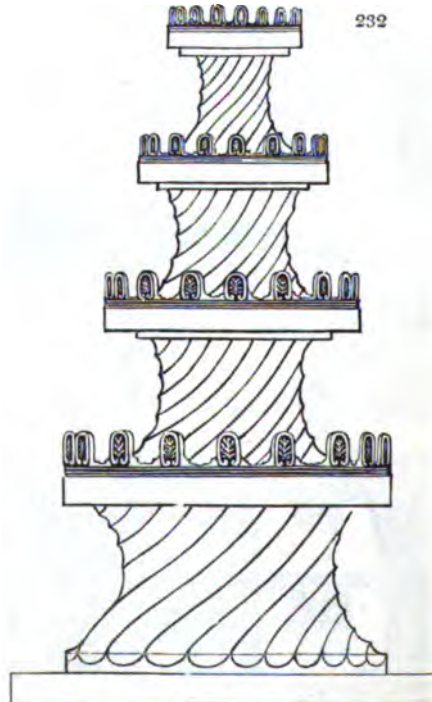


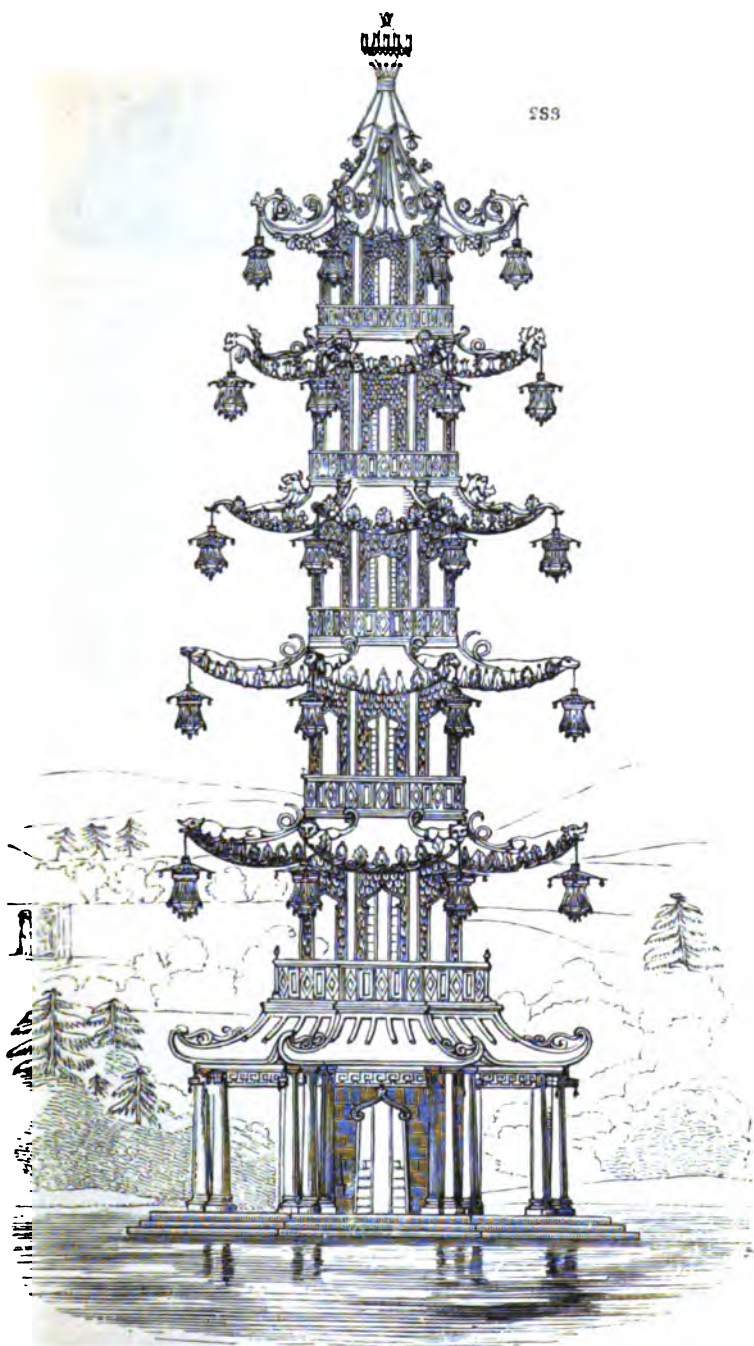
side of the valley, which contains the chief wonders of the place. The first objects that met our eye were the dry Gothic bridge, and the embankment leading to it, with a



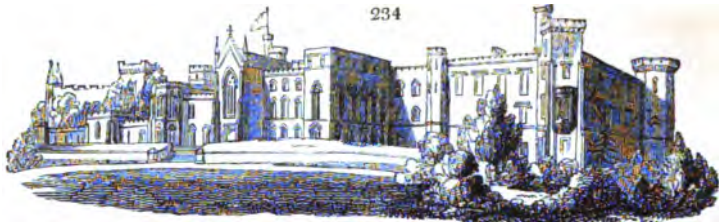


huge imitation of Stonehenge beyond and a pond above the level of the bridge alongside of it, backed by a mass of castellated stabling. Farther along the side of the valley, to the right of the bridge, is a range of architectural conservatories, with seven elegant glass domes, designed by Mr. Abraham, richly gilt. (*fig. 251.*) Farther on still, to the right, and placed on a high and bold naked rock, is a lofty Gothic tower, or temple, on what is called Thomson's rock, also designed by Mr. Abraham (and seen on the right in *fig. 225.*), consisting of several tiers of balconies, round a central staircase and rooms; the exterior ornaments numerous, and resplendent with gilding. Near the base of the rock is a corkscrew fountain of a peculiar description (*fig. 232.*), which is amply supplied from an adjoining pond. Behind, above, and beyond the range of conservatories are two lakes; and beyond them is another conservatory, curiously ornamented (*fig. 229.*): below the main range of conservatories is a paved terrace walk, with a Grecian temple at one end, and a second terrace containing a second range of conservatories. The remainder of the valley, to the bottom, and on the opposite side, displays such a labyrinth of terraces, curious architectural walls, trellis-work arbours, vases, statues, stone stairs, wooden stairs, turf stairs, pavements, gravel and grass walks, ornamental buildings, bridges, porticoes, temples, pagodas, gates, iron railings, parterres, jets, ponds, streams, seats, fountains, caves, flower-baskets, waterfalls, rocks, cottages, trees, shrubs, beds of flowers, ivied walls, rock-work, shell-work, root-work, moss houses, old trunks of trees, entire dead trees, &c., that it is utterly impossible for words to give any idea of the effect. There is one stair of 100 steps; a cottage for a blind harper, as large as a farm-house (*fig. 230.*); and an imitation cottage roof, formed by sticking dormer windows, and two chimneys, accompanied by patches of heath to imitate thatch, on the sloping surface of a large grey mass of solid rock. This,

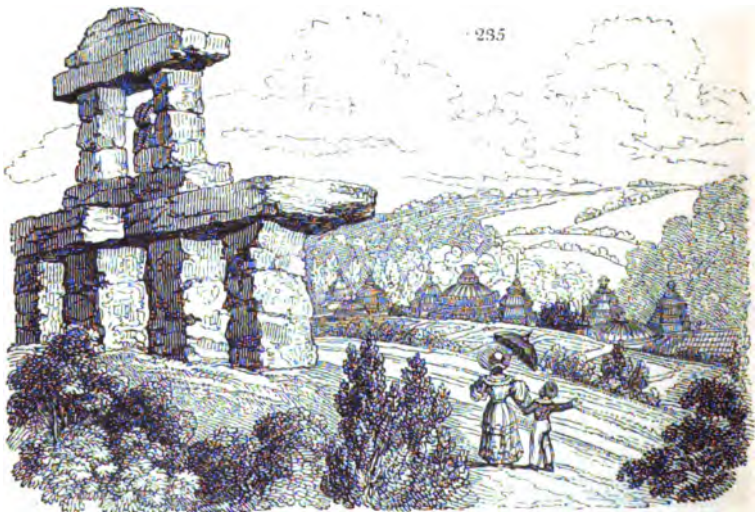




seen at a distance, protruding from a steep bank of wood, bore naturally some resemblance to the roof of a cottage grey with lichens; and the chimney-tops, and windows, were



added, to complete the idea. As the sandstone rock protrudes from the sides of the valley in immense masses, abundance of use has been made of it to form caves, grottoes, caverns, and covered seats; it has even been carved into figures: in one place we have Indian temples excavated in it, covered with hieroglyphics; and in another, a projecting rock is formed into a huge serpent, with a spear-shaped iron tongue, and glass eyes! There is a rustic prospect tower over an Indian temple, cut out of solid rock, on the highest point of the north bank; and in the lowest part of the valley there are the foundation and two stories (executed before the death of the late earl) of an octagon pagoda. The pagoda (*fig. 233.*) was intended to be eighty-eight feet high. It is placed on an island, in the centre of a small pond, and was to have been approached by a Chinese bridge richly ornamented. The diameter of the base of the pagoda is forty feet, and there were to have been six stories, the lower one of stone, and the others of cast iron. From the angles were to have been suspended forty highly enriched Chinese lamps, and these were to be lighted by a gasometer fixed in the lower story. Besides the lamps, there were to have been grotesque figures of monsters projecting over the angles of the canopies, which were to spout water from their eyes, nostrils, fins, tails, &c.; a column of water was also to have been projected perpendicularly from the terminating ornament on the summit of the structure, which, from the loftiness of the source of supply, would have risen to the height of seventy or eighty feet. This fountain was designed by Mr. Abraham, but only the lower story has been executed. The pagoda, the Gothic temple (seen to the right in *fig. 143.*) the range of gilt conservatories, and the imitation of Stonehenge (*fig. 235.*), form the leading artificial features of the valley (*c* in *fig. 223.*)



The valley itself is upwards of a mile in length: it gradually widens from its commencement at the stone bridge with the pond above it, till it terminates by opening into the wide valley containing the Chumet, there a considerable stream, and a navigable canal. This immense valley, it is said, the late earl intended to cover entirely with water; and, as it would have saved the canal company several miles of canal, they offered to form the dam or head, at their own expense. This lake, of

some thousands of acres, would have been as easily produced as that of Blenheim was by Brown.

1191. *In approaching from Cheadle*, we arrive in front of the castellated stables (i), and see the abbey (fig. 234.) across the pond above the level of the bridge. Proceeding a little farther towards the dry bridge, Stonehenge appears in the foreground, and the tops of the seven gilt glass domes of the main range of conservatories below (as in fig. 235.). Raising the eyes, the lofty Gothic temple appears on the left of the picture; and on the right, across the valley, the harper's cottage. In the centre of the picture, over the domes in the foreground, the valley loses itself in a winding bank of wood, in a style of great grandeur and seclusion. None of the details of the valley here obtrude themselves; and the effect, after passing through a wild country, exhibiting no marks of refinement, is singularly impressive. It fills the mind with astonishment and delight, to find so much of the magnificence of art, and the appearance of refined enjoyment, amidst so much of the wildness and solitary grandeur of nature. The imitation of Stonehenge, too, is a feature in artificial landscape which we have not elsewhere seen; and a stranger is puzzled and confounded by finding a stream and a small waterfall supplying a lake on what he conceives to be the highest point of high ground.

1192. *Thus far as to general impressions*; we shall not go into details. It is evident, that the contents of the valley defy all criticism; and that, perhaps, in paying the late author of these extravagant fancies a compliment after his own heart. If his object were originality, and that of a kind which should puzzle and confound, he has certainly succeeded; and, having attained the end which he proposed, as far as respects himself, he is to be considered eminently successful. How far it may be commendable for a man of wealth to gratify a peculiar taste, rather than one which is generally approved by the intelligence of the country in which he lives, is not, in these days, perhaps, a question of much consequence.

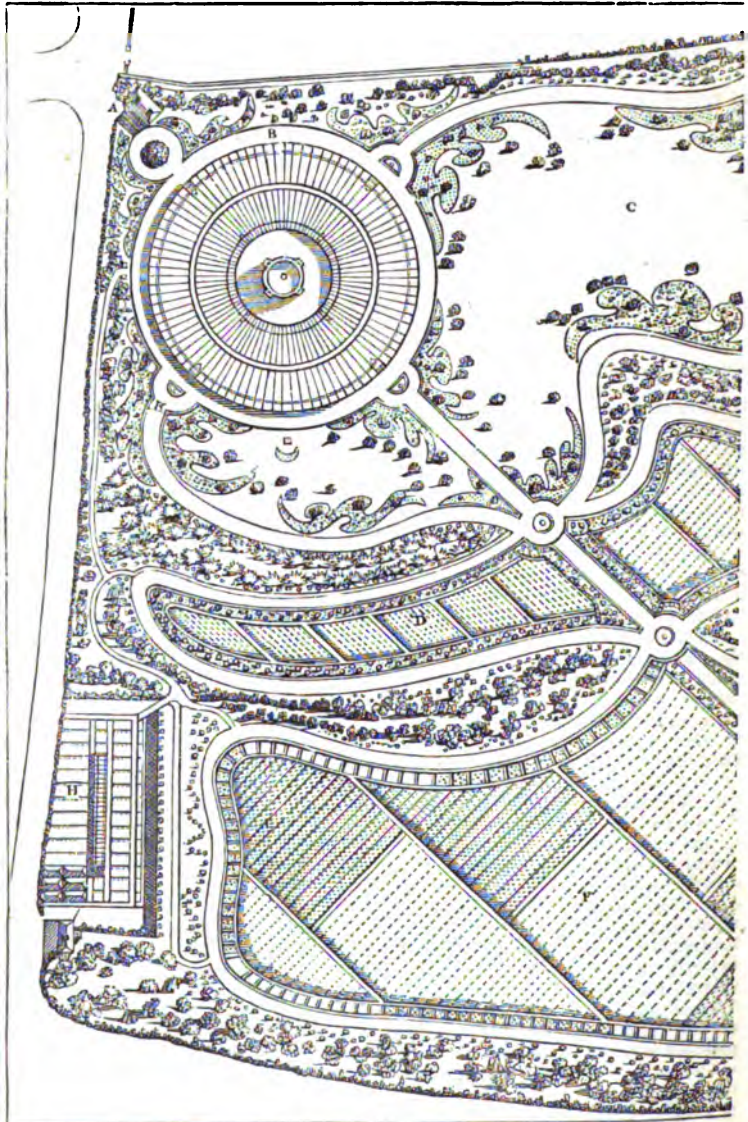
1193. *John, the present and seventeenth Earl of Shrewsbury*, has wisely considered it his duty to continue employing as many hands as were employed by his predecessor; and his works, on the whole, are in a taste that will be more generally approved. In the gardens he has obliterated a number of the walks, stairs, shell-works, and other petty contrivances; which, however, we almost regret, because no trifling alteration can ever improve what is so far out of the reach of reason. To the house he has made, and is making, extensive additions; and has added, among other things, a picture gallery, which will be one of the largest in the kingdom. What are wanting to the place are approaches; not only exhibiting most interesting views, like the present, but of so uniform and gentle a slope, as to be as rapidly driven over as if they were on level ground. The main entrance to the building is also on the wrong side; in consequence of which, a stranger sees the principal beauties of the place before entering the house.

1194. *Public gardens*. England is by no means celebrated for gardens of this description; and the cause, we think, may be traced to the comparatively anti-social character of the British people. As our intercourse with the Continent, however, increases, this peculiarity in our manners will be got rid of; and, as a proof that this process is now in progress, we have already commenced forming various descriptions of public gardens. A few short notices will suffice for this part of our work, and further details will be found under the head of *Garden Statistics*.

1195. *The parks of the metropolis* have, of late years, been increased by the addition of the Regent's Park, which, when the trees are so far advanced as to admit of its being thrown entirely open to the public, will rank with some of the finest public parks in Germany. Greenwich park is remarkable for the variations of its surface, and the extensive views which it commands of the shipping of London, backed by its forest of chimneys, spires, and cupolas, half enveloped in smoke. Hyde Park, which a few years ago narrowly escaped being sold by government for building upon, was entirely neglected till about 1816, when the grassy surface was renovated, some roads formed, and a bridge built across a piece of water, which, we have elsewhere shown (*Gard. Mag.*, vol. i. p. 280. to 286.), serves to counteract the natural character of the ground. We have, in the pages referred to, exhibited, by description and engravings, how this park, and Kensington Gardens adjoining, might have been altered in such a way as to combine an extraordinary share of rural beauty with far more convenience to those who frequent them, than is possessed at present. All this might have been done for much less than the expense of the bridge alluded to, and which, when examined without prejudice, in connection with our observations in the *Gardener's Magazine*, will be allowed to be a standing monument of national extravagance and bad taste. Kensington Gardens are not properly public property; but as the palace to which they are attached has long ceased to be inhabited by the sovereign, the public enjoy the gardens by sufferance, under certain restrictions. One of these is, that no person wearing livery, or carrying a parcel, or not decently dressed, may enter. These exclusive regulations may have suited former times, but they are

altogether unworthy of the present age. St. James's Park is the oldest in the metropolis: it is of very limited extent, and till lately the public were excluded from the greater part of it; but it is now (1832) varied by groups of shrubs interspersed among gravel walks, and is thrown open for pedestrians. It has been justly observed by foreigners, that the parks of London are calculated exclusively for those who possess horses and carriages; and that no provision is made for the enjoyment of the open air by pedestrians, invalids, or children. In the Regent's Park there is not a single gravel walk for persons

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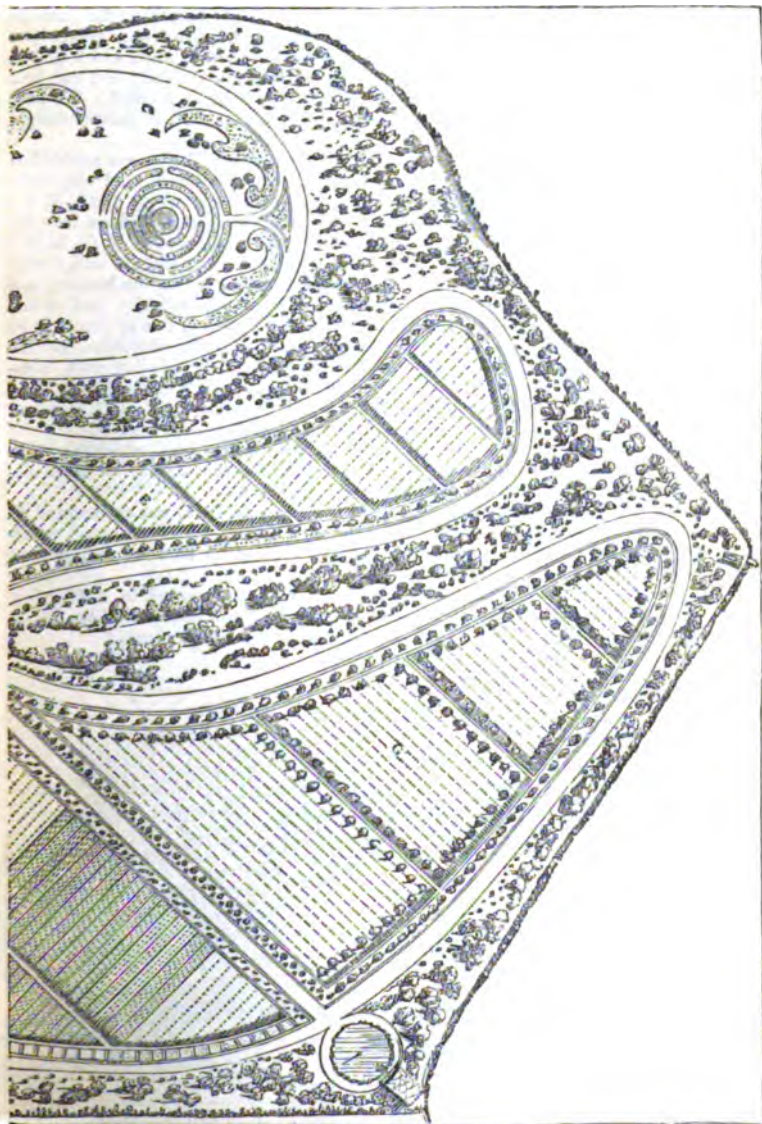


A. The main entrance.
B. Circular terrace-walk surrounding the hot-houses.
C. Pleasure ground.
D. Floricultural garden.

E. American garden.
F. Kitchen-garden and agricultural garden.
G. Orchard.
H. Experimental garden and reserve ground.

on foot; not one place of shelter; and only a few rough benches, as seats, by the side of the carriage road; liable, when the weather is such as to admit of their use, to the inconvenience of being covered with the dust raised by the passing carriages and horses. From the whole of the interior, from the verdure and softness of turf, from the shade of trees, and the beauty of shrubs, the public are completely excluded by a close fence, with locked gates. Civilisation, however, in this country, has now nearly arrived at that point, when the higher classes find that while they enjoy the luxuries and indulgences of their station,

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it is their duty, as well as their interest, to see that the whole mass of society be rendered comfortable. In all future changes, therefore, society will probably be considered as a whole.

1196. *The public parks and gardens of other parts of England* are so few, or so insignificant, as not to deserve mentioning. At Oxford, and at Cambridge, there are a few shady avenues, common to the students, and to the people of the town. At York there is something of the same kind; and at Chester and Chichester there are walks round the town, on the ramparts; but none of these sources of recreation at all deserve the name of public parks or gardens.

1197. *Of gardens belonging to public companies* there are a few in England, and these are chiefly the gardens of botanical and horticultural societies, of zoological societies, and of proprietors of medicinal springs, or baths, &c.

1198. *The garden of the London Horticultural Society* is chiefly devoted to the purposes of culture; but it contains one department, the arboretum, which has some pretensions to exhibit a specimen of landscape-gardening. A plan of this arboretum, which will be afterwards given, will show how far these pretensions have been realised; and will hold up to future designers of gardens, public or private, a style to be avoided. We have elsewhere (*Gard. Mag.*, vol. v. p. 346.) observed on this garden, that, in point of design, it is a disgrace to the country.

1199. *The garden of the Birmingham Botanical and Horticultural Society* was established in 1831, and contains sixteen acres, of a surface considerably varied, and singularly advantageous in point of variety of soil. The upper part of the garden (*fig. 236.*), B, is a level, intended for a circular range of hot-houses; a form adopted, because they are approached by the public from the north. The lower part of the garden, F, G, H, is a declivity upwards of sixty feet beneath the level of the upper part; and the walks, with the exception of a main central avenue, are contrived to descend to the bottom, and ascend again to the level platform on which the hot-houses stand, gradually, and on one uniform slope. The data, and desiderata, and the working plans of this garden, will be given hereafter. The remainder of the garden is occupied with the arboretum, and the herbaceous ground, planted on turf, along the left-hand side of the winding walk, commencing with *Ranunculacææ* at I, and ending with *Tulipidææ* and *Cryptogamia* at K.

1200. *The hot-houses which we designed for the Birmingham garden* (*fig. 238.*) were on a simple and original plan. The details will be found on the opposite side.

1201. *The Manchester and other botanic and horticultural gardens*, which combine examples of landscape-gardening with the culture of garden plants, will be found described at length in the *Gardener's Magazine*, vols. vii. and viii.

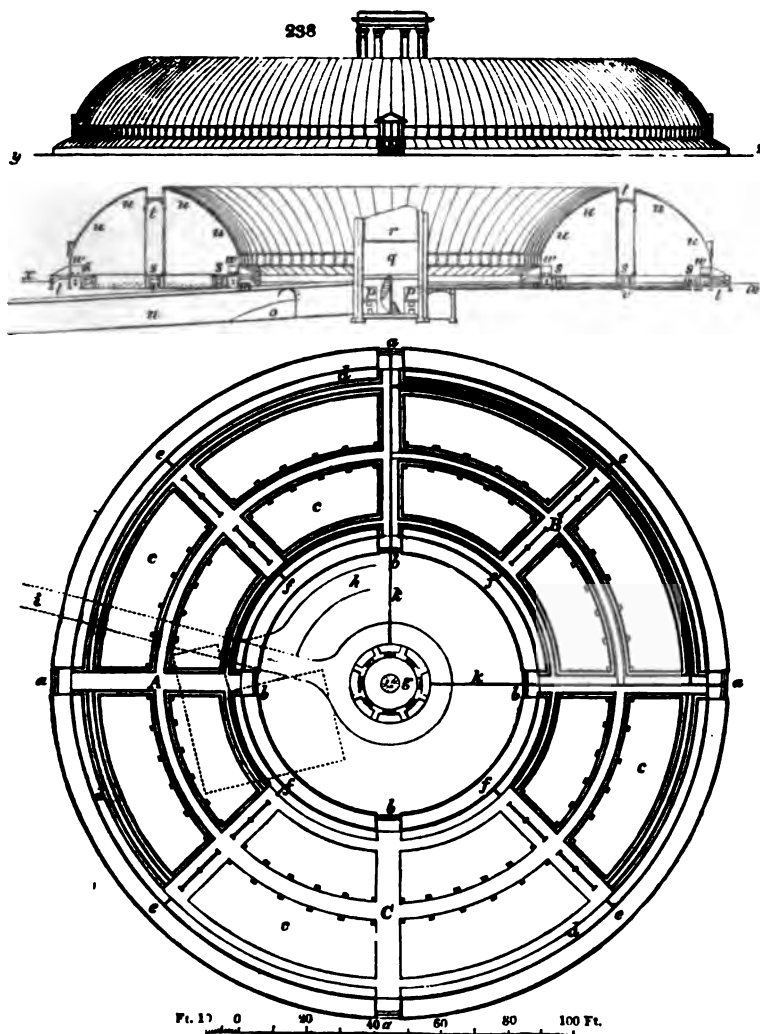
1202. *The garden of the Zoological Society*, in the Regent's Park, was commenced in 1826. It is of limited extent, but full of interest from the number of structures which it contains for animals; and as a garden, it displays some varied borders, well stocked with showy plants, and kept in excellent order.

1203. *The gardens of the Surrey Zoological Society* were commenced in 1830; they contain some handsome structures, and, in particular, a curvilinear menagerie (*fig. 237.*), which combines a series of tropical quadrupeds and birds with exotic plants.

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1204. *Of the gardens of watering-places*, that of Cheltenham is the most celebrated in England, though not eminent for its garden scenery. At Wingfield Spa, in Windsor Forest, extensive walks are laid out in a natural coppice wood, and ornamented with seats, and rustic buildings. A rustic pump-room (*fig. 239.*) has also been erected, and a



a a a a, The main entrances from the surrounding terrace.
b b b b, Corresponding entrances from the interior area.
c c c c, &c., Beds for large specimens to grow in the free soil.
d d d d, &c., Shelves for plants in pots.
e e e e, The exterior pit, in four divisions.
f f f f, The interior pit, in four divisions.
g, Central tower, in which is contained the steam or hot-water apparatus in the collar story, a potting-shed on the ground floor, and in the upper part a supply cistern for the hot-

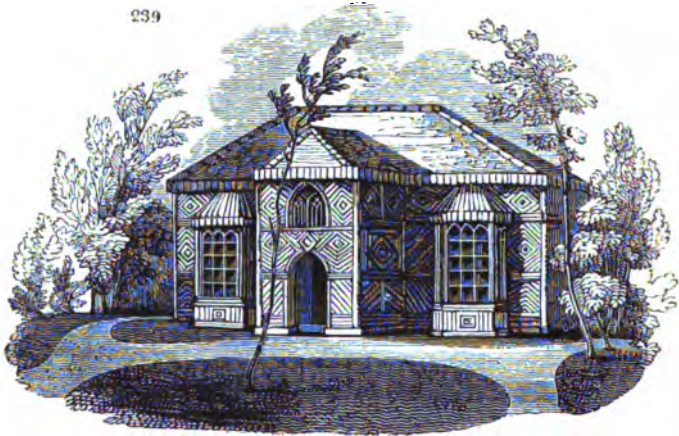
houses and jets. Round the base there is a vaulted passage, by which carts may pass round, unless it is considered preferable to ascend the inclined plane *h*, and drop the coals through manholes on the surface, to the cellars below.
h, Inclined plane to the tunnel.
i, Tunnel, which communicates with the base of the tower, the interior area, and the public road.
k, Means of the steam or hot-water apparatus.

The section, which is taken across an imaginary line from *i*, through *g* and *h*, to *a*, exhibits the following details:—

11, Exterior pits. *m m*, Interior pits.
a, Tunnel.
b, Archway, forming the entrance to the inclined plane which leads from the tunnel to the surface of the central area.
p p, Two steam or hot-water apparatus: either of these will supply heat to the whole range; but two are recommended, in case of accident.
q, Potting-shed.
r, Cistern.
s s, Surface of the hot-house.
t, Walk within the hot-house.
u, Walk over them, in which, during winter, rolls of matting

may be kept, for letting down over the glass to exclude the frost.
v v v v, Situation of pipes pierced with numerous small holes, for watering all the hot-houses, in imitation of a shower of rain, as at Messrs. Loddiges's.
w, Steam-pipes shown under the pathways.
x x x x, Benches for pots.
y y, Surface of the terrace walk.
z z, Elevation, taken opposite the centre of either of the four entrances.

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deserted nobleman's house in the neighbourhood has been turned into an hotel. At Norwood, in Surrey, the gardens of the Beulah Spa present a considerable variety of scenery, and exhibit a tolerable collection of plants; they are entered by a picturesque lodge (*fig. 240.*), and contain a number of curious and ornamental buildings. The taste

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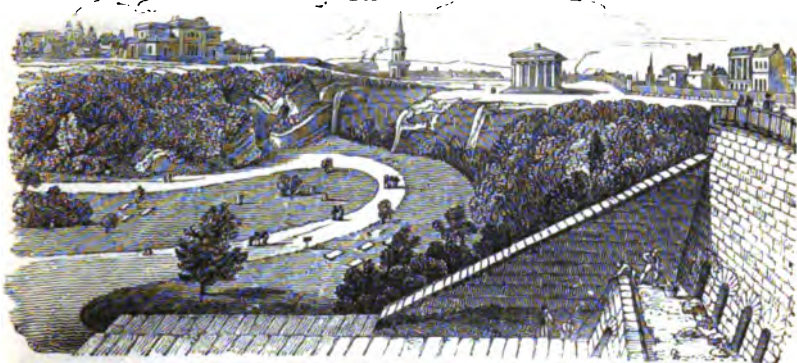
for public gardens of this description is evidently on the increase in Britain; and we should not be surprised, if at no distant time they were to combine with them parks, and various other sources of recreation and enjoyment, now exclusively possessed, at least in Britain, by the wealthy.

1205. *Bowling-greens* were formerly a department common in the pleasure-grounds of country seats; but they are now seldom to be found there, and are better known as a description of public gardens in the neighbourhood of towns, for the recreation of the inhabitants. They generally consist of a square space of half an acre or upwards, well drained, rendered perfectly level, and sown down with grass seeds, or covered with smooth turf. The sides are formed of mounds of turf two or three feet high, on which is generally a terrace walk, surrounding the bowling-green. The mound is to prevent the bowls from running off the green, and the walk is for the use of spectators of the game. These are the essentials, which may have various convenient or ornamental accompaniments; such as a pavilion for refreshments, a surrounding shrubbery for walking in, &c. There is a very handsome one at Birmingham, having several acres of pleasure-ground attached, and with an elegantly fitted up house for the entertainment of the bowlers and their visitors. This house is under the care of the gardener, who has the superintendence of the grounds, and who supplies the refreshments at a price agreed on. There is a bowling-green at the Trindle, near Dudley, with a coffee pavilion and baths attached, and three ponds for fishing, and taking amusement in boats.

1206. *Tea gardens* are to be found in the neighbourhood of all towns; though, till of late, they have been of so very humble a description as almost to escape notice. It deserves to be mentioned in this place, that Abercrombie, the author of *Every Man his Own Gardener*, published soon after the middle of the last century,—a work which has had an extraordinary influence in spreading a knowledge of and taste for gardening,—at one time kept a tea garden between London and Hampstead. If we are not greatly mistaken, the time is rapidly approaching, when gardens of this description will assume an extent, a splendour, and an interest, of which few at present can form an adequate idea.

1207. *Cemeteries*. The practice of the Continent, in removing burial-places from towns to the country, has only recently been imitated in Britain. The first example, we believe, is that of the Necropolis of Liverpool, a parallelogram of three or four acres, laid out as a burial garden in 1825. It belongs to a public company of dissenters, who hold it in shares of 10*l.* each. The Mount or St. James's Cemetery, of Liverpool (*figs.* 241. and 242.), is one of the most extraordinary in Britain, or, perhaps, in Europe. It is formed in

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the bottom and sides of an immense stone quarry, the general form of which is winding and irregular. The sides are planted in some places, and hollowed out into catacombs

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in others. The bottom is reduced to a level, surrounded and crossed by gravel walks, with groups and clumps of shrubbery on glades of lawn. The planting is inferior in taste to the architecture of the catacombs, and of the chapel and parsonage house, by Mr. Foster; but this may have been in part for want of funds. Further details respecting this cemetery will be found in *Fisher's Illustrations of England*, p. 102. A public cemetery has been commenced at Manchester, another in Birmingham, and another in London. The latter contains upwards of thirty acres, and is beautifully situated on rising ground, on the banks of the Uxbridge canal. The practice of removing cemeteries out of towns will, no doubt, soon become general in England.

SUBJECT. 2. Gardening in Scotland, as an Art of Design and Taste.

1208. Gardening was introduced into Scotland by the Romans, and revived by the religious establishments of the dark ages.

1209. *In the sixth century* is supposed to have been formed the garden of the abbey of Icolmkill, in the Hebrides. It is thus noticed by Dr. Walker (*Essays*, vol. ii. p. 5.), from its remains as they appeared in the end of the eighteenth century:—"On a plain adjoining the gardens of the abbey, and surrounded by small hills, there are vestiges of a large piece of artificial water, which has consisted of several acres, and been contrived both for pleasure and utility. Its banks have been formed by art into walks; and though now a bog, you may perceive the remains of a broad green terrace passing through the middle of it, which has been raised considerably above the water. At the place where it had been dammed up, and where there are the marks of a sluice, the ruins of a mill are still to be seen, which served the inhabitants of the abbey for grinding the corn. Pleasure-grounds of this kind," adds Dr. Walker, "and a method of dressing grain, still unpractised in these remote islands, must, no doubt, have been considered in early times, as matters of very high refinement."

1210. *In the twelfth century*, Chalmers informs us (*Caledonia Depicta*, vol. i. p. 801.), "David I. had a garden at the base of Edinburgh Castle. This king," he adds, "had an opportunity of observing the gardens of England under Henry I., when Norman gardening would, no doubt, be prevalent;" and we may reasonably suppose that he was prompted by his genius to profit from the useful, and to adopt the elegant, in that agreeable art.

1211. *During the greater part of the fourteenth century*, Scotland was in a state of intestine war; but in that succeeding, it is generally believed architecture and gardening were encouraged by the Jameses. James I., as we have seen (1103), admired the gardens of Windsor, in 1490; and having been in love there, and married an Englishwoman, would in all probability imitate them. He is described in the *Chronicles of Scotland* as "an excellent man, and an accomplished scholar. At his leisure hours he not only indulged himself in music, in reading and writing, in drawing and painting; but, when the circumstances of time and place, and the taste and manners of those about him, made it proper, he would sometimes instruct them in the art of cultivating kitchen and pleasure gardens, and of planting and engrafting different kinds of fruit trees." (*Scotichron.*, lib. xvi. cap. 30.)

1212. *In the middle of the fifteenth century*, James III. is described by Pitceottie as "delighting more in music and policie (probably from the French *polir*, to remove, level, or improve; or from a corruption of *se polir*, to improve one's self, levelling and smoothing the grounds about a house, being naturally the first step after it is built), and building, than he did in the government of his realm." The general residence of this monarch was Stirling Castle; and a piece of waste surface in the vale below is said to have been the site of the royal gardens. Enough remains to justify a conjecture, that at this early period they displayed as much skill as those of any other country. We allude to a platform of earth resembling a table, surrounded by turf seats, or steps rising in gradation; the scene, no doubt, of rural festivities. The intimate connection which subsisted about this time between the Scots and the French, would, no doubt, render whatever was fashionable in one country, fashionable in the other. Accordingly, we find, not only the French style of gardening and architecture to have prevailed in Scotland at this period, and for two centuries later; but French furnishing and cookery, French manners, and, in the language, the adoption of a number of French words and idioms.

1213. *In the middle of the sixteenth century*, the Regent Murray had a garden in the neighbourhood of Edinburgh, which existed in 1819, but is now covered with buildings. It contained some venerable pear trees, a magnificent weeping thorn tree of great age, and the remains of elm-bowers, which, says Neill, had doubtless, in their time, sheltered the fair Queen of Scots. (*Hort. Tur.*, &c., p. 226.)

1214. *There are various remains of gardens of the fifteenth and sixteenth centuries in Scotland.* At the palace of Falkland is a large square enclosure, on a dull flat, in which there exist only a few stunted ash trees, though the boundary stone wall is still a formidable fence. The gardens of Holyrood House appear to have been exceedingly confined; the boundary wall only remains; and there are some indications of the rows of trees which stood in the park, which seems to have extended to the base of the adjoining hill, Arthur's Seat. The palace of Scone, we learn from Adamson, a poet of the seventeenth century, was surrounded by "gardens and orchards, flowers and fruits;" and the park, in which are still some ancient trees, "abounded in the hart and fallow deer." Generally a few old trees in rows adjoin the other royal residences, and oldest baronial castles; but they give no indications of the extent to which art was carried in their disposition.

1215. *During the seventeenth century*, a few gardens must have been formed in Scotland. About the end of this century, the grounds of the Duke of Hamilton were planted, in all probability by a French artist. The design of Chatelherault, an ornamental object in the park of Hamilton, is named after, and formed in imitation of, the residence of that illustrious family in France, laid out by Le Nôtre.

1216. *About the beginning of the eighteenth century*, the Earl of Lauderdale is said to have sent plans, sections, and sacks of earth from his domain at Hatton, to London and Wise, in London; and these artists, it is added, formed a plan, and sent down a gardener to superintend its execution. Hatton, in 1805, was a fine old place; though it had long changed its possessor.

1217. *English artists were employed in Scotland during this century.* Switzer, Lawrence, and Langley mention, in their works, that they were frequently sent for into Scotland to give plans of improvement. Switzer appears to have resided a considerable time in Edinburgh, as he there published, in 1717, a tract on draining, and other useful and agricultural improvements. The Earls of Stair and of Haddington (who wrote on trees), both great planters, about this time, probably consulted them; as would, perhaps, Fletcher of Saltoun, the proprietors of Dundas Castle, Barnton, Saughton Hall, Gogar, and particularly Craigie Hall, a residence laid out with much art and taste, and next in rank in these respects to Hatton. New Liston, Dalkeith House, Hopetoun House, and various other places near Edinburgh, are also in Switzer's style. New Liston and Hopetoun House, planted, we believe, from 1735 to 1740, were probably the last considerable seats laid out in the ancient style in Scotland.

1218. *The modern style was first introduced into Scotland by the celebrated Lord Kames*, who, some time between 1760 and 1770, displayed it on his own residence at Blair Drummond. An irregular ridge, leading from the house, was laid out in walks, commanding a view, over the shrubs on the declivity, of portions of distant prospect. One part of this scene was composed entirely of evergreens, and formed an agreeable winter garden. Lord Kames did not entirely reject the ancient style, either at Blair Drummond, or in his *Essay on Gardening and Architecture*, published in the *Elements of Criticism*. In that short but comprehensive essay, he shows an acquaintance with the Chinese style, and with the practice of Kent; admits both of absolute and relative beauty as the objects of gardening and architecture; and from this complex destination, accounts for that difference and wavering of taste in these arts, "greater than in any art that has but a single destination." (Vol. ii. p. 431. 4th edit. 1769.)

1219. *Lord Kames's example in Scotland* may be compared to that of Hamilton or Shennstone in England: it was not generally followed, because it was not generally understood. That the *Elements of Criticism*, though long since obsolete as such, tended much to purify the taste of the reading class in Scotland at that time, there can be no doubt. Every person also admired Blair Drummond; but as every country gentleman could not bestow sufficient time and attention to gardening to be able to lay out his own place, it became necessary to have recourse to artists; and, as it happened, those who were employed had acquired only that habit of mechanical imitation which copies the most obvious forms, without understanding the true merits of the original. In short, they were itinerant pupils of Brown, or professors in his school, who resided in Scotland; and thus it is, that after commencing in the best taste, Scotland continued, and, judging from what we saw in 1831, continues still, with, no doubt, various exceptions, to patronise the very worst.

1220. *The grounds of Duddingston House* may be referred to as a contrast to the style of Blair Drummond; and as a proof of what we have asserted in regard to the kind of modern landscape-gardening introduced to Scotland. This seat was laid out about the year 1770. The architect of the house was Sir William Chambers; the name of the rural artist, whose original plans we have examined, was Robinson, nephew to the king's gardener of that name, sent down from London. We know of no example in any country of so perfect a specimen of Brown's manner, nor of one in which the effect of the whole, and the details of every particular part, are so consistent, and co-operate so well together in producing a sort of tame, spiritless beauty, of which we cannot give a distinct idea. It does not resemble avowed art, nor yet natural scenery; it seems, indeed, as if nature had commenced the work, and changed her plan, determining no longer to add to her productions those luxuriant and seemingly superfluous appendages which produce variety and grace. The trees here, all planted at the same time, and of the same age, seem to grow by rule. The clumps remind us of regularly tufted perukes. The waters of the same river neither dare to sink within nor to overflow its banks; the clumps keep at a respectful distance; and the serpentine turns of the roads and walks seem to hint that every movement to be made here must correspond.

1221. *The extent of Duddingston*, we suppose, may exceed 200 acres. The house is placed on an eminence in the centre, from which the grounds descend on three sides, and on the remaining side continue on a level till they reach the boundary belt. This belt completely encircles the whole; it is from 50 to 200 feet wide, with a turf drive in the middle. One part near the house is richly varied by shrubs and flowers, and kept as garden scenery; in the rest the turf is mown, but the ground untouched. A string of wavy canals, on different levels, joined by cascades, enter at one side of the grounds, and, taking a circuitous sweep through the park, pass off at the other. This water creates occasion

for Chinese bridges, islands, and cascades. The kitchen-garden and offices are placed behind the house, and concealed by a mass of plantation. Over the rest of the grounds are distributed numerous oval unconnected clumps, and some single trees. In the drive are several temples and covered seats, placed in situations where are caught views of the house, sometimes seen between two clumps, and at other times between so many as to form a perspective or avenue. There is also a temple on the top of a hill, partly artificial, which forms the object from several of these seats, and from other open glades or vistas left in the inside of the belt. The outer margin of this plantation is every where kept perfectly entire, so that there is not a single view but what is wholly the property of the owner; unless in one instance, where the summit of Arthur's Seat, an adjoining hill, is caught by the eye from one part of the belt, over the tops of the trees in its opposite periphery. That this place has, or had in 1790, great beauties, we do not deny; but they are beauties of a peculiar kind, not of general nature; not the beauties of Blair Drummond, or such as a liberal and enlightened mind would now desire to render general; but in great part such as Sir William Chambers holds up to ridicule in his *Dissertation on Oriental Gardening* (see his *Introduction*, p. 6—11.), and Price laughs at in his *Essays on the Picturesque*. Yet Duddingston may be reckoned the model of all future improvements in Scotland, till within the last twenty years. The same artist laid out Livingston, effected some improvements at Hopetoun House, Dalkeith, Dalhousie, Niddry, the Whim, Moredun, various other places near Edinburgh, and some in Ayrshire.

1222. *No artist of note had hitherto arisen in Scotland in this department of gardening, if we except James Ramsay.* This person was employed by Robertson, in Ayrshire, as a mason, but soon displayed a taste for disposing of verdant scenery, and afterwards became a landscape-gardener of considerable repute. He gave ground-plans and drawings in perspective, both of the buildings and verdant scenery. Leith Head, a small place near Edinburgh, is entirely his creation. His style was that of Brown, in his waters and new plantations near the house; but he was less attached to the belt, his clumps were not always regular, and he endeavoured to introduce a portion of third distance into all his views. Ramsay died at Edinburgh in 1794, and this record of his taste is due to his memory.

1223. *English professors of the modern style have occasionally visited Scotland,* and some regularly. From nearly the first introduction of the new style to the present time, annual journeys have been made into Scotland from the county of Durham by the late White, and subsequently by his son. White, senior, we believe, was a pupil of Brown, of much information on country matters, and generally respected in Scotland. Of his professional talents we have said enough, when we have mentioned their source. Airthrie, near Stirling, and Bargany, in Ayrshire, are the principal productions of this family. In what respects the talents of White, junior, differ from those of his father, or whether they differ at all, we are not aware; though we think it highly probable they will partake of the general improvement of the age. We have already mentioned that none of the eminent English artists had ever been in Scotland; but that Valleyfield was laid out from Repton's designs. Nasmyth, an eminent landscape-painter in Edinburgh, and G. Parkyns, author of *Monastic Remains*, have occasionally given designs for laying out grounds in Scotland, both in excellent taste.

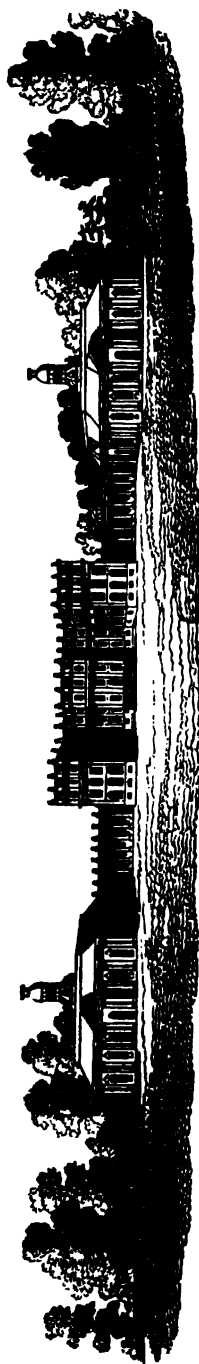
1224. *The country-seats of Scotland* will be found described at length in the *Traveller's Guide* through that country; but as, under England, we have given a somewhat detailed notice of a celebrated place in that kingdom, so here we shall give the description of one long celebrated in Scotland, as furnished us, in 1831, by the very intelligent gardener there, Mr. James Smith.

1225. *Hopetoun House* (fig. 242.) is situated on the banks of the Frith of Forth, a few miles west from Edinburgh. Both on account of the elegance of the mansion itself, and of the magnificence of the scenery with which it is surrounded, it is considered one of the most princely residences in Scotland. The house is of Palladian architecture, in the French palace style of the age of Louis XIV. Its erection was commenced from the designs of Sir William Bruce, and it was finished by Mr. Robert Adams, a well-known architect in the middle of the last century. The site is an irregular platform, not 300 yards from the Forth, and about 100 feet above the waters of that estuary. The ground declines towards the south and north, but especially towards the latter; where there is a steep bank covered with wood, which forms a barrier towards the water. The area, including the park, pleasure-grounds, and garden, is irregularly undulated with ridges and valleys, terminating in a north-east direction towards the sea, and is thickly clothed with old wood. The ground in the immediate vicinity of the house is not susceptible of much pictorial effect; at least, much has not been attempted, probably from the splendour of the more distant scenery, which lies within the range of view from the principal windows, and rises immeasurably above all the feeble imitations of art. The view from the east front is remarkably fine. From a bend in the coast, the house is so placed as to

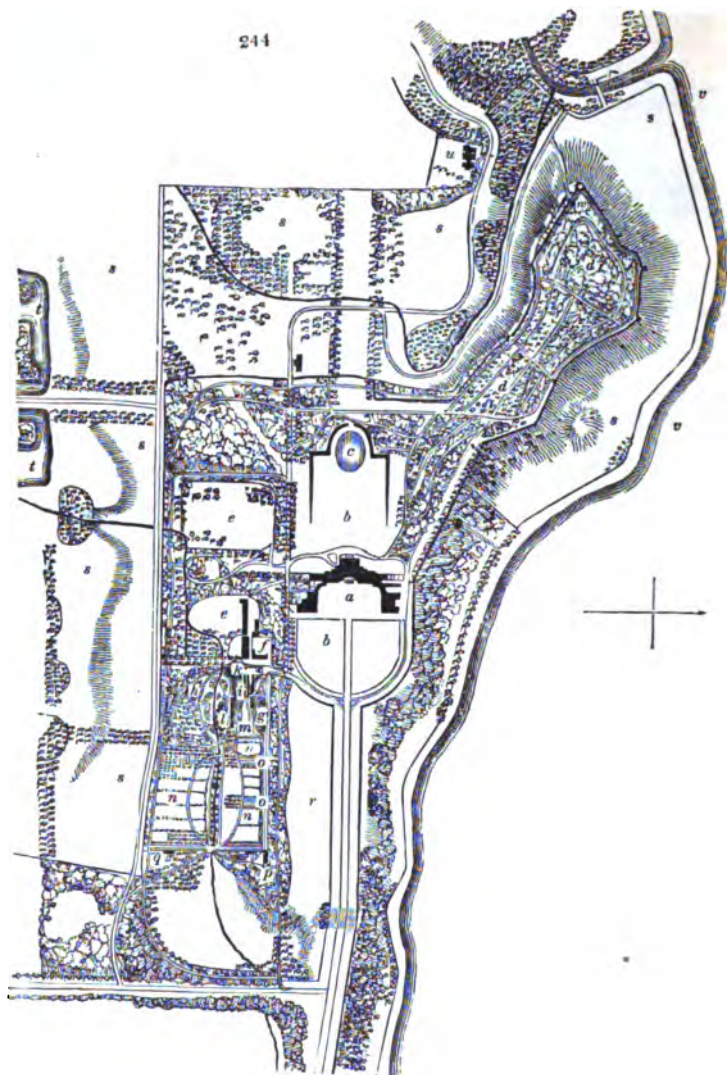
possess an almost central prospect of the Forth, which stretches away as far as the eye can reach, and forms a noble prospect, indented on either side by promontories, interspersed with little islands, and bounded on the extreme horizon by the German Ocean at about the distance of four miles. The elevated and finely wooded grounds of Dalmeny Park on one side, and the bare and rugged hill of North Queensferry on the other, both projecting into the sea and narrowing the passage, are conspicuous objects. In front of the latter is the bay of St. Margaret's Hope, the safest anchorage on the east coast, and at present (1831) a quarantine station. The number of vessels which frequent the Hope in stormy weather give this view quite a marine character. The prospect on the west is less extensive, being limited by the masses of trees in the pleasure-ground, through which only a few vistas are cut to remarkable objects; such as Blackness Castle, one of the forts upheld in conformity with the articles of the Union, and a faded memorial of Scottish national independence. Along the brow of the long and irregular plateau on which the house stands, there is a terrace walk, from which are seen views of surpassing beauty. The Forth, apparently cut off from the east by intervening objects, partakes of the lake character, and is said to resemble some of the lakes of Switzerland. Immediately opposite, the contour of the hills of Fife is rather tame, but it rises into more magnificence as it retires from the eye. Farther west, the Ochil Hills display those finely outlined eminences which characterise the transition series of rocks. They are seen with the sea as a base line, and hence appear to be of greater elevation than they actually are. Beyond them, and still farther west, tower the rugged summits of the Grampians; among which, Ben Ledi, Benmore, and, in clear weather, Ben Lomond, are proudly conspicuous. The ground on the south side of the Forth is less elevated, though there are occasional risings. The intermediate basin is occupied by an apparent lake, about four miles broad, and of great length. Over this sheet of water the summer sunsets are of uncommon splendour.

1226. *The park at Hopetoun House* contains about 1700 acres; but, from the irregularity of the surface, and the abundance of tall trees, it can be seen only in detached portions. A considerable part is set aside for deer, and encloses the kept or highly polished grounds on three sides. The pleasure-ground was laid out between 1725 and 1730, and it is not known whether any of the professional artists of the time were employed to assist in its formation. It appears to have been designed in the Dutch style, as there are remains of yew hedges, and other decorations of that school: many changes have been made, to bring it nearer the modern taste; but it has never been entirely remodelled. There is still a very extensive lawn, with many right angles and straight lines; but the extreme formality of these lines has been broken, at least to the eye, by the introduction of detached trees. There is a certain stateliness about the grounds, which harmonises well with the aspect of the mansion itself. The ground plan (*fig. 244.*) may be said to exhibit the anatomy, but, except to those who are practised in comparing plans with the surfaces from which they were taken, will convey no accurate idea of the physiognomy of the place.

1227. *The climate of this part of Scotland* is favourable to the growth of trees, particularly of evergreens, which are very abundant. Some hollies have trunks approaching to six feet in circumference, and a number of the variegated kinds have reached the stature of trees of the third rank. Among the large trees may be mentioned two cedars of Lebanon; one of which is fifteen feet, and the other upwards of twelve feet, in circumference. There is a black American spruce fir about seven feet, and a hemlock spruce above four feet and a half, in circumference. There are also two tulip trees, which flower



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a, Hopetoun House, fronting the east, and extending nearly 500 feet (*see* *fig.* 143).

b, *b*, Lawns on the front and back of the house.

c, Pond for swans.

d, Part of the pleasure-ground, extending to the north-west of the house, from which are seen the finest views of the Forth, particularly on the north side, at the bastion *w*, 110 feet above the level of the water.

e, Small paddocks.

f, Farm offices, covered by a bank of evergreens.

g, Flower-garden.

h, Arboretum.

i, Meion-ground.

k, Court for dung, and soils.

l, Range of hot-houses.

m, Vinery and peach wall.

n, Kitchen-garden.

o, Wing or screen walls, extending down the north bank, and affording good east and west aspects for fruit trees.

p, Gardener's house.

q, Lodge for journeyman gardeners.

r, Paddock betwixt the principal approach and the gardens, separated from the former by a sunk fence.

s, Part of the deer park.

t, Reservoirs for supplying water to the swans' pond, and to the house.

u, Abercorn (the parish) church.

v, Frith of Forth, about four miles broad.

every year, the largest of which is nearly six feet in girth. It is a fact, perhaps, worth notice, that the cedars before mentioned increase annually by two inches in circumference; while the greatest increase that has been observed in any other trees here is one inch, in the Spanish chestnut. As indicating the mildness of the climate, it may be remarked, that the ungrafted Spanish chestnuts ripen their fruit here in favourable seasons.

1298. In the *arborescens* the ground is sown with grass, which is kept short. It is interspersed with a few large trees of beech, sweet chestnuts, Scotch pine, &c. The plants lately introduced are the most showy evergreens, collections of *Crataegus*, *Acer*, and other genera. In this part of the garden, and near the stream of water on both sides, are various figures made in the grass, and planted with rhododendrons, anasels, ledums, and andromedas. The collection of roses is also here, and is extensive.

1299. The situation and climate of these gardens are extremely favourable for fruit. The principal of these are apples, pears, apricots, and figs, which are produced in great abundance, and of excellent quality. Plums and peaches succeed moderately well. Many of the new Flemish, French, and German pears have borne fruit on the walls: in general they are inferior to the older sorts; but the following may be mentioned as valuable acquisitions to the country in general, and to Scotland in particular: — Beurrée Spence, Marie Louise, Napoleon, Greenknove Winterbirne, Duchesse d'Angoulême, Passe-Colmar, several varieties, Nouvelle Beurrée d'Hiver, Délices de Chasselas, Glout Morceau, Beurrée d'Arenberg, with, perhaps, some others. The autumn Bergamotte ripens on standards, and in this state is, perhaps, of finer quality than when grown on walls. The Downton and Ingestrie Pippin apples succeed perfectly well on standards; a thing of common occurrence in England, but rare in Scotland.

1290. The gardens at *Hopetown House* are placed on the south-east of the house; and, as may be seen from the plan (*fig. 244. g to r*), are rather nearer it than in most modern residences. The gardens, however, do not intercept any of the principal views; and they are covered by a tall holly hedge, which, being allowed to grow wild, forms an agreeable side screen to the front lawn. The gardens are formed on the two sides of a shallow valley, through which runs a small stream of water. The declivities slope to the south and north. The extent is about thirteen acres; this space was intersected by a number of interior walls; but these were removed in 1816, when the gardens were remodelled. At that time they had fallen into a state of comparative neglect and exhaustion; and they were surcharged with moisture, in consequence of the stream alluded to running over a bed of peat moss. It was found impossible to confine this stream by any other less artificial means than a paved channel, watertight in the bottom and sides. The peat soil was then carefully drained. The surface of the ground, which had hitherto been very uneven, was levelled; great care being taken to preserve an uniform layer of soil of sufficient thickness, and at the same time to effect such an intermingling of the materials as to remedy the exhaustion, which had arisen from the protracted culture of the surface. In this operation more than 80,000 cart loads of earth were moved. Along several of the walls, the fruit borders had become completely exhausted; the soil was therefore removed, and its place was supplied with turf and fresh loam. Many young trees were planted; and the excellence of their fruit, and the increased fertility of the old trees, have already repaid the labour: indeed, this is an operation which may always be safely recommended in such circumstances, when fresh soil in sufficient quantity can be easily procured. It may be remarked, that, in renewing the soil both of the borders and of the garden, recourse was generally had to an accumulation of vegetable mould, which had been collected from the leaves annually swept from the pleasure-ground: this was employed to ameliorate the heavy soil, and was attended with the happiest effects.

1291. The *kitchen-garden* (*fig. 244. n n n*) is composed of two declivities, with a narrow intermediate space, and embraces a considerable variety of soils; such as sand, gravel, peat earth, and light and clayey loam. These circumstances, with the varied inclinations of the surface, are very advantageous in accelerating or protracting crops, and in adapting them to the different seasons. When the whole was recast, in 1816, it was wished to avoid the stiff form which prevails in many gardens in this part of Scotland, and advantage was taken of the extent and uneven surface to give the whole an irregular effect without entrenching much on the principle of utility; one wall encloses the kitchen, flower, and other garden departments. The gardens may be said to be divided into four unequal portions, running into each other without any very marked separation; the rill of water running from west to east divides the whole into two parts. The north side is again divided by a large holly hedge twenty feet high; and the south side by a waved walk, and by a bank of evergreens. The north-west division, as being nearest the house, is a flower-garden, with hot-houses below the middle of the bank. The south-west division is an arboretum, which has a communication with the pleasure-ground. The two eastern and larger divisions are the fruit and kitchen gardens combined. But the hollow space by the water is occupied on the one side by a Linnean arrangement of herbaceous plants, and on the other by an American ground, filled with shrubs and other plants which require a moist and peaty soil.

1292. The *flower-garden* is stocked with an extensive collection of the most ornamental plants which will stand the open air of this climate. Supplementary to these a great quantity of pelargoniums, fuchsias, and other showy green-house plants, are propagated every autumn, and planted out in the beginning of the following summer; these, with

georginas, and the finer annuals, provide means of decoration during autumn, which rival the splendour, and, perhaps, surpass the elegance, of the first flowers of May.

1233. *The forcing-houses* extend to about 200 feet. Grapes and pines are the principal forced fruits. There is a stove for exotics; and a forcing-house for roses and other tender flowers. The collection of plants is considerable. The melon-ground is very extensive, comprising seventy lights. Part of these are employed in growing successive pine plants; and there is a small pit in addition to the flued houses, in which they are successfully fruited by dung heat.

1234. *Public gardens* are scarcely known in Scotland where the mass of society are only beginning to be emancipated from political and social slavery. They are, however, much less necessary in a country which has been hitherto more agricultural than either manufacturing or commercial; and where, the surface being hilly and naked, fresh air is breathed every where, even in the towns. No country in the world, however, has finer situations for public parks and gardens; and the time for forming them is fast approaching.

1235. *Cemeteries.* A general cemetery has been proposed for the city of Edinburgh, and the popular opinion seems to be in favour of a portion of the King's Park, or the hill called Arthur's Seat. Were the latter laid out with a winding carriage-road to the summit, and judiciously planted, it would in a few years surpass any thing of the kind which we read of in history, not excepting even the Necropolis of Cyrene, of which we shall hereafter give a description and view. Our ideas on the subject of the Edinburgh cemetery will be found more at length in the *Gardener's Magazine*, vol. viii. p. 362.

SUBSCR. 3. *Gardening in Ireland, as an Art of Design and Taste.*

1236. *Of the ancient state of gardening in Ireland* very little is known. A short *Essay on the Rise and Progress of Gardening in Ireland*, by J. C. Walker, is given in the *Transactions of the Royal Irish Academy* (vol. xiv. part 3.), from which we shall glean what is available for our purpose.

1237. *In the time of Queen Elizabeth*, Fynes Morrison, "a minute observer," travelled through that kingdom. He does not once mention a garden as appertaining either to a castle or to a monastery; he only observes, "that the best sorts of flowers and fruits are much rarer in Ireland than in England; which, notwithstanding, is more to be attributed to the inhabitants than to the ayre." In an inedited account of a Tour in 1634, also quoted by Walker (*Trans. R. I. A.*), Bishop Usher's palace is said to have a "pretty neat garden."

1238. *Of remains of ancient gardens in Ireland* we may quote a few examples. Some of the largest sculptured evergreens are at Bangor, in the county of Down; and at Thomas-town, in the county of Tipperary, are the remains of a hanging garden, formed on the side of a hill, in one corner of which is a verdant amphitheatre, once the scene of occasional dramatic exhibitions. Blessington gardens, if tradition may be relied on, were laid out during the reign of James II. by an English gentleman, who had left his estate at Byfleet in Surrey, to escape the persecution of Cromwell. In King William's time, knots of flowers, curious edgings of box, topiary works, grassy slopes, and other characteristics of the Dutch style, came into notice. Rowe and Bullein, Englishmen, who had successively nurseries at Dublin, were in these days the principal rural artists of Ireland; though Switzer and Laurence, as well as Batty Langley, occasionally visited that country.

1239. *The first attempts to introduce the modern style into Ireland* are supposed to have been made by Dr. Delany at Delville, near Glasnevin, about the year 1720. Swift has left a poetical description of these scenes. Dr. Delany, Walker says, "impressed a vast deal of beauty on a very small spot of ground; softened the obdurate straight line of the Dutch into a curve, melted the terrace into a sloping bank, and opened the walk to catch the vicinal country." Walsh (*History of Dublin*, 1820) says, these grounds retain all the stiffness of the old garden. As there existed an intimacy between Pope and Delany, it is supposed the former may have assisted his Irish friend. This example appears to have had the same sort of influence in Ireland that the gardening of Lord Kames had in Scotland; it gave rise to a demand for artists of the new school, and the market was supplied by such as came in the way. Much less, however, was done in that country, partly from the abundance of picturesque scenery in many districts, and partly from other obvious causes. Mount Shannon, near Limerick, the seat of the late Chancellor Clare, is said to have been laid out from his lordship's designs; and the recent improvements at Charleville forest, where one of the most comfortable and magnificent castles in Ireland has been executed by Johnson of Dublin, were the joint productions of Lord and Lady Charleville. Walker mentions Marino, Castletown, Carton, Curraghmore, the retreat of St. Woolstans, and Moira, as exhibiting the finest garden-scenery in Ireland. Powerscourt, and Mucruss, near the lakes, are reckoned the most romantic residences, and are little indebted to art. The illiberality of the owner of

Powerscourt, in shutting it up on Sundays, has been finely ridiculed by Prince Pückler Muskau (*Tour, &c.* vol. i. p. 198.), who, passing it on a Sunday, "pursued his way along a high wall, over which, from time to time, he cast a longing and stolen glance at the magnificent waterfalls and enchanting scenery." St. Valori, Walker's own seat, is a beautiful little spot, near the well-known village of Bray. Miss Plumtre mentions Blarney Castle (*fig. 245.*), as one of the most enchanting spots in the world. There have been delightful shrubberies, which might easily be restored.

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The castle stands on a rock not very high, and below are fine meadows, with an ample stream flowing through them; there is plenty of wood, and a considerable lake at a short distance from the house, which furnishes excellent trout: in short, nature has left little for art to supply; and yet this charming spot is deserted, abandoned, looking wholly neglected and forlorn. (*Residence in Ireland, 1817, p. 240.*) The seats of Mr. Bourne, and of Counsellor West, near Dublin, are much indebted both to art and nature, and are among the most beautiful villa residences in Ireland.

1240. *Public gardens.* There is a park at Dublin belonging to the vice-regal residence, and there are walks on the ramparts of Londonderry and other towns; but the most curious public gardens in Ireland are the Hanging Gardens of Limerick. These contain an acre of ground, which is covered with lines of arches rising in terraces one above another; the lowest twenty-five feet, and the highest forty feet. Over these arches is placed a layer of earth, five feet thick, and planted with choice fruit trees and flowers. The space under the arches is employed as cellars, and will hold nearly 2000 hogheads. The work was commenced in 1823, and was completed in between five and six years, at an expense of nearly 15,000*l.* There are some tea gardens, one or two botanical and horticultural gardens, but, as far as we know, no cemetery gardens, in Ireland. The country, however, is admirably adapted for every department of gardening, and the people are equally adapted to enjoy it.

1241. *English artists professing the modern style* have been but little employed in Ireland, the common practice being to engage a good kitchen-gardener from England, and leave every thing to him. Sutherland was, in 1810, the local artist of greatest repute. A. McLeish settled in Ireland in 1813, and contributed to establish and extend a better taste than had previously appeared. W. T. Mackay, curator of the Trinity College garden, is said to excel in laying out grounds. Hely Dutton, James Fraser, and E. Murphy are the present artists.

SECT. II. *British Gardening, in respect to the Culture of Flowers and Plants of Ornament.*

1242. *Flowers* are more or less cultivated wherever gardening is practised; but a particular attention to this department of the art can only take place under circumstances of ease, and a certain degree of refinement. A taste for fine flowers has existed in Holland and the Netherlands from a very remote period, and was early introduced into England; but when that taste found its way to Scotland and Ireland is much less certain.

SUBSECT. 1. *Gardening in England, in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.*

1243. *The taste for florists' flowers, in England,* is generally supposed to have been brought over from Flanders with our worsted manufactures, during the persecutions of Philip II.; and the cruelties of the Duke of Alva, in 1567, were the occasion of our receiving, through the Flemish weavers, gillyflowers, carnations, and Provence roses. But flowers and flowering shrubs were known and prized even in Chaucer's time, as appears from a well-known passage of that poet. An Italian poet published, in 1586, a volume of poems, one of which is *On the Royal Garden*: from this poem it would appear that Queen Elizabeth was attached to the culture of flowers; but few are named either in these poems, or in the description of Theobald's. Parterres seem to have been introduced in the beginning of Queen Elizabeth's reign, and also the tulip, and damask and musk roses. Gerard, who published his herbal in 1597, mentions James Garret, "a London apothecary, a principal collector and propagator of tulips, for twenty years bringing forth every season new plants of sundry colours not before seen, all which to describe particularly were to roll Sisypheus's stone, or number the sands."

1244. *One of the earliest notices which we have of a botanic garden in England* is that of the Duke of Somerset, at Syon House, in the beginning of this century. It was placed under the superintendence of Dr. Turner, whom Dr. Pulteney considers as the father of

English botany. Turner had studied at Bologna and at Pisa, where, as we have already seen (§ 192.), some of the first botanic gardens were formed. After being some years with the Duke of Somerset, he retired from Syon House to Wells, where he had a rich garden, and died there in 1568. Frequent mention is made of the garden of Hugh Morgan, apothecary to Queen Elizabeth, by Lobel and Gerarde. About this time existed the botanic gardens of Edward Saintlo, in Somersetshire; James Coel, at Highgate; J. Nasmyth, surgeon to James I.; and John de Franqueville, merchant in London. From the care of the latter, Parkinson observes, "is sprung the greatest store that is now flourishing in this kingdom." Gerarde had a fine garden in Holborn, in the end of the sixteenth century, of which there is a catalogue in the British Museum, dated 1596, and another published in 1599, folio. Gerarde mentions Nicholas Lete, a merchant in London, "greatly in love with rare and fair flowers, for which he doth carefully send into Syria, having a servant there, at Aleppo, and in many other countries; for which myself, and the whole land, are much bound unto him." The same author also gives due honour to Sir Walter Raleigh, Lord Edward Zouch, the patron of Lobel, who brought plants and seeds from Constantinople, and to Lord Hunaden, Lord High Chamberlain of England, who, he says, "is worthy of triple honour for his care in getting, as also for his keeping such rare and curious things from the farthest parts of the world." (*Pulteney's Sketches*, p. 125.)

1245. *In the beginning of the seventeenth century*, flowers and curious plants appear to have been very generally cultivated. William Coys, of Stubbers in Essex, had a garden, which Lobel and Gerarde inform us was well stored with exotics. Under his care the *Yucca* first flowered in England, in 1604. Plat's *Flora's Paradise beautified*, which is the first book that treats expressly on flowers, appeared in 1608. Parkinson published his *Paradisus* in 1629. "A modern florist," observes Dr. Pulteney, "wholly unacquainted with the state of the art at the time Parkinson wrote, would perhaps be surprised to find that his predecessors could enumerate, besides 16 described as distinct species, 190 varieties of the tulip, 60 anemones, more than 90 of the narcissus tribe, 50 hyacinths, 50 carnations, 20 pinks, 30 crocuses, and above 40 of the *Iris* genus." (*Sketches*, &c. vol. ii. p. 123.) The laurel, or bay-cherry, was then very rare, and considered as a tender plant, being defended "from the bitterness of the winter by casting a blanket over the top thereof;" and the larch tree was only reared up as a curiosity. Green-house plants were placed in cellars, where they lost their leaves, but those of such as survived shot out again in spring when removed to the open air.

1246. *Flowers were much cultivated in Norwich*, from the time of the Flemish weavers settling there. Sir J. E. Smith (*Linæ. Trans.*, vol. ii. p. 296.) mentions a play called *Rhodon and Iris*, which was acted at the florists' feast at Norwich, in 1637; a proof that the culture of flowers was in great estimation there at that time; and in 1671 Evelyn mentions Sir Thomas Brown's garden there, as containing a paradise of rarities, and the gardens of all the inhabitants as full of excellent flowers. From Norwich the love of flowers seems to have spread to other manufacturing establishments; and the taste still continues popular, not only there, but among the weavers in Spitalfields, Manchester, Bolton, and most of the commercial towns in Lancashire, and many in Cheshire, Derbyshire, and other adjoining counties. A florists' society is established in almost every town and village in the northern districts. These societies have annual shows, as in London and Norwich; and a book, called *The Flower Book*, is published annually in Manchester, containing an account of their transactions, the prizes which have been given, and the new flowers which have been originated.

1247. *Ham House*, the Duke of Lauderdale's, had famous parterres and orangeries at this time. Sir Henry Capell had a very fine orangery and myrtetum at Kew; and Lady Clarendon, who, Evelyn informs us, was well skilled in flowers, had an ample collection at Swallowfield in Berkshire.

1248. *The place of Royal Herbalist* was created by Charles I.; and Parkinson was the first that filled it. Queen Mary, wife of William III., appointed Plukenet, "a man distinguished for botanical knowledge." Under this botanist's directions, collectors were despatched to the Indies in search of plants.

1249. *Tradescant's botanic garden at Lambeth* was established previously to 1629. Tradescant was a Dutchman, and gardener to Charles I. In 1656, his son published a catalogue of this garden, and of the museum which both of them had collected. Weston observes (*Catalogue of Authors on Gardening*, p. 30.), that Tradescant's garden having for some years lain waste, William Watson, F.R.S. visited its site on the 1st of May, 1749, and found many of the exotics remaining; they having endured two great frosts in 1729 and 1740. (*Phil. Trans.*, vol. xl.) Tradescant left his museum to Elias Ashmole, who lodged in his house. Mrs. Tradescant contested the will, and on losing the cause drowned herself. E. Ashmole presented the collection to the University of Oxford, 1677. The Tradescants were usually called Tradescain by their contemporaries; the name is uniformly so spelt in the parish registers. Henry Flatman, the painter, in a poem, mentions Tradescant's collection, and says, —

" Thus John Tradescant starves our wondering eyes
By buying up his new-born rarities."

Poems, p. 147.

1250. *The Chelsea botanic garden* seems to have existed about the middle of this century. In 1685, Evelyn visited Watts, their head-gardener. "What was very ingenious, was the subterranean heat conveyed by means of a stove under the conservatory, all vaulted with brick, so that he has the door and windows open in the hardest frosts, excluding only the snow." (*Memoirs, &c.*, vol. i. p. 606.) In Watts's garden was a tulip tree, and in the hot-house a tea shrub. (*Ray's Letters*.) The ground occupied by this garden was rented from Sir Hans Sloane; who afterwards, in 1723, when applied to for its renewal, granted it in perpetuity at 5*l.* a year, and fifty new plants to be presented annually to the Royal Society, till their number amounted to two thousand; this number being at that period thought sufficient to exhaust the then unexplored sources of nature.

1251. *Various private botanic gardens* existed at the end of this century. That of the celebrated naturalist Ray in Essex, Dr. Uvedale's at Enfield, and especially that of the Duchess of Beaufort at Badmington, were rich in plants; but that of Sir Hans Sloane at Chelsea surpassed them all.

1252. *A public botanic garden in England* was first founded at Oxford, in 1639, nearly a century after that at Padua. This honour was reserved for Henry, Earl of Danby, who gave for this purpose five acres of ground, built green-houses and stoves, and a house for the accommodation of the gardener, endowed the establishment, and placed in it, as a superintendent, Jacob Bobart, a German, from Brunswick, who lived, as Wood tells us, in the garden-house. In March, 1719, the vice-chancellor compelled Bobart's son to resign the office of botanic professor; and he died, at a very advanced age, a few months after. The garden contained at his death above 1600 species. Bobart's descendants are still in Oxford, and are known as coach proprietors.

1253. *Green-houses and plant-stoves* seem to have been introduced or invented about the middle of the seventeenth century. They were formed in the garden at Heidelberg in 1619 (see § 595.), and in the Altorf garden in 1645. Evelyn mentions Leader's orangery in 1662, and the green-house and hot-house at Chelsea are mentioned both by that author and Ray in 1683.

1254. *During the whole of the eighteenth century*, botany was in a flourishing state in England. Previously to this period, the number of exotics in the country probably did not exceed 1000 species: during this century above 5000 new species were introduced from foreign countries, besides the discovery of a number of new native plants. Some idea may be formed of the progress of gardening, in respect to ornamental trees and shrubs, from the different editions of Miller's *Dictionary*. In the first edition, in 1724, the catalogue of evergreens amounts only to twelve. The Christmas rose and aconite were then rare, and only to be obtained at Fairchild's at Hoxton: only seven sorts of geraniums were then known. Every edition of this work contained fresh additions to the botany of the country. In the preface to the eighth and last edition, published in 1768, the number of plants cultivated in England is stated to be more than double those which were known when the folio edition was published in 1731. Miller was born in 1691; and was appointed gardener to the Company of Apothecaries in 1722, upon Sir Hans Sloane's liberal donation of near four acres to the Company. He resigned his office about a year before his decease, which took place in 1771, and was succeeded by Forsyth, who was succeeded by Fairbairn, 1784, who died in 1814, and was then succeeded by Anderson, the present excellent curator.

1255. *As great encouragers of botany* during this century, Miller mentions, in 1731, the Duke of Chandos, Compton Speaker of the House of Commons, Dubois of Mitcham, Compton Bishop of London, Dr. Uvedale of Enfield, Dr. Lloyd of Sheen. Dr. James Sherard, apothecary, had, at Eltham, one of the richest gardens England ever possessed. His gardener, Knowlton, was a zealous botanist, and afterwards, when in the service of the Earl of Burlington, at Lanesborough, discovered the globe conifer. Dr. Sherard's brother was consul at Smyrna, and had a fine garden at Sedokio, near that town, where he collected the plants of Greece and many others. The consul died in 1728, and the apothecary in 1737. Fairchild, Gray of Fulham, Gordon, and Lee, eminent nurserymen, introduced many plants during the first half of the century. The last three corresponded with Linnaeus. Collinson, a great promoter of gardening and botany, had a fine garden at Mill Hill, near Hendon. Richard Warner had a good botanic garden at Woodford Green. The Duke of Argyle, styled a *treemonger* by Horace Walpole, had early in this century a garden at Whitton, near Hounslow, richly stocked with exotic trees. A number of other names of patrons, gardeners, and authors, equally deserving mention, are necessarily omitted. Dr. (afterwards Sir John) Hill had a botanic garden at Bayswater: he began to publish in 1751, and produced numerous works on plants and flowers, which had considerable influence in rendering popular the system of Linnaeus, and spreading the science of horticulture, and a taste for ornamental plants.

In 1775, Drs. Fothergill and Piteairn sent out Thomas Blaikie to collect plants in Switzerland; and this indefatigable botanist, as we have before observed (§ 340.), sent home all those plants mentioned in the *Hortus Kewensis* as introduced by the two Doctors.

1256. During the latter part of the eighteenth century, George Hibbert, and Thornton of Clapham, opulent commercial men, may be mentioned as great encouragers of exotic gardening botany. The collection of heaths, Banksias, and other Cape and Botany Bay plants, in Hibbert's garden, was most extensive, and the flower-garden one of the best round the metropolis. The Duke of Marlborough, while Marquis of Blandford, formed a collection of exotics at White Knights, surpassed by none in the kingdom. (*Historical Account of White Knights, &c.*, 1820, folio.) R. A. Salisbury, one of our first botanists, and a real lover of gardening, had a fine garden and rich collection at Chapel Allerton, in Yorkshire. Subsequently, he possessed the garden formed by Collinson at Mill Hill. Choice collections of plants were formed at the Earl of Tankerville's at Walton, the Duke of Northumberland's at Syon House, at the Comte de Vander's at Bayswater, Vere's at Knightsbridge, and many other places. Lee, Loddiges, Colvill, and several other nurserymen, might be named as greatly promoting a taste for plants and flowers by their well-stocked nurseries and publications. Of these, *Lee's Introduction to Botany*, *Andrews's Heathery*, and *Loddiges's Botanical Cabinet*, are well known and esteemed works. A grand stimulus to the culture of ornamental plants was given by the publication of *Curtis's Botanical Magazine*, begun in 1787, and still continued in monthly numbers. Here the most beautiful hardy and tender plants were figured and described, and useful hints as to their culture added. Other works by Sowerby, Edwards, Kerr, Andrews, &c., of a similar nature, contributed to render very general a knowledge of and taste for plants, and a desire of gardens and green-houses, to possess these plants in a living state. Maddock's *Florist's Directory*, which appeared in 1792, revived a taste for florists' flowers, which has since been on the increase.

1257. The botanic garden at Kew was established in 1760, by the Princess Dowager of Wales, the mother of George III. The exotic department of that garden was established chiefly through the influence of the Earl of Bute, a great encourager of botany and gardening: this nobleman placed it under the care of W. Aiton, who had long been assistant to Miller of the Chelsea garden. Sir John Hill published the first *Hortus Kewensis* in 1768, but editions have since been published under the direction of Aiton, the father and son; the last, in five volumes, the botanic part by Dryander and Brown, is reckoned a standard work. "An Epitome" in a pocket volume has been published, which enumerates about 10,000 species. Sir Joseph Banks gave to this garden the immense collections of plants and seeds obtained in his voyages, and this example has been followed by most travellers; so that it is now the richest in England, as far as respects its catalogue, though it is by some believed that an equal number of species is actually cultivated in the garden of Messrs. Loddiges at Hackney.

1258. The Cambridge botanic garden was founded by the Rev. Dr. Richard Walker in 1761. It has chiefly become celebrated for the useful catalogue of plants (*Hortus Cantabrigienseis*) published by Donn, its late curator. The garden is small, and never at any one time could contain all the plants, to the number of 9000, enumerated in that work. But if ever introduced there, that circumstance is supposed to justify their insertion in the catalogue.

1259. The nineteenth century has commenced with the most promising appearances as to floriculture and botany. The Linnæan and Horticultural Societies of London have been established; florists' societies are increasing; and some other gardening and botanical associations forming in the counties. The number of plant-collectors sent out is greatly increased; and not only do societies and public bodies go to this expense, but even private persons and nurserymen. The botanic gardens of Liverpool, Hull, Colchester, Bury St. Edmunds, Manchester, and Birmingham have been established, and others are in contemplation. The Liverpool garden owes its origin to the celebrated W. Roscoe. It was begun in 1803, and a catalogue published in 1808 by Shepherd, the curator, containing above 6000 species. The Hull garden owes its origin, in a great measure, to Watson, the author of *Dendrologia*, and to Spence, the celebrated entomologist.

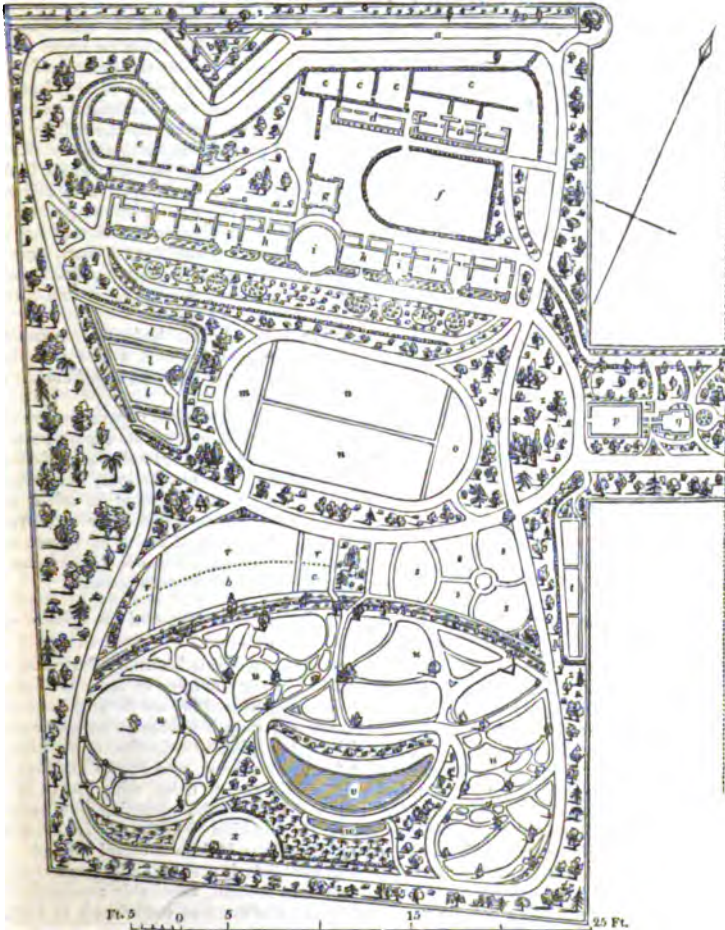
SUBSECT. 2. Gardening in Scotland, in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.

1260. A taste for florists' flowers, it is conjectured, was first introduced into Scotland by the French weavers who took refuge in that country in the seventeenth century, and were established in a row of houses, called Picardy-row, in the suburbs of Edinburgh. It seems to have spread with the apprentices of these men to Dunfermline, Glasgow, Paisley, and other places; for in Scotland, as in England, it may be remarked, that wherever the silk, linen, or cotton manufactures are carried on by manual labour, the

operators are found to possess a taste for, and to occupy part of their leisure time in the culture of flowers.

1261. *The botanic garden of Edinburgh* (fig. 246.) occupies sixteen acres, and includes extensive hot-houses and other desiderata in a superior style. The original garden took its rise, about the year 1680, from the following circumstances:—"Patrick Murray, baron of Livingston, a pupil of Dr. (afterwards Sir Andrew) Balfour, in natural history, formed a collection of 1000 plants at Livingston; but soon afterwards dying abroad, Dr. Balfour had his collection transferred to Edinburgh, and there, uniting it with his own, founded the botanic garden. It had no fixed support for some time; but at length

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- a a, Border, chiefly for tender plants.
 b, Wooded enclosure for plants requiring shade.
 c c c, Enclosures for rare plants, chiefly herbaceous.
 d d, Back range of hot-houses.
 e, Green-house ground for setting out the plants on during the summer season.
 f, Compact ground.
 g, Boiler-house.
 h h h, Front range of hot-houses.
 i i i i, Hot-houses in this range intended to be built, but not yet erected.
 k k, Collections of ornamental flowering shrubs.
 l l l, Nursery and annual ground.
 m, Duplicate collection of herbaceous plants.
 n n, General Librarian arrangement of herbaceous plants.

- o, Medical plants.
 p, Class room.
 q, Curator's house.
 r r, Collection of plants peculiar to Scotland.
 s s, Plants common to Scotland and some other parts of the British Islands.
 t t, Plants not natives of Scotland.
 u u u u, Collection of roses.
 v, Curator's kitchen-garden.
 w w w, Natural arrangement of herbaceous plants.
 x, Aquarium.
 y, Bog.
 z, Enclosure for rare plants, chiefly dwarf shrubs.
 aa, Collection of willows.
 b b b b, Arboretum.

the city of Edinburgh allotted a piece of ground near the College church, for a public garden, and appointed a salary for its support out of the revenues of the University." (*Walker's Essays*, 358.) In 1767, the garden was removed to a more eligible situation, considerably enlarged, and a very magnificent range of hot-houses erected under the direction of Dr. John Hope, who first taught the Linnæan system in Scotland. This garden, in general arrangement, and in the order in which it was kept till its destruction in 1822, was inferior to none in Britain, though at Kew and Liverpool the collection of plants was necessarily much greater. The collection in 1812 amounted to upwards of 4000 species, among which were some rare acclimatised exotic trees, which had attained a great size. This garden was again removed, in 1822, to its present situation.

1262. *In the early part of the eighteenth century*, this taste was introduced to the higher classes by James Justice, F.R.S., who had travelled on the Continent, and spared no expense in procuring all the best sorts of florists' flowers from Holland, and many curious plants from London. Such was his passion for gardening, that he spent the greater part of his fortune at Crichton, near Edinburgh, where he had the finest garden, and the only pine-stove, in Scotland, and the largest collection of auriculae, as he informs us, in Europe. In 1755, he published *The Scots Gardener's Director*, esteemed an original work, and containing full directions, from his own experience, for the culture of choice flowers. This work, with variations, was published in 1764, under the title of *The British Gardener's Director*. About the end of this century, florists' societies, which had existed before, but declined with the decline of gardeners' lodges, were revived in Edinburgh; and there are now several in Glasgow, Paisley, and other parts of the country. Those at Paisley are considered remarkable for the skill and intelligence of their members, and the fine pinks and other flowers produced at their shows. (*Gen. Rep. of Scot.*, App. to chap. ii.) The Edinburgh Florists' Society gave rise to the Caledonian Horticultural Society, which was established in 1809, and has greatly promoted this and other branches of gardening in Scotland.

1263. *In the middle of the eighteenth century*, the Earl of Bute had a rich botanic garden in the island from which he takes his title. Towards the end, a sale botanic garden was formed at Forfar, by Mr. George Don, the well-known British botanist; and another at Monkwood, in Ayrshire, by Mr. James Smith.

1264. *The nineteenth century*, as far as it has yet gone, has witnessed a great degree of progress in botany and floriculture in Scotland. The establishment of the experimental garden of Inverleith in 1824, and the general foundation of horticultural societies throughout the country, by exhibiting new and beautiful garden productions, has called forth that love of fruits and flowers, which may be said to be dormant in mind, in countries advanced to a certain degree of civilisation. Perhaps a still more powerful cause may be traced to the leisure which many families, the heads of which have been in the army or navy, have had, since the peace of 1814, to settle on and improve their estates; and the opportunity afforded to others of travelling, and importing improvements.

SUBSECT. 3. *Gardening in Ireland, in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.*

1265. *Botany and flower-gardening* have been much neglected in Ireland. Parterres, it would appear (*J. C. Walker's Hist.*), came into notice during the reign of King William. Dr. Caleb Threlkeld was among the first of the few who formed private botanic gardens for their own use, and Sir Arthur Rawdon almost the only individual who displayed wealth and taste in collecting exotics. Upon visiting the splendid collection of Sir Hans Sloane, at Chelsea, Sir Arthur, delighted with the exotics there, sent James Harlow, a skilful gardener, to Jamaica, who returned with a ship almost laden with plants in a vegetating state. For these a hot-house was built at Moira, in the beginning of Charles the Second's reign, supposed to be the first erection of that kind in Ireland. In 1712, a small collection of plants was cultivated in the garden of the Dublin Medical College.

1266. *The botanic garden of Trinity College* was established in 1786, and though small, yet contains the richest and most varied collection in Ireland, admirably managed by Mr. Mackay. There is also a botanic garden at Cork; and one was established, in 1830, in Belfast.

1267. *The botanic garden of the Dublin Society* was established in 1790, chiefly through the exertions of Dr. Walter Wade. It contains upwards of thirty acres, delightfully situated, and very ingeniously arranged; but, like most of the other botanic gardens in Ireland, always excepting that of Trinity College, it is very imperfectly kept up. There are a few private collections in Ireland; and one of the best flower-gardens is that of Lord Downes, at Merville, near Dublin; but, in general, it may be stated, that ornamental culture of every kind is in its infancy in that country. Something will probably be effected by the Dublin Horticultural Society, established in 1816. The origin of this society is thus given:—In the reign of George I., the Huguenots established a florists' club, for the promotion of the cultivation of florists' flowers, which was continued till the

reign of George II. From that time the science of gardening was entirely neglected in Ireland, until a number of the principal gardeners in the vicinity of Dublin formed themselves into a horticultural society in 1816.

1968. *A botanic garden has lately been established at Belfast*, through the influence of Dr. Drummond and the Belfast Natural History Society. The first curator was Mr. Drummond, now a botanical collector in Australia, and he was succeeded by Mr. David Bishop, the author of *Causal Botany*.

SECT. III. *British Gardening, in respect to its horticultural Productions.*

1269. *The knowledge of culinary vegetables and cultivated fruits* was first introduced to this country by the Romans; and it is highly probable that the more useful sorts of the former, as the brassica and onion tribe, always remained in use among the civilised parts of the inhabitants, since *hale* and *leeks* are mentioned in some of the oldest records, and the Saxon month April was called *Sprout Kale*.

1270. *The native fruits of the British isles*, and which, till the thirteenth or fourteenth century, must have been the only sorts known to the common people, are the following:—small purple plums, sloes, wild currants, brambles, raspberries, wood strawberries, cranberries, blackberries, red-berries, heather-berries, elder-berries, roan-berries, haws, holly-berries, hips, hazel nuts, acorns, and beech-mast. The wild apple or crab, and wild cherry, though now naturalised, would probably not be found wild, or be very rare in the early times of which we now speak. The native roots and leaves would be earth-nut, and any other roots not remarkably acrid and bitter; and chenopodium, sorrel, dock, and such leaves as are naturally rather succulent and mild in flavour.

1271. *The more delicate fruits and legumes*, introduced by the Romans, would, in all probability, be lost after their retirement from the island; and we may trace with more certainty the origin of what we now possess to the ecclesiastical establishments of the dark ages, and during the reign in England of the Norman line and the Plantagenets. It may in general be asserted, that most of our best varieties of fruits, particularly apples and pears, were brought into the island by ecclesiastics in the days of monastic splendour and luxury, during the twelfth, thirteenth, fourteenth, and fifteenth centuries. Gardens and orchards (*horti et pomaria*) are frequently mentioned in the earliest chartularies extant; and of the orchards many traces still remain in different parts of the country, in the form, not only of enclosure-walls, and prepared fruit-tree borders, but of venerable pear-trees, some of them still abundantly fruitful, and others in the last stage of decay. Of the state of horticulture previous to the beginning of the sixteenth century, however, no distinct record exists. About that time it began to be cultivated in England, and at more recent periods in Scotland and Ireland.

SUBJECT. 1. *Gardening in England, in respect to its horticultural Productions.*

1272. *The earliest notice of English horticulture* which we have met with, is in Gale's *History of Ely*; and by William of Malmesbury, and belongs to the twelfth century. Brithnød, the first abbot of Ely, in 1107, was celebrated for his skill in gardening, and for the excellent gardens and orchards which he made near that monastery. "He laid out very extensive gardens and orchards, which he filled with a great variety of herbs, shrubs, and fruit-trees. In a few years the trees which he planted and ingrafted, appeared at a distance like a wood, loaded with the most excellent fruits in great abundance, and added much to the commodiousness and beauty of the place." (*Gale's Hist. of Ely*, vol. ii. ch. 2.) The vine, we have seen (§ 1094.), was introduced by the Romans in the third century; and both vineyards and orchards are mentioned by different chroniclers as existing in the fifth and sixth centuries. Indeed, from the name of the apple forming a part of the Irish, Cornish, and Welsh languages, that fruit is conjectured by some to have existed in the British islands even previously to the Roman invasion. (*Johnson's History of Gardening*, p. 37.) William of Malmesbury speaks of the abundance of vineyards and orchards in the vale of Gloucester. At Edmondsbury, a vineyard was planted for the use of the monks of that place, in 1140.

1273. *In the thirteenth century* (A. D. 1294), the monks of Dunstable were at much expense in repairing the walls about the garden and herbary of their priory; and the herbary mentioned in Chaucer's *Nonne's Priest's Tale* appears to have been well stored with medical herbs, shrubs, &c. Paris, in describing the backwardness of the seasons in 1257, says, that "apples were scarce, pears still scarcer; but that cherries, plums, figs, and all kinds of fruits included in shells, were almost quite destroyed." (*Henry's Hist.* b. iv. chap. 5. sect. 1.)

1274. *Previously to the sixteenth century*, it is generally said, that some of our most common pot-herbs, such as cabbages, were chiefly imported from the Netherlands, their culture not being properly understood in this country. "It was not," says Hume, "till the end of the reign of Henry VIII. that any salads, carrots, turnips, or other edible roots, were produced in England. The little of these vegetables that was used, was

furtherly imported from Holland and Flanders. Queen Catherine, when she wanted a salad, was obliged to despatch a messenger thither on purpose." (*Hist. of Eng.* anno 1547.) Fuller, in 1660, speaking of the gardens of Surrey, says, "Gardening was first brought into England for profit about seventy years ago; before which we fetched most of our cherries from Holland, apples from France; and hardly had a mess of rath-ripe peas, but from Holland, which were dainties for ladies, they came so far and cost so dear. Since, gardening hath crept out of Holland to Sandwich, Kent, and thence to Surrey, where, though they have given £6 an acre and upwards, they have made their rent, lived comfortable, and set many people to work." (*Worthies*, part iii. p. 77.)

1275. During the reign of Henry VIII., rapid steps were made in horticulture. According to some authors, apricots, musk-melons, and Corinth grapes from Zante, were introduced by that monarch's gardener; and different kinds of salad, herbs, and esculent roots, were about the same time first brought into the country from Flanders. Salads, however, according to Holingshed, are mentioned during Edward IV.'s reign. Henry had a fine garden at his favourite palace of Nonesuch, in the parish of Chess, in Surrey. The garden-wall was fourteen feet high, and there were 212 fruit trees. In Nicolas's *Private Purse Expenses of King Henry VIII.*, from November 1529 to December 1532, published in 1832, salad, and especially lettuce, is repeatedly mentioned as being brought by the king's gardeners from Richmond and Greenwich. Artichokes occur frequently. Among the fruits are grapes, peaches, apricots, quinces, and medlars. Notice is made of reward being given to the gardener at Hampton Court for melons and cucumbers, dated October 8. Leland, who wrote during this reign, informs us (*Itinerary*, &c.), that at Morle, in Derbyshire, "there is as much pleasure of orchards of great variety of fruit, as in any place of Lancashire. The castle of Thornbury, in Gloucestershire, had an orchard of four acres, and there were others at Wresehill on the Ouse."

1276. Books on horticulture appeared towards the middle of the sixteenth century. The first treatise of husbandry was a translation from the French, by Bishop Grosshead, in 1500. In 1521, appeared Arnold's *Chronicles*, in which is a chapter on "The crafte of graffynge, and plantynge, and alterynge of fruits, as well in colours as in taste." The first author who treats incidentally on gardening is Tusser, whose *Hundred Pointes of Husbandry* was first published in 1557.

1277. Thomas Tusser (*Sir J. Banks*, in *Hort. Trans.* i. 150.), who had received a liberal education at Eton school, and at Trinity Hall, Cambridge, lived many years as a farmer in Suffolk and Norfolk; he afterwards removed to London, where he published the first edition of his work, and died in 1580. In his fourth edition, in 1573, he first introduced the subject of gardening, and has given us not only a list of the fruits, but also of all the plants then cultivated in our gardens, either for pleasure or profit, under the following heads:—

1278. *Seedes and herbes* for the kychen, herbes and rootes for sallets and sawce, herbes and roots to boyle or to butter, strewing herbes of all sorts, herbes, branches, and flowers for windowes and pots, herbes to still in summer, necessarie herbes to grow in the gardens for physick, not reherst before. — This list consists of more than 150 species.

1279. *Of fruits* he enumerates, apple trees of all sorts, apriochoes, bar-berries, bollese black and white, cherries red and black, chestnuts, cornet plums (probably the Cornelian cherry); damisens white and black, filberts red and white, gooseberries, grapes white and red; grene or grass-plums, hurtill-berries (*Vaccinium Vitis Idæa*), medlers or merles, mulberries; peaches white, red, and yellow fleshed (called also the orange-peach); peres of all sorts, peer plums black and yellow, quince-trees; raspes, reisons (probably currants), small nuts; strawberries red and white; servicee-trees, wardenes white and red, wallnuts, wheat-plums.

1280. *Other fruits*, perhaps, might have been added, as the fig; that fruit having been introduced previous to 1548. The orange and pomegranate, which Evelyn, in 1700, says, had stood at Beddington 120 years; and the melon, which, according to Lobel, was introduced before 1570; so that we had all the fundamental varieties of our present fruits in the middle of the sixteenth century. The pine-apple is the only exception, which was not introduced till 1690; though the fruit was imported from the West Indies as early as 1657.

1281. *The fertility of the soil of England* was depreciated by some in Tusser's time, probably from seeing the superior productions brought from Holland and France. Dr. Bulleyn, a contemporary, defends it, saying, "we had apples, pears, plums, cherries, and hops, of our own growth, before the importation of these articles into England by the London and Kentish gardeners, but that the cultivation of them had been greatly neglected." He refers as a proof of the natural fertility of the land to the great crop of sea-peas (*Pisum maritimum*), which grew on the beach between Orford and Aldborough, and which saved the poor in the dearth of 1555. Oldys, speaking of Gerard's fine garden, and alluding to the alleged depreciation of our soil and climate, says, "from whence it would appear, that our ground could produce other fruits besides hips and haws, acorns

and pig-nuts." At this time, observes Dr. Pulteney (*Sketches*, &c., 118.), "kitchen-garden wares were imported from Holland and fruits from France."

1282. *During the reign of Elizabeth*, horticulture appears to have been in a state of progress. Various works on this branch then appeared, by Didymus Mountain, Hyll, Mascall, Googe, &c.; these, for the most part, are translations from the Roman and modern continental authors. Mascall is said to have introduced some good varieties of the apple.

1283. *Charles I.* seems to have patronised gardening. His gardener was Tradescant, a Dutchman, and he appointed the celebrated Parkinson his herbalist. In 1639, appeared the first edition of this man's great work, in folio, entitled "*Paradisi in sole Paradisus terrestris* ; or, a Garden of all sortes of pleasant Flowers, with a Kitchen Garden of all manner of Herbs and Roots, and an Orchard of all sort of Fruit-bearing Trees, &c." This (*Martyn's Miller's Dict.*, and *Ed. Encyc. art. Hort.*) may be considered as the first general book of English gardening possessing the character of originality. For the culture of melons, he recommends an open hot-bed on a sloping bank, covering the melons occasionally with straw, — the method practised in the north of France at this day. Cauliflowers, celery, and finocchio were then great rarities. Virginia potatoes (our common sort) were then rare ; but Canada potatoes (our Jerusalem artichoke) were in common use. The variety of fruits described, or at least mentioned, appears very great. Of apples there are 58 sorts ; of pears, 64 ; plums, 61 ; peaches, 21 ; nectarines, 5 ; apricots, 6 ; cherries, no fewer than 36 ; grape-vines, 23 ; figs, 3 ; with quinces, medlars, almonds, walnuts, filberts, and the common small fruits.

1284. *Cromwell* was a great promoter of agriculture and the useful branches of gardening, and his soldiers introduced improvements whenever they rested any time in a place. He gave a pension of 100*l.* a year to Hartlib, a Lithuanian, who had studied husbandry in Flanders, and published *A Letter to Dr. Beattie, concerning the Defects and Remedies of English Husbandry*, and *The Legacy* (by Robert Child), both useful works. He was an author, says Harte, who preferred the faulty sublime to the faulty mediocrity. He recommended the adoption in England of the two secrets of Flemish husbandry, — that of letting farms on improving leases, and cultivating green crops.

1285. *Charles II.*, being restored to the throne, introduced French gardening ; and his gardener, Rose, Daines Barrington informs us, "planted such famous dwarfs at Hampton Court, Carlton, and Marlborough gardens, that London, who was Rose's apprentice, in his *Retired Gardener*, published in 1706, challenges all Europe to produce the like." Waller, the poet, in allusion to the two last gardens, describes the mall of St. James's Park, as —

"All with a border of rich fruit-trees crown'd."

When Quintinye came to England to visit Evelyn, Charles II. offered him a pension to stay and superintend the royal gardens here ; but this, says Switzer (*Pref. to Ichnographia Rustica*), he declined, and returned to serve his own master. Daines Barrington conjectures that Charles II. had the first hot and ice houses ever built in this country, as, at the installation dinner given at Windsor, on the 23d of April, 1667, there were cherries, strawberries, and ice-creams. These fruits, however, had been long, as Switzer states, raised by dung-heat by the London gardeners, and the use of ices must have long before been introduced from the Continent.

1286. *Evelyn* was a distinguished patron of horticulture. On returning from his travels, in 1658, he published his *French Gardener*, and from that time to his death in 1706, continued one of the greatest promoters of our art. In 1664, he published his *Sylva*, *Pomona*, and *Calendarium Hortense* ; the latter, the first work of the kind which had appeared in this country. In 1693, his translation of Quintinye's work on orange trees, and his *Complete Gardener*, appeared ; and his *Acetaria*, in 1699, was his last work on this branch of gardening. Evelyn is universally allowed to have been one of the warmest friends to improvements in gardening and planting that has ever appeared. He is eulogised by Wotton, in his *Reflections on Ancient and Modern Learning*, as having done more than all former ages, and by Switzer, in his historical preface to *Ichnographia Rustica*, as being the first that taught gardening to speak proper English. In his *Memoirs* by Bray are the following horticultural notices : —

1287. *Lady Brook's at Hackney*, in 1661 ; "vines planted in strawberry borders, staked at ten feet distance. I saw the famous queen-pine brought from Barbadoes, and presented to his majesty." Evelyn had seen one four years before ; and he afterwards saw the first king-pine presented at the Banqueting-house, and tasted of it. At Strawberry Hill is a picture, in which Charles II. is receiving a pine-apple from his gardener, Rose, who is presenting it on his knees.

1288. *At Sir William Temple's, at East Sheen*, in 1666, the most remarkable things "are his orangery and gardens, where the wall-fruit trees are most exquisitely nailed and trained, far better than I have noted any where else." Sir William has some judi-

cious remarks on the soils and situations of gardens, in his *Essay* written in 1668. He was long ambassador at the Hague, and had the honour, as he informs us, and as Switzer confirms, of introducing some of our best peaches, apricots, cherries, and grapes.

1289. *At Kew Gardens* in 1678 (*Memoirs*, vol. ii. p. 17.), "Sir Henry Capel has the choicest plantation of fruit in England, as he is the most industrious and most understanding in it. Daines Barrington (*Archæologia*, vol. viii. p. 122.) considers Lord Capel to have been the first person of consequence in England, who was at much expense in his gardens, having brought over with him many new fruits from France.

1290. *During the eighteenth century*, the progress of horticulture, as of every other department of gardening, was rapid. This will appear from the great number of excellent authors who appeared during this period, as Miller, Lawrence, Bradley, Switzer, in the first half; and Hitt, Abercrombie, the Rev. Mr. Marshall, M'Phail, and others, in the latter part of the period. Switzer was an artist gardener and a seedsman, and laid out many excellent kitchen and fruit-gardens, and built some hot-walls and forcing-houses.

1291. *Forcing-houses and pine-stoves* appear to have been introduced in the early part of the eighteenth century: but forcing by hot-beds and dung placed behind walls of boards were, according to Switzer (*Fruit Gardener*) and Lord Bacon, in use for an unknown length of time. (See Bradley's *Treatise on Husbandry and Gardening*, 1724.)

1292. *The pine-apple*, according to Bradley, was first successfully cultivated by Sir Matthew Decker, at Richmond, in 1719. It was brought by that gentleman from Holland, where, as we have already seen, § 292, it had been introduced by De la Court from the West Indies, and cultivated in pits, in his garden near Leyden. Warner, of Rotherhithe, excelled in the culture of the vine, and raised from seed the red or Warner's Hamburg, a variety which still continues to be much esteemed.

1293. *In the last year of the seventeenth century* appeared a curious work, entitled *Fruit-walls improved by inclining them to the Horizon*, by N. Facio de Duillier, F. R. S. This work incurred the censure of the practical authors of the day; but, founded on correct mathematical principles, it attracted the attention of the learned, and of some noblemen. Among the latter was the Duke of Rutland; and the failure of the trial of one of these walls led to the earliest example which we have been able to discover of forcing grapes in England. This, Lawrence and Switzer agree, was successfully accomplished at Belvoir Castle, in 1705. Switzer published the first plans of forcing-houses, with directions for forcing generally, in his *Fruit Gardener*, in 1724.

1294. *The nineteenth century* has commenced by extraordinary efforts in horticulture. The culture of exotic fruits and forcing has been greatly extended; and while in the middle of the eighteenth century scarcely a forcing-house was met with, excepting near the metropolis, there is now hardly a garden in the most remote county, or a citizen's potagery, without one or more of them. The public markets, especially those of the metropolis, are amply supplied with forced productions; and far better pines, grapes, and melons are grown in Britain than in any other part of the world.

1295. *The London Horticultural Society*, established in 1802, has made astonishing exertions in procuring and disseminating fruits, culinary vegetables, and horticultural knowledge, and has succeeded in rendering the subject popular among the higher classes, and in stimulating to powerful exertion the commercial and serving gardeners. Provincial horticultural societies have now become general, and they have certainly given an extraordinary stimulus both to floriculture and horticulture.

SUBJECT. 2. Gardening in Scotland, in respect to its horticultural Productions.

1296. *The earliest Scottish horticulturists*, Chalmers remarks, were the abbots; and their orchards are still apparent to the eyes of antiquaries, while their gardens can now be traced only in the chartularies. A number of examples of gardens and orchards are mentioned in writings of the twelfth and thirteenth centuries: and even at this day, Mr. Neill observes, "several excellent kinds of fruits, chiefly apples and pears, are to be found existing in gardens, near old abbeys and monasteries. That such fruits were introduced by ecclesiastics cannot admit of a doubt. The Arbroath oslin, which seems nearly allied to the burr knot apple of England, may be taken as an instance; that apple having been long known all round the abbey of Aberbrothwick, in Forfarshire; and tradition uniformly ascribing its introduction to the monks. — The great care bestowed on the culture of fruits, and of some culinary herbs, by the clergy and nobility, could not fail to excite, in some degree, the curiosity and the attention of the inhabitants in general; and it may, perhaps, be said that the first impulse has scarcely spent its force; for it is thus but comparatively a short time (four or five centuries) since the cultivation of apples, pears, cherries, gooseberries, and currants, and many of the common kitchen-vegetables, was introduced into this country." (*On Scottish Gardens and Orchards*, in *Gen. Rep. of Scot.*, p. 3.)

1297. *About the beginning of the eighteenth century*, the best garden in Scotland was

that of J. Justice, at Crichton, near Edinburgh. From the year 1760 to 1785, that of Moredun claimed the priority. Moredun garden was managed by William Kyle, author of a work on forcing peaches and vines; and Dr. Duncan informs us, that the late Baron Moncrieff, its proprietor, "used to boast, that from his own garden, within a few miles of Edinburgh, he could, by the aid of glass, coals, and a good gardener, match any country in Europe, in peaches, grapes, pines, and every other fine fruit, excepting apples and pears;" these, he acknowledged, were grown better in the open air in England, and the north of France. (*Discourse to Caled. Hort. Soc.*, 1814.) It is observed, in another of Dr. Duncan's discourses to this society, that in 1817, on the 10th of June, a bunch of Hamburg grapes was presented, weighing four pounds, the berries beautiful and large. "In June," it is added, "such grapes could not be obtained at any price, either in France, Spain, or Italy." These facts are decisive proofs of the perfection to which horticulture has attained in Scotland, in spite of many disadvantages of soil, climate, and pecuniary circumstances.

1298. *The Scottish authors on this department of gardening are not numerous. The first was Reid, in the seventeenth, and the best, Justice, about the middle of the eighteenth century. In the nineteenth century, Nicol's works appeared, and a variety of other writers in the Memoirs of the Caledonian Horticultural Society.*

1299. *The nineteenth century promises greatly to increase the reputation of Scotland for gardeners and gardening, not only from the general improvement in consequence of the increase of wealth and refinement among the employers and patrons of the art, but from the stimulus of the Caledonian Horticultural Society, which, by well devised competitive exhibitions and premiums, has excited a most laudable emulation among practical gardeners of every class.*

SUBJECT. 3. Gardening in Ireland, in respect to its Horticultural Productions.

1300. *As far as respects hardy fruits and culinary vegetables, the gardens of the principal proprietors in Ireland may be considered as approaching to those of Scotland or England, as they are generally managed by gardeners of these countries; but in respect to hot-house productions, Irish gardens are far behind those of the sister kingdoms. Pine-apples were first brought to Dublin by Buller, a nurseryman there, in the reign of George II. In the neighbourhood of Kilkenny, the pine-apple seems to have been more extensively cultivated during the latter half of the past century, than it has been there, or any where else, either before or since. Robertson, an eminent nurseryman at Kilkenny, states (*Gard. Mag.*, vol. vi. p. 27.), that within ten or twelve miles of the city, he could reckon, in 1785, "a dozen gardens or more, each of which contain pine-stoves from fifty to one hundred feet in length; and other forcing-houses corresponding, well stocked, and managed by able gardeners from Kew, Hampton Court, and other places round London." About that time, the Countess of Ormond had her table regularly served through the winter with cucumbers raised in her pine-stoves, on trellises against the back wall; a practice which has been only recently introduced in the neighbourhood of London.*

SECT. IV. British Gardening, in respect to the planting of Timber Trees and Hedges.

1301. *The British isles were well stocked with timber when comparatively unpeopled with men. As population increased, culture extended itself, and forests were encroached on or eradicated, to make room for the plough or the scythe. History, as far as it goes, bears witness to this state of things in England, Scotland, and Ireland.*

SUBJECT. 1. Gardening in England, in respect to the planting of Timber Trees and Hedges.

1302. *The woods of England were so numerous and extensive when Domesday-book was compiled, as to be valued, not by the quantity of timber, but by the number of swine which the acorns and mast could maintain. Four hundred years after this, in the time of Edward IV., an eminent writer says that England was then a well-timbered country.*

1303. *Till the beginning of the seventeenth century, the subject of planting for timber and fuel seems not to have attracted much attention as an important part of the rural economy of England. Sir John Norden, in his *Surveyor's Dialogue*, published in 1607, notices the subject; as had been done before by Benese in 1598, and Fitzherbert in 1523. In 1612 was published, *Of planting and preserving of Timber and Fuel, an old Thrift newly revived*, by R. C.; and in the following year, *Directions for planting of Timber and Fire Wood*, by Arthur Standish. Planting for timber and copse is noticed in Googe's *Husbandry*, published in 1578; and is the express subject of Manwood's *Treatise on Forests, and their Original and Beginning*, published in 1598; and of Rathborne's *Surveyor*, in 1616. It is singular that so many books on this subject should have been published so near together at so early a period. The reason seems to be, as Professor*

Martyn has observed, that a material attack was made on the forests in the 27th year of the reign of Henry VIII., when that monarch seized on the church lands; and from this time the consumption of oak timber was continually increasing, not only in consequence of the extension of commerce, and of great additions to the royal navy, but because it was made more use of in building houses. This alarmed both government and individuals. Holingshead, who lived in the reign of Elizabeth, says, "that in times past men were contented to live in houses built of sallow, willow, &c.; so that the use of oak was, in a manner, dedicated wholly unto churches, religious houses, princes' palaces, navigation, &c.; but now nothing but oak is any where regarded."

1304. *In the reign of James I.*, it appears that there was great store of timber, more than proportioned to the demand. For, on a survey of the royal forests, &c. in 1608, we find that a great part of what was then intended to be sold, remained a considerable time undisposed of.

1305. *During the civil war*, in the time of Charles I., and all the time of the interregnum, the royal forests, as well as the woods of the nobility and gentry, suffered so much from neglect, that many extensive forests had, in a few years, hardly any memorial left of their existence but their names. This loss would not have operated so severely, had the principal nobility and gentry been as solicitous to plant with judgment, as to cut down their woods.

1306. *The publication of Evelyn's Sylva*, in 1664, raised a great spirit of planting, and created a new era in this as in other branches of gardening. In his dedication to Charles II., in 1678, he observes, that he need not acquaint the king how many millions of timber trees have been planted in his dominions, at the instigation, and by the sole direction, of that work. The government at that time, alarmed by the devastation which had been committed during the civil war, gave great attention to the increase and preservation of timber in the royal forests.

1307. *Tree-nurseries were first established during the seventeenth century.* Young trees, the early authors inform us, were procured from the natural forests and coopes, where they were self-sown; but about the beginning of the seventeenth century, public nursery-gardens were formed, originally for fruit trees; but towards the end, nurserymen, as we learn from Switzer and Cook, began to raise forest trees and hedge-plants from seeds. The first nursery we hear of was that of Corbett, at Twickenham, mentioned by Ben Jonson; and the next of consequence that of London and Wise, at Brompton Park, already mentioned, and still continued as a nursery. Corbett, under the name of Pointer, is mentioned by Sir Hugh Plat, and also by Gerarde. He was the father of Richard Corbett the poet, and bishop of Norwich, who also inhabited a house at Twickenham.

1308. *During the eighteenth century*, especially in the latter part, planting proceeded rapidly. The Society of Arts, &c., established in 1753, have greatly contributed, by their honorary and pecuniary rewards, to restore the spirit for planting. The republication of Evelyn's *Sylva*, in a splendid manner, by Dr. Hunter, and subsequently of different works by Kennedy, Young, Watson bishop of Llandaff, Marshall, Pontey, and others, has doubtless contributed to that desirable end; and the result is, that many thousand acres of waste lands have been planted with timber trees, independently of demesne-plantations, and such as have been made for shelter or effect.

1309. *The nineteenth century has commenced* with a much more scientific mode of planting and managing trees than formerly existed. Excellent modes of pruning have been pointed out and practised by Pontey, Monteath, Billington, Blaikie, and others, which will render future plantations much more valuable than where this operation and thinning have been so generally neglected as hitherto. At the same time, it deserves to be remarked, that the practice of close pruning large trees, introduced by some of these writers, though it has added to the bulk and exterior beauty of the timber of the trunk, has been found, on cutting down the tree, to have materially injured the timber. The wound formed by the amputation of large branches heals over, but the wood below, probably from its not being intimately united with that which grows over it, is often found to decay.

1310. *At what time hedges were introduced into England is uncertain.* They would probably be first exhibited in the gardens of the Roman governors, and afterwards re-appear in those of the monks. From these examples, from the Roman authors on husbandry, or more probably from the suggestion of travellers who had seen them abroad, they would be introduced in rural economy. Marshall conjectures, that clearing out patches in the woods for aration, and leaving strips of bushes between them, may have given the first idea of a hedge; and this supposition is rendered more plausible, from the circumstance of some of the oldest hedges being in very irregular lines, occupying much space, and consisting of a variety of plants. However originated, they did not come into general use in laying out farms till after the Flemish husbandry was introduced in Norfolk, about the end of the seventeenth century. (*Ken's Hints, &c.*) So rapidly have they increased since that period, that at the end of the eighteenth cen-

tury they had entirely changed the face of the country. In the time of George I. almost every tract of country in England might have been said to consist of four distinct parts or kinds of scenery:—1. The houses of the proprietors, and their parks and gardens, and the adjoining village, containing their farmers and labourers; 2. The common field or intercommonable lands in aration; 3. The common pasture, or waste, untouched by the plough; and, 4. The scattered or circumscribing forest, containing a mass of timber or copse. But at present these fundamental features are mixed and variously grouped, and the general face of the country presents one continual scene of garden-like woodiness, interspersed with buildings and cultivated fields, unequalled in the world.

1311. *The oldest enclosures in England* are in Kent and Essex, and seem to have been formed of hawthorn, aloe, crab, hazel, dogwood, &c. taken from the copses, and planted promiscuously; but now almost all field or fence hedges are formed of single or double rows of hawthorn, with or without trees planted at regular distances to shoot up for timber.

SUBJECT. 2. *Gardening in Scotland, in respect to the planting of Timber Trees and Hedges.*

1312. *Scotland in ancient times was clothed with extensive tracts of wood.* (Graham, in *Gen. Rep. of Scot.*, vol. ii.) By various operations carried on by the hand of nature and of man, this clothing has been in a great measure destroyed. The attempts to restore it by planting timber, however, appear to be of recent origin. Dr. Walker seems to be of opinion that the elder (*Sambucus nigra*) was the first barren tree planted in Scotland; and that the plane or sycamore was the next. The wood of the former was in much request for making arrows. "A few chestnuts and beeches," he adds, "were first planted in gardens not long before the middle of the seventeenth century, some of which have remained to our times." Notwithstanding this high authority, however, there seems to be good reason to conclude that some trees which still exist were planted before the Reformation; they appear to have been introduced by the monks, being found for the most part in ecclesiastical establishments. Such are the Spanish chestnuts, the most of which are still in a thriving condition in the island of Inchmahoma, in the lake of Monteith, in Perthshire, where there was a priory built by David I. Some of these chestnut trees measure within a few inches of eighteen feet in circumference, at six feet from the ground. They are probably three hundred years old, or upwards. There are planted oaks at Buchanan, which are apparently of the same age.

1313. *The father of planting in Scotland*, according to Dr. Walker, was Thomas earl of Haddington, having begun to plant Binning Wood, which is now of great extent and value, in 1705. But it is stated on an authority almost approaching to certainty, that the fine timber in the lawn at Callender House, in Stirlingshire, was planted by the Earl of Linlithgow and Callender, who had accompanied Charles II. in his exile, upon his return from the Continent after the Restoration. This timber is remarkable, not only for its size, but for its quantity. Planting for timber became very general in Scotland between the years 1730 and 1760, by the exertions and examples of Archibald duke of Argyle, the Duke of Athol, the Earls of Bute, Loudon, Hyndford, and Panmure, Sir James Nasmyth, Sir Archibald Grant, Fletcher of Saltoun, and others. It is well ascertained that Sir Archibald Grant began to plant in 1719.

1314. *A great stimulus to planting in Scotland* was given by the *Essays* of Dr. Anderson, published in 1784, in which the value of the larch tree, and the progress it had made at Dunkeld, since planted there in 1741, were pointed out. The examples and writings of Lord Kames also contributed to bring this and every description of rural improvement into repute; but the high price of timber during the war produced the most sensible effect as to planting.

1315. *The first two tree-nurseries in Scotland* were established at Edinburgh, about the beginning of the eighteenth century, by Malcolm, at the Water Gate, and Gordon, at the Fountain Bridge. To these succeeded a considerable one by Anderson and Leslie, about 1770. Leslie contributed to render the larch popular, and was the first nurseryman who ventured to erect a green-house. Since this period, tree-nurseries are nearly as common in Scotland as in England.

1316. *Hedges were introduced into Scotland*, by some officers in Cromwell's army, about the middle of the seventeenth century. The first were planted at Inch Buckling Brae, in East Lothian, and at the head of Loch Tay, in Perthshire. The former hedge was in existence in 1804, and then consisted of a single row of old hawthorns. Hedges are now general in all the low and tolerably fertile and sheltered parts of the country; contributing with the plantations to ameliorate the climate, and greatly to improve the scenery. (*Farm. Mag.*)

SUBJECT. 3. *Gardening in Ireland, in respect to the planting of Timber Trees and Hedges.*

1317. *Trees appear to have covered Ireland in former times.* "Though in every part of Ireland, in which I have been," observes A. Young in 1777 (*Tour*, vol. ii. 9d edit.), "one hundred contiguous acres are not to be found without evident signs that they were once wood, at least very well wooded; yet now the greatest part of the kingdom exhibits a naked, bleak, dreary view, for want of wood, which has been destroyed for a century past with the most careless prodigality, and still continues to be cut and wasted. The woods yet remaining are what in England would be called copse. The gentlemen in that country are much too apt to think they have got timber, when in fact they have got nothing but fine large copse-wood." Shaw Mason, in a *Statistical Survey of Ireland*, lately published, says there were natural woods in some places in James II.'s time; but he produces very few instances of artificial plantations of full growth, and none of older date than the middle of the seventeenth century, when it appears, that through the instigation of Blythe and other officers in Cromwell's army, some gentlemen began to plant and improve. The late Lord Chief Baron Foster was the greatest planter when A. Young visited Ireland, and his lordship informed the tourist that the great spirit for this sort of improvement began about 1749 and 1750. "Tradition," says Hayes, "gives the oak of Shillela, in the county of Wicklow, the honour of roofing Westminster Hall, and other buildings of that age; the timbers which support the leads of the magnificent chapel of King's College, Cambridge, which was built in 1444, as also the roof of Henry VIII.'s Chapel at Westminster Abbey, are said to be oak from these woods. It is generally understood that some of the finest timber of Shillela, which remained in Charles II.'s time, was sold to the Dutch, and sent into Holland, for the use of the Stadthouse and other buildings. In 1669, William earl of Strafford furnished Laurence Wood, of London, with such pipe-staves, to a great amount, at 10*l.* for 1000, as are now sold for 50*l.*, and are only to be had from America. (*Treatise on Planting, &c.*)

1318. *Hedges*, as fences, were probably, as in Scotland, introduced by the officers of Cromwell's army.

SECT. V. *British Gardening, as empirically practised.*

1319. *The use of gardens* is perhaps more general in England and Scotland than in any other country, if we except Holland. The laborious journeyman mechanic, whose residence, in large cities, is often in the air, rather than on the earth, decorates his garret-window with a garden of pots. The debtor deprived of personal liberty, and the pauper in the workhouse, divested of all property in external things, and without any fixed object on which to place their affections, sometimes resort to this symbol of territorial appropriation and enjoyment. So natural it is for all to fancy they have an inherent right in the soil; and so necessary to happiness to exercise the affections, by having some object on which to place them.

1320. *Almost every cottage in England has its appendant garden*, larger or smaller, and slovenly or neatly managed, according to circumstances. In the best districts of England, the principal culinary vegetables, some salads, herbs, flowers, and fruits, are cultivated; and in the remote parts of Scotland, at least potatoes and borecoles are planted. Tradesmen and operative manufacturers, who have a permanent interest in their cottages, have generally the best cottage-gardens; and many of them, especially at Norwich, Manchester, and Paisley, excel in the culture of florists' flowers.

1321. *The gardens of farmers* are larger, but seldom better managed, than those of the common cottages, and not often so well as those of the operative manufacturers in England. They are best managed in Kent and in East Lothian.

1322. *The gardens and grounds of citizens*, who have country-houses, may be, in size, from an eighth of an acre to a hundred acres or upwards. Such a latitude, it may easily be conceived, admits of great variety of kitchen-gardens, hot-houses, flower-gardens, and pleasure-grounds. They are, in general, the best managed gardens in Britain, and constitute the principal scenery, and the greatest ornament of the neighbourhood of every large town. Those round the metropolis, Liverpool, and Edinburgh, are pre-eminent.

1323. *The gardens of independent gentlemen of middling fortune* vary considerably in dimensions. Few of the kitchen-gardens are under an acre, the flower-gardens may contain a fourth or a third of an acre, and the pleasure-ground from three to ten or twelve acres. The lawn or park varies from thirty or forty to three or four hundred acres. The whole is in general respectably kept up, though there are many exceptions, arising from want of taste, of income, or engagement in other pursuits on the part of the proprietor; or restricted means, slovenliness, and want of taste and skill in the head-gardener. These gardens abound in every part of every district of Britain, in proportion to the agricultural population.

1324. *The first-rate gardens of Britain* belong chiefly to the extensive landholders; but in part also to wealthy commercial men. The kitchen-gardens of this class may include from three to twelve acres, the flower-garden from two to ten acres, the pleasure-ground from twenty to one hundred acres, and the park from five hundred to five thousand acres. Except in the cases of minority, absence of the family, or pecuniary embarrassments, these gardens are kept up in good style. They are managed by intelligent head-gardeners, with assistants for the different departments, and apprentices and journeymen as operatives. A few of such residences are to be found in almost every county of England, in most of those in Scotland, and occasionally in Ireland.

1325. *The royal gardens of England* cannot be greatly commended; they are in no respect adequate to the dignity of the kingly office. That at Kew has been already mentioned as containing a good collection of plants; but neither this nor any of the other royal gardens are at all kept in order as they ought to be, not on account of want of skill in the royal gardeners, but for want of support from their employers. The superintendence of the royal gardens are now (1833) in other hands than the gardeners'.

1326. *Gardens, parks, or promenades, for public recreation*, as we have seen (§ 1195.), are not very common in Britain; but of late an extensive equestrian ride, or drive, has been formed in London in the Regent's Park, and one at Edinburgh on the Calton Hill, which commands a singular variety of prospect. There are also squares and other walks, and equestrian promenades, in the metropolis and other large towns; but, in respect to this class of gardens, they are much less in use in Britain than on the Continent; for Britons are comparatively domestic and solitary animals.

1327. *Of gardens for public instruction*, there are botanic gardens attached to the principal universities, and experimental gardens belonging to the London and Edinburgh horticultural societies.

1328. *Commercial gardens* are very numerous in Britain, arising from the number, magnitude, and wealth of her cities being much greater, in proportion to the territorial extent of the country, than in any other kingdom. In general, they have been originated by head-gardeners, who have given up private servitude.

1329. *Market-gardens and orchards* are numerous, especially round the metropolis, and their productions are unequalled, or at least not surpassed, by any gardens in the world, public or private. Forcing is carried on extensively in these gardens, and the pine cultivated in abundance, and to great perfection. Their produce is daily exposed in different markets and shops; so that every citizen of London may, throughout the year, purchase the same luxuries as the king or as the most wealthy proprietors have furnished from their own gardens, and obtain for a few shillings what the wealth of Croesus could not procure in any other country! a striking proof what commerce will effect for the industrious. Some gardens are devoted to the raising of garden-seeds for the seed-merchants, and others to the growing of herbs and flowers for the chemist or distiller.

1330. There are *florists' gardens*, where plants are forced so as to furnish roses and other flowers of summer in mid-winter. The tradesman's wife may thus at pleasure procure a drawing-room garden equal to that of her sovereign, and superior to that of all the kings and nobles on the rest of the globe.

1331. *Of nursery-gardens* for stocking and forming new gardens and plantations, and repairing or increasing the stock of old ones, there are a number in which a very considerable capital is embarked. These have greatly increased with the increasing spirit for planting, and other branches of gardening. The principal are near the metropolis; but they are to be found in most districts, originated in almost every case by head-gardeners, whose capital consists of the savings made during their servitude.

1332. *Bees*, being frequently kept in gardens, are managed by the gardener. They are commonly kept in straw hives, and treated with little art; but some amateurs use hives of peculiar forms, and adopt corresponding systems of management.

1333. *Ice*. Every country residence has its ice-house, and that also, being commonly in the park or pleasure-ground, is under the care of the gardeners.

1334. *The operative part of gardening* is carried on by labourers, apprentices, journeymen, and masters. The labourers are, women for weeding, gathering some descriptions of crops, and other light works; and men for assisting in the heavier operations in extraordinary seasons. The permanent sub-operatives are the apprentices and journeymen; the former are indentured generally for three years, at the expiration of which they become journeymen, and after a few years' practice in that capacity, in different gardens, they are considered qualified for being masters, or taking the charge of villa, private, or first-rate gardens, according to their capacity, education, and assiduity, and the class of gardens in which they have studied and practised.

1335. *Formerly there were lodges, or societies of gardeners*, and a sort of mystic institution and pass-word kept up, like those of the German gardeners and masons; but

within the last fifty years this has been in most places given up. The use of books, and the general progress of society, render such institutions useless in point of knowledge and hospitality, and injurious politically, or in respect to the market value of labour. (*Preston's History of Masonry*.)

1336. *The head-gardeners of Britain* are universally allowed to be the most intelligent and trustworthy part of the operatives of any branch of rural economy, and the most faithful and ingenious of those who constitute the serving establishment of a country residence. Those of Scotland are by many preferred, chiefly, perhaps, from their having been better educated in their youth, and more accustomed to frugality and labour. "Scotland," Neill observes, "has long been famous for producing professional gardeners; perhaps more so than any other country, unless we except Holland, about a century ago. At present, not only Great Britain, but Poland and Russia, are supplied from Scotland; and the numbers of an inferior class to be found in every part of England and Ireland are quite astonishing." (*Gen. Rep. &c.*, chap. ii.) Lord Gardenstone (*Travelling Memoirandum*, 1790) says, that in every country in Europe, he found gardeners more sober, industrious, and intelligent, than other men of a like condition in society.

1337. *The use of gardens in Ireland* is of a very limited description; and the gardens there, of all the classes, are greatly inferior to the corresponding classes in Britain. A few exceptions may be made in favour of the Dublin botanic gardens, and those of one or two wealthy citizens and extensive proprietors; but the cottage-gardens, in many districts, contain nothing besides potatoes; and potatoes are the chief ingredients in the gardens of private gentlemen. Parnel, Wakefield, and Curwen have ably shown that, till wheaten bread and meat take place of these roots, no great improvement can be expected among the lower classes of Ireland. "Where the habitation itself is so wretched," observes Bicheno, "the ornament of a garden is not to be expected. No rose or woodbine twines around the door, with some warbling bird suspended near; nor is there the least plot appropriated to flowers. The houses of the more wealthy are remarkably deficient in this respect, although they have a milder climate than England, and might easily preserve the choicest plants. The lady even does not indulge in a few pots of rarities at her window. The disinclination of farmers to become gardeners admits of explanation,—they are gardeners on a larger scale; but, that persons otherwise occupied should not be cultivators, is less easy of solution." (*Ireland and its Economy*, &c.)

1338. *The artists or architects of gardens, in Britain*, are of three classes. First, head-gardeners, who have laid out the whole or part of a residence, under some professor, and who commence artist or ground workmen, as this class is generally denominated, as a source of independence. Such was Brown, White, &c. Secondly, architects who have devoted themselves chiefly to country buildings, and, thus acquiring some knowledge of country matters, and the effects of scenery, combine with building the laying out of grounds, depending for the execution of their ideas on the practical knowledge of the gardener *pro tempore*. This class are commonly called ground-architects. Such was Kent. Thirdly, artists who have been educated and apprenticed, or otherwise brought up entirely or chiefly for that profession. These are often called landscape-gardeners; but the term is obviously of too limited application, as it refers only to one branch of the art. Such were Bridgman, Emes, &c.

SECT. VI. *British Gardening, as a Science, and as to the Authors it has produced.*

1339. *Those superstitious observances* attendant on a rude state of society retained their ground in British gardening till the end of the seventeenth century. Meager, Mascal, Worlidge, and the authors who preceded them, regulate the performance of horticultural operations by the age of the moon. Turnips or onions, according to these authors, sown when the moon is full, will not bulb, but send up flower-stalks; and fruit trees planted or grafted at that season will have their period of bearing greatly retarded. We heard in Scotland, about 1795, the same doctrine as to turnips and onions mentioned by an old market-gardener. A weak tree is to be pruned in the increase, and a strong tree in the wane of the moon. Quintinye seems to have been the first to oppose this doctrine in France, and through Evelyn's translations of his *Complete Gardener*, he seems to have overturned it also in England. "I solemnly declare," he says, "that, after a diligent observation of the moon's changes for thirty years together, and an enquiry whether they had any influence in gardening, the affirmative of which has been so long established among us, I perceived that it was no weightier than old wives' tales, and that it had been advanced by unexperienced gardeners. I have, therefore, followed what appeared most reasonable, and rejected what was otherwise: in short, graft in what time of the moon you please, if your graft be good, and grafted on a proper stock, provided you do it like an artist, you will be sure to succeed. In the same manner, sow what sorts of grain you please, and plant as you please, in any quarter of the moon, I'll answer for your success, the first and last day of the moon being equally favourable."

1340. *The influence of Dacon's writings* produced the decline and fall of astrology, in

the beginning of the eighteenth century. A different mode of studying the sciences was adopted. Vegetable physiology and chemistry (the first a new science, and the latter degraded under the name of alchemy) began to be studied, and the influence of this dawn of intellectual day was felt even in agriculture and gardening.

1341. *The practice of forcing fruits and flowers*, which became general about the middle of the century, led gardeners to reflect on the science of their art, by bringing more effectually into notice the specific influence of light, heat, air, water, and other agents of vegetation. The elementary botanical works published about the same time, by diffusing the doctrines of Linnæus, co-operated; as did the various horticultural writers of this century, especially Miller, Bradley, and Hill, and subsequently Anderson, Knight, and many others.

1342. *The increasing culture of exotics*, Dr. Pulteney observes, "from the beginning of the eighteenth century, and the greater diffusion of taste for the elegancies and luxuries of the stove and green-house, naturally tended to raise up a spirit of improvement and real science in the art of culture. To preserve far-fetched varieties, it became necessary to scrutinise into the true principles of the art, which ultimately must depend on the knowledge of the climate of such plant, and the soil in which it flourishes in that climate. Under the influence of such men as Sloane, the Sherards, and other great encouragers of science, gardeners acquired botanical knowledge, and were excited to greater exertion in their art."

1343. *The increased zeal for planting*, and more careful attendance to the pruning of trees, tended to throw light on the subject of vegetable wounds, and their analogy with those of animals, as to the modes of healing, though the French laugh at our ignorance on this subject (*Cours d'Agr. art. Plais*) at the close of the eighteenth century.

1344. *But the science of horticulture received its greatest stimulus from Knight*, the enlightened president of the Horticultural Society. The first of this philosopher's writings will be found in the *Philosophical Transactions* for 1795, entitled *Observations on the Grafting of Trees*. In the same *Transactions* for 1801 and 1803 are contained his ingenious papers on the fecundation of fruits, and on the sap of trees. Subsequent volumes contain other important papers; and a great number, in which science and art are combined in a manner tending directly to enlighten and instruct the practical gardener, will be found in the *Transactions of the Horticultural Society*. Through the influence of this author and that society, over which he is so worthy to preside, we see commenced an important era in the horticulture of this country; an era rendered peculiarly valuable, as transferring the discoveries of science immediately to art, and rendering them available by practitioners. How great may be its influence on the comforts and luxuries of the table, it is impossible to foresee. The introduction and distribution of better sorts of the common hardy fruits and culinary plants will tend immediately to the benefit of the humbler classes of society; and by increasing a little the size, and encouraging the culture, both ornamental and useful, of cottage-gardens, the attachment of this class to their homes, and consequently their interest in the country, will be increased. Even agriculture will derive advantages, of which, as an example, may be adduced the result of pinching off the blossoms of the potato, which, by leaving more nourishment for the root, will increase the produce (according to Knight's estimate) at least one ton per acre. (*Hort. Tr.*, vol. i. p. 190. *Treatise on the Apple and Pear*.)

1345. *Gardening, as an art of design and taste*, may be said to have been conducted mechanically, and copied from precedents, like civil architecture, till the middle of the eighteenth century; but, at this time, the writings of Addison, Pope, Shenstone, and G. Mason appeared; and in these, and especially in the *Observations on Modern Gardening*, by Whately, are laid down unalterable principles for the imitation of nature in the arrangement of garden scenery. The science of this department of the art may therefore be considered as completely ascertained; but it will probably be long before it be appropriated by gardeners, and applied in the exercise of the art as a trade. A somewhat better education in youth, and more leisure for reading in the periods usually devoted to constant bodily labour, will effect this change; and its influence on the beauty of the scenery of country residences, and on the face of the country at large, would be such as cannot be contemplated without a feeling of enthusiastic admiration. If this taste were once duly valued and paid for by those whose wealth enables them to employ first-rate gardeners, it would soon be produced. But the taste of our nobility does not, in general, take this turn, otherwise many of them would display a very different style of scenery around their mansions.

1346. *Britain has produced more original authors on gardening than any other country*. It may be sufficient here to mention, in the horticultural department, Miller and Justice; in floriculture, Parkinson and Maddocks; in planting, Evelyn and Nicol; and in landscape-gardening, G. Mason and Whately.

CHAP. V.

Of the present State of Gardening in Ultra-European Countries.

1347. *The gardens of the old continents* are either original, or borrowed from modern Europe. With the exception of China, the gardens of every other country in Asia, Africa, and America may be comprised under two heads: the aboriginal gardens, displaying little design or culture, except in the gardens of rulers and chiefs; and the gardens of European settlers, displaying something of the design and culture of their respective countries. Thus, the gardening of the interior of Asia, like the manners of the inhabitants, is the same, or nearly the same, now, that it was 3000 years ago; that of North America is British; and that of almost all the commercial cities in the world except those of China, is European, and generally either Dutch, French, or English. We shall notice, in succession, the principal countries in Asia, Africa, America, and Australia.

SECT. I. *Of the present State of Gardening in Asia.*

1348. *Gardening in Asia*, as an art of design and taste, is the same as it ever has been within the records of human knowledge. It differs chiefly from that of Europe in the absence of turf, and of open gravel walks; the heat of the climate preventing the growth of the one, and rendering unsuitable the use of the other. The outlines of a garden, nearly 3000 years ago, coincide with the gardens formed in the same countries at the present day. Maundrell in the fourteenth century, Chardin in the seventeenth, Russell in the eighteenth, and Morier in the nineteenth centuries, enumerate the same trees and plants mentioned by Moses, Diodorus, and Herodotus, without any additions. The same elevation of site for the palace (*fig. 247.*), the same terraces in front of it, and



the same walls and towers surrounding the whole for security, still prevail as in the time of Solomon and his successors. As an art of culture, the gardening of Asia, like that of all hot countries, is characterised by the use of surface irrigation. We shall notice the different countries in the order of Asia Minor, Persia, Arabia, Hindostan, Ceylon, the Birman empire, Java, Malacca, Siam, Cochinchina, Singapore, Japan, and the Chinese empire.

SUBSECT. 1. *Of the present State of Gardening in Asia Minor, &c.*

1349. *The garden of the Emir Facardine, at Beroot*, is described by Maundrell as a large quadrangular spot of ground, divided into sixteen lesser squares, four in a row, with walks between them, and planted with citron trees. Each of the lesser squares was bordered with stone, and in the stonework were troughs, very artificially contrived for conveying the water all over the garden, there being little outlets cut at every tree, for the stream, as it passed by, to flow out and water it. On the east side were two terrace walks, rising one above the other; each having an ascent to it of twelve steps. At the north end they led into booths and summer-houses, and other apartments very delightful. (*Journey from Aleppo to Jerusalem at Easter*, p. 40.)

1350. *The gardens of Damascus* are described by Egmont and Heyman as perfect paradises, being watered with copious streams from Lebanon; and in the *Account of the Ruins of Balbec*, the streams are said to be derived from Libanus and Anti-Libanus; and the shades of the palms and elms are described as exquisite in that burning climate. The time of the singing of birds is mentioned in *Solomon's Song* as a season of great pleasure; and then, as now, they no doubt constituted a material article in fine gardens. Russel observes, that "in Syria there are abundance of nightingales, which not only afford much pleasure by their songs in the gardens, but are also kept tame in the houses, and let out at a small rate to divert such as choose it in the spring; so that no entertainments are made in this season without a concert of these birds." (*Natural History of*

Alleppe, p. 71.) William de Bouldesall, who wrote an account of his peregrinations in the East in 1381, visited the monastery of St. Catherine at the foot of Mount Sinai, and was delighted with its gardens and scenery. At Damascus he was astonished at the splendour of the gardens which surrounded that city, which, he says, amounted to 40,000. In crossing the mountains to Sidon, Buckingham met at least fifty mules laden with myrtle for the supply of families in Damascus to strew on the graves of their deceased friends. He was told that a similar caravan went every month. (*Travels among the Arab Tribes*, p. 408.) The same traveller informs us that Lady Hester Stanhope, who resides in Syria, has her summer residence at Mount Lebanon, and her winter one in the convent of St. Elias, near Seyda, the ancient Sidon. In the latter she has turned one of the courts of the convent into an English flower-garden; and into this garden all the doors of her living-rooms open. (*Ibid.*, p. 421.) Near Vostiza, the Ægium of the ancients, on the beach of the stream Selinus, Hobhouse found "the enormous plane tree, which was notorious in the time of Chandler. One of its largest branches, as thick as the trunk of most trees, has lately fallen off; and many of the other boughs are supported by long beams of wood." (*Journal of Travels in Albania*, &c., p. 229.) The same tree is described by Buckingham as being fifteen feet in diameter, and 100 feet in height, and as being covered with rich and exuberant foliage.

1351. *The famous cedars of Mount Lebanon* are thus mentioned by Buckingham:—"Leaving Biskerry on our right, we ascended for an hour over light snow, until we came to the Arz-el-Libenein, or the cedars of Lebanon. These trees form a little grove by themselves, as if planted by art, and are seated in a hollow, amid rocky eminences all round them, at the foot of the ridge which forms the highest peak of Lebanon. There are, I should think, at present, about 200 in number, all fresh and green. They look, on approaching them, like a grove of firs; but, on coming nearer, are found to be in general much larger, though the foliage still keeps its resemblance. There are about twenty that are very large, and, among them, several from ten to twelve feet in diameter at the trunk, with branches of a corresponding size, each of them like large trees extending outward from the parent stock, and overshadowing a considerable space of ground." (*Travels among the Arab Tribes*, p. 475.)

1352. *Asiatic cemeteries* are almost always without the walls of the towns, and are planted with fine trees, generally cypresses. The custom of strewing the graves with flowers and aromatic shrubs, or planting them near the tombs, is also nearly universal.

1353. *The cemetery at Damascus* is very extensive. The tombs are formed with great care, and are finished with extraordinary neatness. At the foot of each grove is enclosed a small earthen vessel, in which is planted a sprig of myrtle, regularly watered every day by the friends of the deceased. Buckingham saw twenty or thirty females watering the myrtles, and strewing flowers on the graves. (*Travels among the Arab Tribes*, p. 316.)

1354. *The cemeteries of Tarabulus* are nearly as extensive as those of Damascus, though the population of the town does not exceed 10,000. The tombs are handsomer than those at Damascus, and more in the true Turkish style of Constantinople and Smyrna: all are daily furnished with myrtle, freshly watered, and visited and strewed with flowers by the female relatives and friends. (*Ibid.* p. 463.)

1355. *Gardening in Asia Minor, &c., as an art of culture*, appears to have attained considerable eminence from an early period. The largest bunch of grapes which we read of in history (Num. xiii. 23.) was raised in that country; and the figs of Smyrna have been celebrated from time immemorial. Pliny says that the Syrians were excellent gardeners, and took such pains, and were so ingenious in cultivating their grounds, as to give rise to a Greek proverb to that effect. (*Nat. Hist.*, b. xx. c. 51.) "The gardens," says Buckingham, "that surround the city of Damascus on the north, the fine olive-grounds and long avenues of trees to the south, the numerous villages on the east, and the great suburb of Salheyah, with the thronged public way that leads to it, on the west, added to the sombre but rich and thickly planted cypresses, the slender poplars, the corn grounds, and the rivers and streams which so abundantly water the whole, give to this charming spot a character becoming a scene in fairy-land." (*Travels among the Arab Tribes*, p. 305.) In the neighbourhood of Damascus is a plain celebrated for its roses, which are there cultivated extensively for the purpose of producing tarts, cakes, and the celebrated attar (oil) of roses. This plain forms part of the great plain of Syria: it is about three miles from Damascus, and its entire area is thickly planted with rose trees, which are cultivated and irrigated with great care. A writer in the *New Monthly Magazine* (No. lxxix. p. 434.) observes, that one of the best tarts he ever tasted was composed of nothing but rose-leaves, and that no conserves are so exquisite as those made in the neighbourhood of Damascus from dried cakes of roses. The environs of Tarabulus, near Mount Lebanon, are chiefly laid out in gardens, in which orange and lemon trees abound. A fine stream flows at the foot of the hill behind the castle, and discharges itself into the sea. Behind the castle is a coffee-house, visited as a place of recreation to enjoy the sound of the water, the verdure, and the shade. (*Ibid.*, p. 462.)

The northern portion of the ancient walls of Antioch is now filled with one extensive wood of gardens, chiefly olive, mulberry, and fig trees; and along the winding banks of the river are seen tall and slender poplars. (*Bramsen's Letters, &c.*) The environs of Jaffa are very fertile, and are adorned with many fine gardens, which produce quantities of dates, lemons, citrons, oranges, grapes, water-melons, and vegetables. (*Ibid.*, p. 562.) The plain of Rama is the most fertile part of the Holy Land; but the environs of Jerusalem are barren. (*Ibid.*) The musselim, or governor, of Smyrna has, for his summer residence, a house in the midst of a spacious garden; and many acres of the adjoining grounds, belonging to the principal Franks, are laid out in the same manner, abounding with almost every species of fruit of the finest quality. The figs in these gardens, which are eaten when green, and their grapes, so much prized in Europe, are not more delicious than their citrons, lemons, oranges, pomegranates, and melons. (*Hob. Alb.*, p. 629.) The neighbourhood of Smyrna is laid out in a variety of extensive gardens, apparently well kept, and stocked with abundance of fruit. (*Bram. Letters.*) Macfarlane found the constant mention of the fig trade, at Smyrna, an annoyance nearly as vexatious as the mosquitoes. (*Travels to Constantinople*, p. 64.) The constant subject of conversation at Smyrna is figs. (*Madden's Turkey*, p. 147.)

SUBJECT. 2. *Of the present State of Gardening in Persia.*

1356. *The gardens of the Persians*, observes Sir John Chardin, in 1686, "consist commonly of a grand alley or straight avenue in the centre, planted with plane (the zinaar, or chenar of the East), which divides the garden into two parts. There is a basin of water in the middle, proportionate to the garden, and two other lesser ones on the two sides. The space between them is sown with a mixture of flowers in natural confusion, and planted with fruit trees and roses; and this is the whole of the plan and execution. They know nothing of parterres and cabinets of verdure, labyrinth, terraces, and such other ornaments of our gardens. The reason of which is, that the Persians do not walk in their gardens as we do; but content themselves with having the view of them, and breathing the fresh air. For this purpose they seat themselves in some part of the garden as soon as they come into it, and remain there till they go out." According to the same author, the most eastern part of Persia (Hyrcania) is one entire and continued parterre from September to the end of April. "All the country is covered with flowers; and this is also the best season for fruits; since, in the other months, they cannot support the heat and unhealthy state of the air. Towards Media and the northern frontiers of Arabia, the fields produce of themselves tulips, anemones, single ranunculuses of the most beautiful red, and crown imperials. In other places, as around Ispahan, jonquils are wild, and flower all the winter. In the season of narcissus, seven or eight sorts spring up among lilies (*Lilium candidum*), lily of the valley, violets of all colours, gillyflowers, and jasmines, all of an odour and beauty far surpassing those of Europe. But nothing can be more beautiful than the peach trees, so completely covered with flowers as to obstruct the view through their branches." Morier mentions the garden of Azar Gerib, in Ispahan, as extending a mile in length, and being formed on a declivity divided into twelve terraces, supported by walls, each terrace divided into a great number of squares. This garden is devoted to the culture of the most esteemed Persian fruits. The neighbourhood of Bushire was formerly famous for its gardens; but Morier informs us, "that in the whole territory of Bushire, at this day, there are only a few cotton bushes (*Acacia Julibrissin*); here and there date-trees; now and then a konar tree (a palm), with water-melons, beringauts (gourds), and cucumbers." These date trees, the towers, and the presence of camel-drivers, gave this town, when Morier saw it, a truly Persian appearance. (Fig. 248.)



1357. "The prevailing plan of Persian gardens," says Sir R. K. Porter, "is that of long parallel walks, shaded by even rows of tall umbrageous planes, interspersed with a

variety of fruit trees, and every kind of flowering shrub. Canals flow down the avenues in the same undeviating lines, and generally terminate in some large marble basins of square or octagon shapes, containing sparkling fountains. Formal as this may seem, and, therefore, the reverse of picturesque, the effect was amazingly grand. The number of avenues and canals formed so extended a sylvan scene, that, when viewed from any point, it appeared a vast wood, with thousands of brilliant rills gliding amongst thickets." On these passages, G. L. Meason observes, "that the Persians are not content with one fountain in a canal or basin, but often have many small low jets, to keep the whole surface of the water in agitation, and to heighten the sparkling effects through the foliage. Would not," he asks, "a small canal near an European mansion, thus managed, and surrounded with overhanging evergreen and other shrubs, become a most interesting part of home scenery?" (*Landscape Architecture of Italy*, p. 85.) According to Fraser, Persian gardens have little variety. Those of Masanderan, when he saw them in 1829, were fast hastening to decay. (*Travels in Persia*, p. 46.)

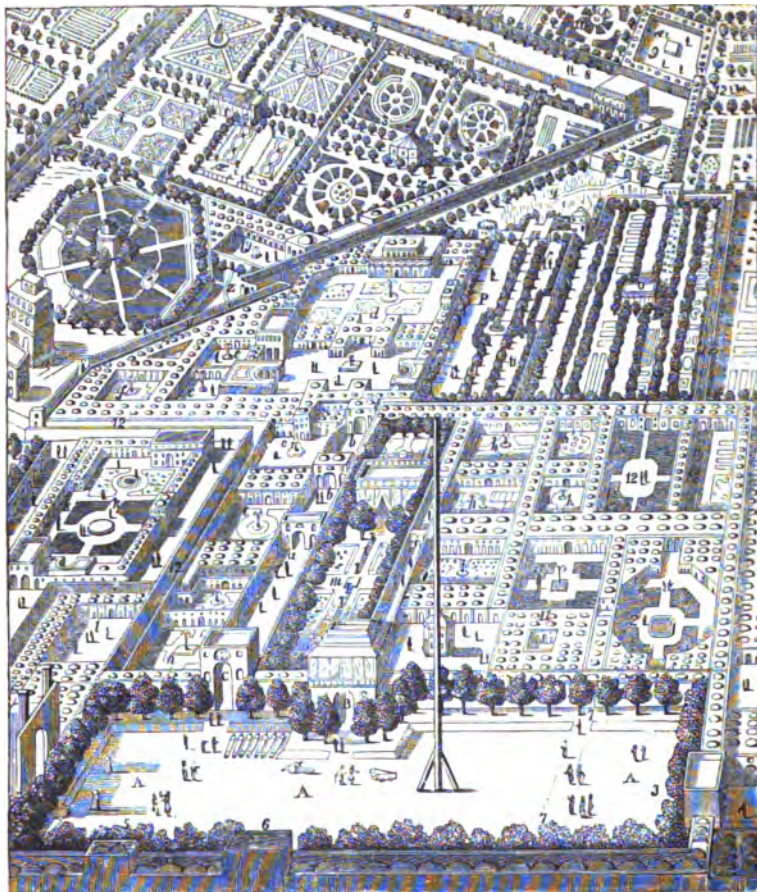
1358. *The gardens of Persia* are said to vie in beauty and luxuriance with any in the universe; and to them the Persians devote their principal attention. When Mirza Abul Hasan was ambassador to the British court, one of his greatest satisfactions arose from occasionally walking, unattended, in Kensington Gardens.

1359. *The palaces and gardens of Ispahan.* Most of the houses of the Persian citizens are built so as to combine pleasure with domestic seclusion: for the first purpose, they have contrived to have near them shrubberies, shade, water, flowers, and, in short, every thing that can gratify the senses; and, for the latter, they divide the house into two distinct parts. The first of these divisions is called the diwaan, and is devoted for the reception of guests, &c.; while the other, which is called the haram, is devoted exclusively to the use of the female part of the family. In the principal palace of the king of Persia (built by Ahasius the First) the diwaan consists of several small palaces, or rather pavilions, fitted up with numerous recesses and sofas, with one larger than the rest, containing a noble hall for the celebration of convivial entertainments. The haram consists of a number of dark buildings, in the figure of a polygon; and, to conceal the females it contains, effectually from the public eye, its gardens are surrounded by a wall thirteen fathoms high. The relative position of the different parts of the palace, and its numerous gardens, will be seen in the plan (fig. 249.):—

1360. *The gardens of Kerim Khan* are thus described by Morier:—"An immense wall, of the neatest construction, encloses a square tract of land, which is laid out into walks shaded by cypress and chenar (*Platanus*), and watered by a variety of marble canals, and small artificial cascades. Over the entrance, which is a lofty and arched passage, is built a pleasure-house. In the centre of the garden is another of the principal pleasure-houses. There is a basin in the middle of the principal room, where a fountain plays, and refreshes the air, &c. The whole soil of this garden is artificial, having been excavated from the area below, and raised into a high terrace. The garden is now falling into decay; but those who saw it in the reign of Kerim Khan delight to describe its splendour, and do not cease to give the most ravishing pictures of the beauty of all the environs of his capital." (*Journey to Persia*, 1812, p. 206. *Johnson's Journey from India*, 1817, chap. v.)

1361. *Trees and bushes* appear to have been held in superstitious veneration in these countries as early as the time of Moses, of which the story of the burning bush may be adduced as a proof. There are many other instances, mentioned in the Jewish writings, of attachment to trees, and especially to the oak and plane. Morier, Johnson, and Sir William Ouseley (*Embassy*, &c., vol. i.), describe the Persians as often worshipping under old trees in preference to their religious buildings. The chenar, or plane, is greatly preferred. On these trees the devotees sacrifice their old clothes by hanging them to their branches, and the trunks of favourite trees are commonly found studded with rusty nails and tatters. (*Sir William Ouseley, App.*, 1819.) Groves of trees are equally revered in India, and are commonly found near the native temples and burial-places of the princes.

1362. *Cemeteries.* There are said to be 1001 mausoleums at Shiraz; those of Chodja Hafiz and Saadi Sjeraft (both celebrated poets) are the most beautiful. The burial-place of the first is situated at Muselli, an estate possessed by Hafiz, who, it is remarked, was not buried by the nation, but had the expenses of his funeral defrayed out of his own private fortune. His cemetery is square and spacious, shaded by poplars (a rare tree in Persia), and having a lion carved in stone on each side of the entrance. The wall is built of brick, and coincides in direction with the cypress trees of the surrounding garden. The ground is strewn with tombstones, and divers sepulchral memorials of those who had desired to be buried under the guardian influence of the poet. Entering from the neighbouring garden which was bequeathed to the cemetery, the keeper conducts a stranger into the place of the sepulchre. This is surrounded by lattice-work, and contain three tumuli besides the grave of the poet; one encloses the remains of a secular prince,



- A. The great court before the palace.
 B. Entrance gate to the diwan.
 C. Entrance gate of the gallery, leading to the gymnasium or apartment of the women, guarded by a strong band of soldiers.
 d. Second gate leading to the harem, guarded on the outside by the sophi of the gatekeepers, and within by a band of black eunuchs.
 e. The third and fourth gates of the gymnasium, guarded by white eunuchs.
 f. House and gardens of the eunuchs.
 g. Residence and gardens of the royal wives.
 h. Houses and gardens of the concubines.
 i. House and miscellaneous apartments for the royal children.
 j. House of the king's mother.
 k. Various pavilions for books and refreshments.
 l. The royal kitchen.
 m. Workshops and exhibition rooms of the royal jewellers, goldsmiths, and watchmakers.
 n. Sanctuary.
 o. Garden of the hostelry.
 p. Garden of the chief chamberlain.
 q. Garden of the Forty Columns.
 r. Garden of secret admission.
 s. Vineyards.

- r. Rosary, with house annexed.
 s. Garden of the butterfly.
 t. Garden of the lark, or the eighth paradise.
 u. Enclosed way.
 v. Place for forty horses for the royal riding.
 w. Residence of the masters of the horse.
 x. Stables and houses for grooms.
 y. Hydraulic machine for supplying water to the gymnasium, 1. House for settling accounts, deciding suits, &c.
 2. Royal karavansera (place of hospitality for strangers).
 3. Entrance to Cenaria; a large house, for the display of merchandise: in the vestibule is a place for jewellery; above is a theatre for music; and on each side are places for refreshments, with a shop for the exchange of money.
 4. Gate of the principal royal temple.
 5. Temple with incruated sides.
 6. Theatre for the performance of automata.
 7. Gate of the Forum.
 8. Commencement of the royal road, called the Tajahar-beach.
 9. Karavansera.
 10. Part of the garden Musamman.
 11. Vessels (angl) of the port.
 12. Public ways; some covered, and some open. — (*Keruey's Amusements Exoticæ, &c., tom. I. rel. xiii. p. 177.*)

and the other two illustrious individuals, who, when living, were disciples of Hafiz. (fig. 250.) In the place of the sepulchre, sits a priest, who repeats verses from the Koran in praise of the illustrious dead, and enumerates their virtues; when he has finished, another, and afterwards a third, in the open burying-place, takes up the same theme; so that the lamentations are incessant. The tombs are placed in a row; and the form of all of them is the same. They are about the size of a sarcophagus, and have each a large stone, about a man's height, at both ends. The stone of which they are

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made is of a common kind, and unpolished. On each side are sculptured verses from the Koran, and, on the stones placed at the feet, are elegant epitaphs. Hafiz died A.D. 1340. (*Kämpfer's Aman. Erot., &c.*, fasc. ii. rel. vi. p. 367.)

1363. *The sepulchre of Saadi* lies at the base of a mountain, and consists of a garden, a tomb, and a fountain. The garden is neglected, and has only a few reeds growing in it. The tomb is square, and has been magnificent, but is now falling into decay. The fountain presents also the remains of a superb ornament. (*Ibid.*)

1364. *Persian gardening, as an art of culture*, is not understood to be far advanced, notwithstanding the excellence of its native productions. Nature, as Sir William Temple observes, has done too much, for art to have an adequate stimulus for exertion. Till our intercourse with North America and China, not only the finest fruits, but the most fragrant and showy flowers, were obtained from Persia. The aboriginal horticulture of these countries consists chiefly in the culture of the native fruits, the variety of which is greater than that indigenous to any other country. The peach, the palm tribe, and, in short, every fruit tree cultivated in Persia by the natives, is raised from seed, the art of grafting or laying being unknown. Water is the grand desideratum of every description of culture in this country. Without it nothing can be done, either in agriculture or gardening. It is brought from immense distances, at great expense, and by very curious contrivances. One mode practised in Persia consists in forming subterraneous channels at a considerable depth from the surface, by means of circular openings at certain distances, through which the excavated material is drawn up (*fig. 251.*); and the channels so formed are known only to those who are acquainted with the country. These conduits are described by Polybius, a Greek author, who wrote in the second century before Christ; and Morier (*Journey to Persia*)

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found the description perfectly applicable in 1814. Doves' dung, the same author observes, is in great request in Persia and Syria, for the culture of melons. Large pigeon-houses (*fig. 252.*) are built in many places, expressly to collect it. The melon

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is now, as it was 2500 years ago, one of the necessities of life, and it has been supposed that, when the prophet Isaiah, meaning to convey an idea of the miseries of a famine

foretold that a cab of doves' dung would be sold for a shekel of silver, he referred to the pigeons' dung required for the cultivation of the melon. We have elsewhere shown (§ 44.) that this appears to be a mistake. Sir John Malcolm says, that, when he was in that country (A.D. 1800), grapes were sold at less than a halfpenny a pound; while, in some provinces, fruit had scarcely a nominal value. (*Bucke's Beauties, &c. of Nature.*)

SUBJECT. 3. *Of Gardening in Arabia.*

1365. *The gardening and agriculture of Arabia* may properly be said to constitute but one art, and that art is at the lowest ebb. Although the Arabs cultivate the ground, they do not hold it in any fixed occupancy. The whole of Arabia, with some few exceptions on its boundaries, is one immense common, over which the different tribes are in continual motion. When they come, at the rainy season, to a favourable spot, they sow it, wait about three months for its growth, reap the harvest, and proceed onward. The Fellahs, or fixed cultivators, are the objects of their most profound contempt, and an alliance with them is considered as involving the deepest ignominy. (*Ed. Rev.*, and *Gard. Mag.*, vol. vii. p. 93.)

SUBJECT. 4. *Of the present State of Gardening in Hindostan.*

1366. *Of the gardening of Hindostan* we have collected various notices from travellers ancient and modern, chiefly on gardening as an art of design and taste, but partly on horticulture and floriculture.

Division i. *Gardening in Hindostan, as an Art of Design and Taste.*

1367. *The gardens of the chiefs of India*, now or lately existing, are of the same general character as those of Persia. In the gardens belonging to the Mahometan princes, which in some parts of India were made at a very great expense, a separate piece of ground was usually allotted for each kind of plant, the whole being divided into square plots, separated by walks. Thus, one plot was filled with rose trees, another with pomegranates, &c. The gardens of this sort, most celebrated in India, were those of Bangalore and Delhi. The former, belonging to Tippoo, were made by him and his father, Hyder Ali. As Bangalore is very much elevated above the sea, it enjoys a temperate climate; and in the royal gardens there were seen not only the trees of the country, but also the cypress, vine, apple, pear, and peach; both the latter produced fruit. Strawberries were likewise raised, and oaks and pine trees, brought from the Cape of Good Hope, flourished. These gardens are now in a state of decay. Some magnificent palaces and walled gardens are mentioned by Morier and other Oriental travellers; but all agree in representing their interior in a state of neglect.

1368. *The gardens of Sheikh al Jebal*, "Chief of the Mountaineers," or "Old Man of the Mountain," as he is called by Marco Polo, though at first sight they may appear to belong to the fabulous class, yet, we are assured by Mariden, really did exist, though Marco Polo's description of them be rather highly coloured, agreeably to the Persian diction. The district in which lay the residence of the Old Man of the Mountain, whose real name was Alo-eddin, obtained the name of Mulehet, signifying, in the language of the Saracens, the place of heretics. We give Marco Polo's account of these gardens below. "In a beautiful valley, enclosed between two lofty mountains, Alo-eddin had formed a luxurious garden, stored with every delicious fruit and every fragrant shrub that could be procured. Palaces of various sizes and forms were erected in different parts of the grounds, ornamented with works in gold, with paintings, and with furniture of rich silks. By means of small conduits contrived in these buildings, streams of wine, milk, honey, and some pure water, were seen to flow in every direction. The inhabitants of these palaces were elegant and beautiful damsels, accomplished in the arts of singing, playing upon all sorts of musical instruments, dancing, and especially those of dalliance and amorous allurement. Clothed in rich dresses, they were seen continually sporting and amusing themselves in the gardens and pavilions; their female guardians being confined within doors, and never suffered to appear. The object which the chief had in view, in forming a garden of this fascinating kind, was this: that, Mahomet having promised to those who should obey his will the enjoyments of Paradise, where every species of sensual gratification should be found, in the society of beautiful nymphs, he was desirous of its being understood by his followers, that he also was a prophet, and the compeer of Mahomet, and had the power of admitting to Paradise such as he should choose to favour. In order that none without his licence might find their way into this delicious valley, he caused a strong and impregnable castle to be erected at the opening of it; through which the entry was by a secret passage. At his court, likewise, this chief entertained a number of youths, from the age of twelve to twenty years, selected from the inhabitants of the surrounding mountains, who showed a disposition for martial exercises, and appeared to possess the quality of daring courage. To them he was in

the daily practice of discoursing on the subject of the paradise announced by the prophet, and of his own power of granting admission ; and at certain times he caused draughts of a soporific nature to be administered to ten or a dozen of the youths, and, when half dead with sleep, he had them conveyed to the several apartments of the palaces in the garden. Upon awakening from this state of lethargy, their senses were struck with all the delightful objects that have been described, and each perceived himself surrounded by lovely damsels, singing, playing, and attracting his regards by the most fascinating caresses ; serving him also with delicate viands and exquisite wines ; until, intoxicated with excess of enjoyment, amidst actual rivulets of milk and wine, he believed himself assuredly in paradise, and felt an unwillingness to relinquish his delights. When four or five days had thus been passed, they were thrown once more into a state of somnolency, and carried out of the garden. Upon their being introduced to his presence, and questioned by him as to where they had been, their answer was, ' In paradise, through the favour of your highness : ' and then, before the whole court, who listened to them with eager curiosity and astonishment, they gave a circumstantial account of the scenes to which they had been witnesses. The chief, thereupon addressing them, said, ' We have the assurances of our prophet, that he who defends his lord shall inherit paradise ; and, if you show yourselves devoted to the obedience of my orders, that happy lot awaits you.' Animated to enthusiasm by words of this nature, all deemed themselves happy to receive the commands of their master, and were forward to die in his service. The consequence of this system was, that, when any of the neighbouring princes, or others, gave umbrage to this chief, they were put to death by these his disciplined assassins ; none of whom felt terror at the risk of losing their own lives, which they held in little estimation provided they could execute their master's will. Thus, there was no person, however powerful, who, having become exposed to the enmity of the Old Man of the Mountain, could escape assassination. His territory being situated within the dominions of *Utaï* (Hulagu), the brother of the Grand Khan (Mangu), that prince had information of his atrocious practices as above related, as well as of his employing people to rob travellers in their passage through his country, and, in the year 1262, sent one of his armies to besiege this chief in his castle. It proved, however, so capable of defence, that for three years no impression could be made upon it ; until at length he was forced to surrender from the want of provisions, and, being made prisoner, was put to death. His castle was dismantled, and his garden of paradise destroyed." (*Marco Polo*, pp. 112—114.) The whole of this story, abating the extravagance of the diction, and high colouring of the picture (which, as Marco derived it from Persia, furnishes an additional proof of his fidelity in repeating what he heard), is a well authenticated historical fact ; and though Marco Polo may be mistaken a few years in the date of Alo-eddin's castle being dismantled, and his paradise destroyed, yet it is quite certain that Hulagu Khan, the grandson of Gengis, put this chief, and, according to Mirkhoud, 12,000 of his infatuated followers, to death, about the time mentioned by Marco Polo. (*Murray's Historical Account of Discoveries in Asia*, Edin. 1820 ; *Quart. Rev.*, April, 1821.)

1369. *A garden at Cabul*, in Afghanistan, between Persia and Hindostan, is thus described by the emperor Baber : — " Opposite to the fort of Adinshpûr, to the south, on a rising ground, I formed a charbagh (or great garden), in the year 914 (1508). It is called Baghe Vafâ (the Garden of Fidelity). It overlooks the river which flows between the fort and the palace. In the year in which I defeated Behâr Khan, and conquered Lahore and Dibâl-pûr, I brought plantains and planted them here. They grew and thrived. The year before I had also planted the sugar cane in it, which thrrove remarkably well. I sent some of them to Budakhshân and Bokhâra. It is on an elevated site, enjoys running water, and the climate in the winter season is temperate. In the garden there is a small hillock, from which a stream of water, sufficient to drive a mill, incessantly flows into the garden below. The fourfold field-plot of this garden is situated on this eminence. On the south-west part of this garden is a reservoir of water of large dimensions which is wholly planted round with orange trees ; there are likewise pomegranates. All around the piece of water the ground is quite covered with clover. This spot is the very eye of the beauty of the garden. At the time when the orange becomes yellow, the prospect is delightful. Indeed, the garden is charmingly laid out."

1370. *The garden of Bagh-e-keldâm* is thus described by the same author : — " On the outside of the garden are large and beautiful spreading plane trees, under the shade of which there are agreeable spots finely sheltered. A perennial stream, large enough to turn a mill, runs through the garden ; and on its banks are planted planes and other trees. Formerly this stream flowed in a winding and crooked course ; but I ordered its course to be altered according to a regular plan, which added greatly to the beauty of the place. Lower down than these villages, and about a kop or a kop and a half above the level plain, on the lower side of the hills, is a fountain, named Khwâjeh-seh-yârân

(Kwajeh, three friends), around which there are three species of trees; above the fountain are many beautiful plane trees which yield a pleasant shade. On the two sides of the fountain, on small eminences at the bottom of the hills, there are a number of oak trees; except on those spots where there are groves of oak, there is not an oak to be met with on the hills to the west of Kábul. In front of this fountain, towards the plain there are many spots covered with the flowery arghwán tree, and, besides these arghwán plots, there are none else in the whole country." (*Memoirs of Baber, Emperor of Hindostan, &c.*)

1371. *The gardens of Kalimar*, near Delhi, which were made in the beginning of the seventeenth century by the emperor Shah Jehan, are said to have cost 1,000,000*l.* sterling, and were about a mile in circumference. They were surrounded by a high brick wall; but the whole are now in ruins. (*Edin. Encyc.*, art. *India*, p. 87.) "The palace of Delhi," says Bishop Heber, "formerly celebrated for the splendour and richness of its architecture, though still inhabited by the 'King of Kings' (the Emperor Akbar Shah), is now in a ruinous state; not from absolute poverty, but because its inhabitants have no idea of cleaning or mending anything. The gardens," he continues, "are not large, but, in their way, must have been extremely rich and beautiful. They are full of very old orange and other fruit trees, with terraces and parterres, on which many rose-bushes and jonquils were growing. A channel of white marble for water, with little fountain pipes of the same material, carved like roses, is carried here and there, among these parterres, and at the end of the terrace is a beautiful octagonal pavilion, also of marble, lined with mosaic flowers, with a marble fountain in its centre, and a beautiful bath in a recess on one of its sides. The windows of this pavilion, which is raised to the height of the city wall, command a good view of Delhi and its neighbourhood. But all was, when we saw it, dirty, lonely, and wretched: the bath and fountain were dry; the inlaid pavement was hid with lumber and gardeners' sweepings, and the walls were stained with the dung of birds and bats. How little did Shah Jehan, the founder of these fine buildings, foresee what would be the fate of his descendants, or what his own would be! 'Vanity of vanities!' was surely never written in more legible characters than on the dilapidated arcades of Delhi." (*Trav. in Ind.*, p. 562.)

1372. *Of the royal gardens of Shah Leemar*, near Lahore, a city of Hindostan, some account is given in the *Journal of the Royal Institution* for July, 1820. "They differ," says the writer, "from the indigenous royal gardens generally found in India, in belonging to the class of hanging gardens." Their length is about 500 yards, and their breadth about 140. They consist of three terraces, watered by a stream brought upwards of sixty miles, and irrigating the country through which it passes. The only thing worthy of notice is the use of this water in cascades for cooling the air. There are large trees, including the apple, pear, and mango; a border and island of flowers, among which the narcissus abounds.

1373. *In the ruins of the palace of Ghazepoor*, Bishop Heber was shown a deep trench round an octagonal platform of blue, red, and white mosaic pavement. This trench, he was told, was filled with rose water, when the Nawáb and his friends were feasting in the middle. (*Narrative, &c.*, vol. i. p. 265.)

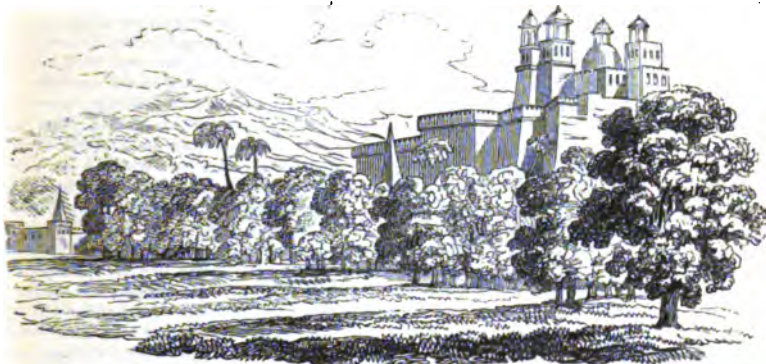
1374. *The ruins of the palace built by the Sultan Sujah*, brother to the emperor Aurengzebe, in 1630, looked like a great house which had lately been burned; and, though the beams and pillars of the verandas remained naked, and entirely devoid of vegetation, they were not picturesque. Among the toddy palms, and other fruit trees, of what had once been the garden, were some cottages and thatched sheds of the rudest structure. (*Ibid.*, vol. i. p. 193.) Speaking of these gardens elsewhere, Bishop Heber observes:—"I ascended what, for Bengal, was really a steep place, passing a little brook, in which I fancied I saw gravel; a phenomenon which I had not observed since I left England. The path wound among cottages, toddy palms, and other fruit trees, as well as some little ruinous mosques, and a cutcherry, which struck me as simple and elegant. It was merely a thatched shed like an Otaheitan house, with an earthen ornament at each end of its ridge-pole; but it was supported on a basement of stone (another novelty), with some broad, easy steps, and a small raised platform in its centre. Its situation, surrounded as it was by trees, reminded me of the Crimes; or it might have been such a place as Samuel or Saul sat to do judgment in, in Rama." (*Ibid.*, vol. i. p. 192.)

1375. *One of the palaces at Lucknow* is said by Bishop Heber (*Trav.*, p. 387.) to resemble in its external details that of the Marquis of Westminster, Eaton Hall, near Chester. In this palace, as in others in India, there is no passing from one court to another for beggars, though Lucknow is at present the most splendid court in India. The King of Oude resides there. (*Ibid.*, vol. i. p. 380.)

1376. *The gardens of Patna*. At the eastern extremity of Patna is a large wood of palms and fruit trees, pointed out to Bishop Heber as the gardens belonging to a summer palace, built and planted by the Nawáb Jaffier Ali Khan. They are renowned for their beauty and extent, being two or three miles in circuit. (*Ibid.*, vol. ii. p. 237.)

1377. *The residence of Baboo Hurree Mohun Thakoor (fig. 253.),* Bishop Heber found more like an Italian villa, and the conversation of the owner more European, than he

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expected. The house is surrounded by an extensive garden, laid out in formal parterres of roses, intersected by straight walks, with some fine trees, and a chain of tanks, fountains, and summer-houses, not ill adapted to a climate where air, water, and sweet smells are almost the only natural objects which can be relished during the greater part of the year. The garden is little less Italian than the façade of the house; and, on the bishop mentioning this similarity, the owner observed, that the taste for such things was brought into India by the Mussulmans. There were also swing whirligigs, and other amusements for the females of the family; but the strangest was a sort of "*Montagne Russe*" of masonry, very steep, and covered with plaster, down which the Bishop was told that the ladies used to slide. (*Narrative, &c.*, vol. ii. p. 293.)

1378. *The dwellings of the Baboos, or native Hindoo gentlemen, merchants, or bankers,* are immense convent-like mansions; those of the native labourers, huts of mud or bamboo, or brick in towns. (*Ibid.*, vol. i. p. 24.)

1379. *The house and grounds of a wealthy Hindoo merchant, a shawl manufacturer near Delhi,* afford a specimen of Eastern domestic architecture. They comprise three small courts surrounded by stone cloisters, two of them planted with flowering shrubs and orange trees, and the third ornamented with a beautiful marble fountain. (*Ibid.*, p. 555.)

1380. *The houses of the natives of Dinapoor* are almost all of mud, but their tiled roofs and verandas give them a better aspect than the common Bengalee cottage. The bocheries are very different from those of Calcutta, being little tabernacles, like the movable military shrines represented on ancient monuments, with curtains and awnings, and drawn either by one horse or two oxen. (*fig. 254.*) (*Ibid.*, vol. ii. p. 243.)



1381. *On Indian scenery generally,* Bishop Heber has the following passages; which, though unconnected, we consider sufficiently interesting and characteristic to record in

this work: — "In Hindostan, which name is confined by the natives to Upper India only, and more particularly to that part of it which was within the usual limits of the Mogul empire, and is now subject to the Company, there are few natural curiosities, and the distinguished works of architecture are chiefly confined to the great cities and vicinity. They are, however, far superior to all which I had expected, and very different from the idea generally formed of them in Europe. I had heard much of the airy and gaudy style of Oriental architecture; a notion, I apprehend, taken from that of China only; since solidity, solemnity, and a richness of ornament so well managed as not to interfere with solemnity, are the characteristics of all the ancient buildings I have met with in this country. I recollect no corresponding parts of Windsor at all equal to the entrance of the castle of Delhi and its marble hall of audience; and even Delhi falls very short of Agra in situation, in majesty of outline, in size, and the costliness and beauty of its apartments. They are not the Mussulmans only who have surprised me. At Benares, indeed, the Hindoo works are all small; but in the wild countries, which I am now traversing, and where the Hindoos have been pretty much left to themselves, there are two palaces, Umeer and Jyepoor, surpassing all which I have seen of the Kremlin, or heard of the Alhambra; a third, Joudpoor, which I have not seen, is said to be equal to either; and the Jain temples of Aboo, on the verge of the western desert, are said to rank above them all." — "The green-house-like smell and temperature of the atmosphere which surrounded us, the exotic appearance of the plants and of the people, the verdure of the fields, the dark shadows of the trees, and the exuberant vigour of the soil, teeming with life and food, neglected, as it were, out of pure abundance, would have been striking to any person, but was particularly so to one just landed from a long voyage." — "The most striking differences between the English and the Asiatic Gothic lie in the broad projecting cornices of the latter. Cut off the cornice of an Indian building and all flanking projections, and it might pass for one in the Gothic style of European architecture. The Hindoos avoid round or octagon turrets or staircases, lest they should check the breeze. The Patans built like giants, and finished their work like jewellers." A district granary was built like a glass-house, with an outside stair winding to the top. The bishop found, in one place, a lodge of bamboos and thatch, with a man in it watching a field of cucumbers; and in another he saw a large fire lighted in the open air, to keep off the wild hogs and wolves. At the town of Almorah are four spreading trees like ash trees, called toon trees, in the four approaches of the town, used as gallowses: in Scotland, trees anciently used for the same purpose were called dool trees. The houses of a village in the Himalayah mountains were all of two stories, the lowest for the cattle, and the upper one of the appearance of an ordinary cottage garret. All the neighbouring hill side was built up in narrow terraces.

1382. *Indian cemeteries.* The ancient cemeteries in India appear to have been all accompanied by gardens. Captain Benjamin Blake, who describes the gardens of Shah Leemar, near Lahore, in making excursions in the neighbourhood, "stumbled, as it were, upon a most magnificent mausoleum, round which was a walled garden of orange and pomegranate trees." The King of Oude still keeps the tomb and garden of his ancestor, Sufter Jung, in good repair; and Bishop Heber saw a large garden cemetery, containing tombs and mosques, near Delhi. The bishop also mentions Humaiûn's tomb, near Delhi, as being a noble building of granite, inlaid with marble, in a very chaste and simple style of architecture. It is surrounded by a large garden, with terraces and fountains, all now gone to decay. The garden itself is surrounded by an embattled wall, with towers, four gateways, and a cloister within, all the way round. (*Trav. &c.*, vol. i. p. 555.) Bishop Heber, who consecrated a burial-ground near Dacca, describes it as a wild and dismal place, surrounded by a high wall with an old Moorish gateway, in the centre of a wilderness and jungle.

Division ii. *Gardening in Hindostan, as an Art of Culture.*

1383. *The culture of vegetables*, in India and other countries of the East, belongs more to what may properly be considered agriculture than to gardening, since it is performed in the open fields, and by the same class who raise the staple commodities of human subsistence. The culture of rice, of the palm tree, and of the sugar cane, which supply almost the whole of the food of all ranks, will be found noticed in our *Encyclopædia of Agriculture*, and we shall therefore here chiefly confine ourselves to some notices respecting botanic gardens and floriculture.

1384. *The orchards of Bengal* are what chiefly contribute to attach the peasant to his native soil. He feels a superstitious veneration for the trees planted by his ancestors, and derives comfort and profit from their fruit. Orchards of mango trees diversify every part of this immense country; the Palmyra palm abounds in Bahar. The cocoa nut thrives in those parts which are not remote from the tropic. The date tree grows every where, but especially in Bahar. Plantations of the areca or betel palm are common in the central parts of the country.

1385. *The culinary vegetables of Europe* have all been introduced into India. Potatoes grown there are deemed equal in quality to those of England. Asparagus, cauliflowers, peas, and other esculent plants, are raised, but they are comparatively tasteless.

1386. *The desert of Europeans in Calcutta* is distinguished by a vast profusion of most beautiful fruits, procured at a very moderate expense; such as pine-apples, plantains, mangoes, pomeloes or shaddocks, melons of all sorts, oranges, custard apples, guavas, peaches, and an endless variety of other orchard fruits.

1387. *The botanic garden of Calcutta* was established in 1768, and has been subsequently greatly enlarged. In 1793, when Dr. Roxburgh was appointed curator, it contained only 300 species; but this indefatigable botanist soon increased the number to 3500, as appears by the catalogue of the garden printed at Singapore in 1814. Dr. Roxburgh died in that year, and was succeeded by the present superintendent, and no less indefatigable botanist, Dr. Wallich, whose botanical exertions in Nepal are well known in Europe. The following agreeable description of this garden is given by Bishop Heber:—"The botanic garden at Calcutta is a very beautiful and well-managed institution, enriched, besides the noblest trees and most beautiful plants of India, with a vast collection of exotics, chiefly collected by Dr. Wallich himself, in Nepal, Pulo Penang, Sumatra, and Java, and increased by contributions from the Cape, Brazil, and many different parts of Africa and America, as well as Australia and the South Sea Islands. It is not only a curious, but a picturesque and most beautiful scene; and more perfectly answers Milton's idea of Paradise, except that it is on a dead flat instead of a hill, than any thing which I ever saw. Among the exotics I noticed the nutmeg, a pretty tree, something like a myrtle, with a beautiful peach-like blossom, but too delicate for the winter even of Bengal, and therefore placed in the most sheltered situation, and carefully matted round. The sago palm is a tree of great singularity and beauty, and in a grove or avenue produces an effect of striking solemnity not unlike that of Gothic architecture. There were some splendid South American creepers; some plants, from the Malayan Archipelago, of vast size and great beauty; and, what excited a melancholy kind of interest, a little wretched oak, kept alive with difficulty under a sky and in a temperature so perpetually stimulating, which allowed it no repose, or time to shed its leaves, and recruit its powers by hybernation. Some of the other trees, of which I had formed the greatest expectations, disappointed me; such as the pine of New Caledonia, which does not succeed here: at least, the specimen which was shown me was weak-looking and diminutive, in comparison with the prints in Cook's voyage, the recollection of which is strongly imprinted on my mind, though I have not looked at them since I was a boy. Of the enormous size of the *adansonia*, a tree from the neighbourhood of Gambia and Senegal, I had heard much; the elephant of the vegetable creation! I was, however, disappointed. The tree is doubtless wonderful, and the rapidity of its growth is still more wonderful than its bulk; but it is neither particularly tall nor stately. Its bulk consists in an enormous enlargement of its circumference immediately above the roots, and for a comparatively small height up its stem; which rather resembles that disease of the leg which bears the elephant's name, than tallies with his majestic and well-proportioned, though somewhat unwieldy, stature. Dr. Wallich has the management of another extensive public establishment at Chitty-ghur, near Barrackpoor, of the same nature with this, but appropriated more to the introduction of useful plants into Bengal. He is himself a native of Denmark, but left his country young, and has devoted his life to natural history and botany in the East. His character and conversation are more than usually interesting; the first, all frankness, friendliness, and ardent zeal for the service of science; the last, enriched by a greater store of curious information relating to India and the neighbouring countries, than any which I have yet met with. These different public establishments used to be all cultivated by the convicts in chains, of whom I have already spoken. In the botanic garden, their labour is now supplied by peasants hired by the day or week; and the exchange is found cheap, as well as otherwise advantageous and agreeable; the labour of freemen here, as elsewhere, being infinitely cheaper than that of slaves." (*Narr. of a Journey*, &c., vol. i. p. 41.)

1388. *A botanic garden between the Ganges and the Jumna* has lately been formed, under the auspices of the British government, for the purpose of receiving and propagating Indian plants which it is thought might be adapted for culture in Europe. The situation is 6300 feet above the level of the sea, and, being exposed to the north, there is thus produced, in the heart of Hindostan, a temperature no more than equal to that of the southern part of the European continent. Among the plants lately said to be introduced are, the spurge laurel, the *Daphne cannabina*, of which, in Nepal, paper is made; a shrub, the *Symplocos racemosa*, the bark of which is used in dyeing; a species of wheat brought from the central part of Asia, where it flourishes, on the borders of Chinese Tartary, at an elevation of 10,600 feet; and a species of barley, *Hordeum celéstee*, met with in the Himalayah mountains, in fields elevated 12,000 feet above the

level of the sea. These corns are sown in the month of October, and ripen in the end of April. (*Le Globe*.)

1389. *Other botanic gardens* in India exist, or lately existed, at Madras, Bombay, Penang, and Singapore; also at Saharunpore, in the province of Delhi. The latter is chiefly for the purpose of collecting medicinal and other plants. The Madras garden has lately been given up. The Bombay garden was established in 1827, and is in a prosperous state. The gardens of Penang and Singapore were both established in 1823, and are, comparatively with other gardens in India, of very limited extent.

1390. *The rose fields*, which occupy many hundred acres in the neighbourhood of Ghazepoor, are described as being, at the proper season, extremely beautiful. The flowers are cultivated for distillation, and making "attar." Rose water is both good and cheap. The price of a seer, or weight of two pounds (a large quart), of the best, being eight annas, or a shilling. The attar is obtained, after the rose water is made, by setting it out during the night, and till sunrise in the morning, in large open vessels exposed to the air, and then skimming off the essential oil which floats at the top. The rose water which is thus skimmed bears a lower price than that which is warranted with its cream entire; but Bishop Heber was told that there is very little perceptible difference. To produce one rupee's weight of attar, 200,000 well grown roses are required. The price, even on the spot, is extravagant; a rupee's weight being sold in the bazaar (where it often is adulterated with sandal wood) for 80 sicca rupees; and at the English warehouse, where it is warranted genuine, at 100 sicca rupees, or 10*l*.! Mr. Melville, the English resident, who made some for himself one year, told Bishop Heber that he calculated the rent of the land, and price of utensils, really cost him at the rate of 5*l*. for the above trifling quantity; without reckoning the risk, labour of servants, &c. (*Narr. &c.*, vol. i. p. 266.)

1391. *The Agricultural and Horticultural Society of India*, in the first volume of their Transactions, have given the translation of an Indian book on horticulture, which, although it may contain some useful directions, shows the low condition of that art in the East. In it we are told that there are trees which bring good luck, and others that bring bad; how we ought not to sow or plant but on certain days of the week or month; and how we may change the nature of the fruits of mango, by steeping the grains in the fat of a rabbit for the space of a month, &c. They, moreover, recommend to rub and prick the roots with different substances, in order that they may carry fruit a longer time. A description of the gardens and fruit trees of Cashmere, by Mr. Moorcroft, contains many interesting details. The fruits of that country are the same as those of the south of Europe; such as apples, pears, peaches, quinces, apricots, plums, cherries, walnuts, pomegranates, almonds, &c.; but there are many varieties of these fruits, and it appears that some are superior to those that have been obtained in Europe. The author thinks that advantage might be taken of the vicinity of Cashmere to British India. In the kingdom of Cashmere, where there are many lakes, they construct floating gardens, in which they cultivate a great quantity of melons and cucumbers. Mr. Moorcroft, during his sojourn in Thibet, also enquired as to the culture of the forage named prangos (*Prángos pabularia Lindl.*), a forage very much sought after by sheep, and from which important results are anticipated, if it could be naturalised in Europe, or at the Cape of Good Hope. Packets of grains and roots of this umbelliferous plant have been sent to different persons, and particularly to Dr. Wallich at Calcutta; but we are ignorant of the results of this communication. The president found a new mode of grafting in use in a western district of Bengal, which he thus describes:—"In the season of the year when the bark easily separates from the wood, having previously cut off the end of a small branch which was considered unripe, about a quarter of an inch above an eligible bud, the operator makes an annular cut round the bark about half an inch below the bud; and then, with a cloth in his hand, forcibly pulls off the ring of bark, taking care not to injure the bud; after which, he proceeds in the same way with the buds below. Having collected a sufficient number, and kept them fresh in the hollow of a leaf with a little water, he proceeds to the stocks to be engrafted, and, having cut off the head, where the stock appears of a proper size, he strips the bark in small shreds all round to a sufficient depth, until a ring of the bark being applied fits very exactly. The shreds are then collected over the ring of bark, tied above, and bound together by a little moist hay, taking care not to press upon the bud. This perhaps combines the advantages of being the most successful, the most easy, and most simple mode of engrafting or budding used in any country." (*Jameson's Jour.*, Oct. 1831.) This mode of budding has long been practised in Germany, with a very slight variation. It will be found described and figured in the proper place, as flute grafting.

1392. *Bees* are cultivated in the mountainous districts of Hindostan. A correspondent of the *Gardener's Magazine*, writing from the Kossya mountains, 4500 feet above the level of the sea, says, that he was "delighted to find bees cultivated by the moun-

taineers, who, instead of hives, use the hollowed trunk of a tree, and plug it up at each end, closing the joints with lime mortar. The box thus made is preserved from the heat of the sun, by being placed under the eaves of the thatch of the cottages (which extend two or three feet, and come down very low, to exclude the heavy rains which fall in this country for seven months); or it is protected at a distance by a few mats. The honey is excellent." (*Gard. Mag.*, vol. viii.)

1393. *Forest trees* do not naturally abound in Bengal; the teak tree (*Tectona grandis*) is the oak of the East, and grows in abundance in the hilly kingdoms of Burma and Pegu, whence Calcutta is supplied for the purposes of naval architecture. Whether it will ever be found worth while to cultivate this tree in Bengal appears very doubtful. The bamboo is the timber used in the general economy of the country.

1394. *Hedges of native armed plants* are occasionally used round gardens, orchards, and small enclosures. See *An Account of Trees of India and their Uses*, by Dr. Roxburgh, in *Trans. Soc. of Arts*, and a similar treatise in the same work, 1832, by Dr. Wallich.

SUBJECT. 5. Of Gardening in the Island of Ceylon.

1395. *Gardening, as an art of design and taste*, can hardly be said to exist on this island, though Sir Alexander Johnstone (*Gard. Mag.*, vol. v. p. 74.) has described the mansion of Rajah Pakse (fig. 255.) as containing an architectural veranda, paved, and agreeably

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situated with respect to the exterior scenery. The great objects of interest in this island are, the culture of the cinnamon and of the different palms. The country is rich in botany, and abounds in palm trees and plantains. The Cingalese, as we have noticed (§ 5.), lay claim to the situation of Paradise; and one of the animals peculiar to the country, the *Loris ceylonicus* of Fischer, has been considered by some philosophers as aboriginal man. (*Cordiner's Ceylon*, vol. ii. p. 421.) If a Cingalese, says Bucke, possesses a garden, he wants but little more. Two jack trees (*Artocarpus incisa*), a palm tree or two, and six or eight cocoas, furnish him with enough to make him content; and his chief enjoyment is to recline under their shade. (*Beauties, &c. of Nature*.)

1396. *The agriculture and gardening of the native Cingalese* may be considered as one art; the objects of culture being edible roots, as the yam; grains, as the rice and spices, and pepper. (See Dr. Davy's *Account, &c.*) All the productions of Hindostan are said to thrive in Ceylon. General Macdowal, with the assistance of Dr. Roxburgh of Calcutta, made a valuable collection of exotics, which he left at Columbo in 1804. He introduced peaches, grafted and trained on espaliers, which bore at three years old. Apples and asparagus succeed well in this climate; and many other European fruits

and vegetables attain a tolerable degree of perfection, when shaded by mats during the day, and well watered during nights.

1397. *The cinnamon tree* (fig. 256.) grows wild in different parts of the island, and is



cultivated by government in four or five very large gardens. From the bark of the cinnamon tree, the cinnamon of commerce, cinnamon water, and cinnamon oil, are prepared; and also a very fine oil, like the oil of cloves, is made from the leaves, and the best description of camphor from the roots. Cordiner describes the cinnamon groves as delightful. "Nothing can exceed the luxury of riding through them in the cool hours of the morning, when the air is cool, and the sweetness of the spring blended with the glow of summer. Every plant in the garden is at all times clothed with fresh and lively green; and, when the cinnamon laurels put forth their flame-coloured leaves and delicate blossoms, the scenery is exquisitely beautiful. The fragrance, however, is not so powerful as strangers are apt to imagine. The cinnamon bark affords no scent when the trees

are growing in tranquillity; and it is only in a few places that the air is perfumed with the delicious odour of other shrubs, the greater proportion of the flowers and blossoms of India being entirely destitute of that quality. Gentle undulations in the ground, and clumps of majestic trees, add to the picturesque appearance of the scene; and a person cannot move twenty yards into a grove without meeting a hundred species of beautiful plants and flowers springing up spontaneously. Several roads for carriages make winding circuits in the woods, and numerous intersecting footpaths penetrate the deepest thickets. In sauntering amidst these groves, a botanist or a simple lover of nature may experience the most supreme delight which the vegetable creation is capable of affording; and the zoologist will not be less gratified by the variety, the number, and the strangeness of many of the animal kingdom." (*Account of Ceylon*, vol. ii. p. 387.)

1398. *The talipot tree* is the *Corypha umbraculifera*. (fig. 257.) All the books of importance in Pali and Cingalese, relative to the religion of Buddho in Ceylon, are written on laminæ of these leaves. This leaf is also used in the maritime provinces as a mark of distinction; each person being allowed to have a certain number of these leaves, folded up as fans, carried with him by his servants. They are also used in making

tents; and, by the common people, to shelter themselves from the rain; one leaf affording sufficient shelter for seven or eight persons.

1399. *Other palms common in Ceylon* are, the cocoa nut (*Cocos nucifera*), the *Borassus flabelliformis*, and the *Caryota urens*. The *Cocos nucifera*, (fig. 258.) is applied to a great variety of uses.



The coarse filament of the husk of the nut called coir is used throughout India for making rope. Cocoa-nut oil and arrack are well known productions. The cocoa-nut forests in Ceylon form a belt, of 130 miles in length, and a mile and a half in breadth, along the south-west part of the coast; and they are scarcely to be found, naturally, any where else in the island. This belt was estimated, when the Dutch governed Ceylon, to contain from 10,000,000 to 11,000,000 cocoa nut trees, and to produce 6000 measures of arrack, 3,000,000 pounds' weight of coir, besides an immense quantity of cocoa nut-oil. The Palmyra palm, or *Borassus flabelliformis* (fig. 259.), grows to great perfection in the province of Jaffna. The wood of this species of palm is almost black. It is used all over India for rafters and for the roofs of houses, and is peculiarly valuable from its resisting all insects, and being extremely durable. (*Gard. Mag.*, vol. v. p. 77.) This tree prevails chiefly to the north of Ceylon, where it is as valuable to the inhabitants as the cocoa nut is in the south; furnishing a considerable portion of their food, and of the articles which they export. The Kitul tree, or *Caryota urens*, has given rise, in Ceylon, to a distinct caste among the natives of the country. This caste is called the caste of the Jaggeraras, from the sugar which is made of the produce of the *Caryota urens* being called Jaggery, and from the whole of the above caste, both males and females, who are very numerous, being employed in the culture of the tree itself, or in the manufacture of the sugar which is procured from it. No sugar is made in Ceylon from the sugar-cane: all the sugar used by the natives of that island is made either from the *Cocos nucifera*, or *Borassus flabelliformis*, or *Caryota urens*. Great quantities of sugar are made from these trees, both for home consumption and for exportation. It has sold for one fourth or one sixth of the price of the cheapest sugar made from the sugar-cane. (*Gard. Mag.*, vol. iii. p. 213.) The Areca nut is the *Arca Catechu* of Linnæus. This nut is used all over India for chewing with the betel leaf, or the betle pfeffer of Willdenow. There are three species of this nut in Ceylon, which grow to great perfection in the interior of the country, and are much esteemed throughout India. (*Trans. R. Asiat. Soc.*, vol. i. p. 545.)



1400. *The Chayá root of Ceylon* is the *Oldenlandia umbellata* of Linnæus, and is used for dyeing red, orange, and purple. It gives rise, in Jaffna and the island of Manar, to a caste, whose sole occupation is to dig for chayá root. (*Ibid.*)

1401. *A botanic garden was established in Ceylon, in 1811*, through the influence of Sir Alexander Johnstone, who was then chief justice of the island. The principal objects of the plan were, to try what vegetable productions from other parts of the world could be advantageously introduced into Ceylon, and to improve the native plants by attentive culture. It was also hoped that the demand for the vegetable productions of Ceylon might be so much increased as to give the natives a decided taste for horticulture. This plan was of more importance, from its being connected with another, which was also proposed by Sir Alexander, and adopted by the English government, for doing away with those restrictions in Ceylon which prevented Europeans holding grants of land in any British settlements abroad, and for encouraging Europeans to become landholders, and to employ their capital in the arts and manufactures of the country. (*Gard. Mag.*, vol. iii. p. 100.) Bishop Heber, when he visited this garden, found it beautifully situated, but not healthy. He was pleased with the variety of plants, and delighted with the splendour of *Gloriosa superba*, and the brilliancy of the Oriental *Amaryllidea*.

SUBSECT. 6. *Gardening in the Birman Empire, Java, Malacca, Siam, Cochín-China, Singapore, and Japan.*

1402. *Of the gardening of the Birman Empire* little is known in Europe. Its botany has been explored by Dr. Wallich, who has discovered there several remarkable new genera of plants. Among the latter may be mentioned one which has been called *Ambérstia*, in compliment to Lady Amherst. The *Ambérstia nobilis* is probably the most beautiful and noble plant of the Indian Flora. There are only two trees of it known to exist, and these are in the gardens of a monastery on the banks of

the Salwen. The hills near Ava are rugged, overrun with the hardy briar or wild India plum, and varieties of *Euphorbia*. There was also an *Opuntia*, exactly the same as the American one, sent to India from his Majesty's gardens at Kew. (*Cox's Journal of a Residence in the Birman Empire*, p. 408.)

1403. In Java, judging from the work of Sir Stamford Raffles, there seems to be very little gardening, either as an art of taste or of culture. The kraton, or palace of the prince, is an extensive square, surrounded by a high wall, with a moat in the front, and sometimes in the rear. An open square is surrounded by railing, in the centre of which are two banian trees, the mark of the royal residence from the earliest date of Javan history. (*History of Java*, p. 84.) The many vast and magnificent remains of edifices found, at this day, in different parts of Java, bear witness to the high degree of perfection in which architecture and sculpture were at one period practised in that island. But whether the natives themselves designed these edifices and their ornaments, or only worked under the direction of ingenious artists from other countries, is a question connected with their history which we shall at present forbear to enquire into. (*Ibid.*, p. 473.)

1404. The cottages in Java, of the lowest class, are invariably built on the ground, with the sleeping-places a little elevated above the floor. The walls are of plaited bamboo. The dwellings of the petty chiefs are distinguished by having eight slopes or roofs, four superior and four secondary. The largest class of houses, in which the chiefs and nobles reside, are of the same form, but with five or six rooms. The cottages are never found detached or solitary; they always unite to form villages of greater or less extent, according to the fertility of the neighbouring plain, abundance of water, or other accidental circumstances. In some provinces, the usual number of inhabitants in a village is about 200; in others, less than fifty. On the first establishing or formation of a village on new ground, the intended settlers take care to provide themselves with sufficient garden ground around their huts for their stock, and to supply the ordinary wants of their families. The produce of this plantation is the exclusive property of the peasant, and is exempted from contribution or burden; and such is their number and extent in some regencies (as in Kedu, for instance), that they constitute, perhaps, a tenth part of the area of the whole district. The spot surrounding his simple habitation the cottager considers his exclusive patrimony, and cultivates with peculiar care. He labours to plant and to rear in it those vegetables that may be most useful to his family, and those shrubs and trees which may at once yield him their fruit and their shade: nor does he waste his efforts on a thankless soil. The cottages, or assemblage of huts, that compose the village, become thus completely screened from the rays of a scorching sun, and are so buried amid the foliage of a luxuriant vegetation, that, at a small distance, no appearance of a human dwelling can be discovered; and the residence of a numerous society appears only a verdant grove or a clump of evergreens. Nothing can exceed the beauty or the interest which such detached masses of verdure, scattered over the face of the country, and indicating each the abode of a collection of happy peasantry, add to scenery otherwise rich, whether viewed on the sides of the mountains, in the narrow vales, or on the extensive plains. In the last case, before the grain is planted, and during the season of irrigation, when the rice-fields are inundated, they appear like so many small islands rising out of the water. As the young plant advances, their deep rich foliage contrasts pleasingly with its lighter tints; and when the full-eared grain, with a luxuriance that exceeds a European harvest, invests the earth with its richest yellow, they give a variety to the prospect, and afford a most refreshing relief to the eye. The clumps of trees, with which art attempts to diversify and adorn the most skillfully arranged park, can bear no comparison with them in rural beauty or picturesque effect. (*Ibid.*, p. 81.) During the Dutch occupation of this island, most of the vegetables and fruits sold in the "land of friends" (the vegetable market of Batavia), were reared by manumitted slaves, who, upon receiving their freedom, were accustomed to hire a small quantity of land from their former masters; in consequence of which, Batavia was supplied more plentifully with fruits than any city in Europe. (*Bucke's Beauties, &c. of Nature*.)

1405. Malacca abounds in beautiful and odoriferous trees and exquisite fruits. From reminiscences of a visit to Malacca, by Mr. Main, inserted in the *Gardener's Magazine*, we learn that the *Æschynomène grandiflora*, the *Tectona indica*, *Barringtonia speciosa*, many species of palms, and particularly the *Michèlia Champaca*, a showy and odoriferous tree, give a character of great richness to the masses of wood. But the catalogue of fruits transcends every thing of the kind, perhaps, in India; for, besides the fruits common every where in the East, they have the *Artocarpus integrifolia*, *Annonas*, and the *Cárica Papaya*, in great perfection. Of the latter, it may be remarked, that, though in the class *Dioecia*, both male and female plants produce fruit, only the female tree always bears the largest. The fruit weighs about two pounds each; may be eaten with sugar, as melons, but is chiefly used as kitchen fruit. But, of all the

delicious fruits in India, none can equal, in purity and delicacy of pulp, richness of flavour, and refreshing coolness of juice, those which follow: — the mangosteen, *Garcinia Mangostana*, is here in the greatest perfection, growing wild in the woods. It is said to be the most salubrious of fruits. The eatable part is a transparent pulp surrounding the seeds. The calyx and stigma are both permanent till the fruit is ripe. There are three other kinds of fruit, probably of the same genus; viz., the duku, an egg-shaped fruit, about the size of an apricot, and, in flavour, little inferior to the mangosteen; the courangi, a small fruit, common at Malacca, the shell is brittle, and encloses one seed, surrounded by a spongy melting substance, of an agreeable acid flavour, like that of the tamarind; the baduc, or jambosteen, which is, in flavour and internal structure, like the mangosteen; the fruit is white, with a slight tincture of pink colour, and it grows in bunches, like the fruit of the potato; and the rambosteen, *Nepbélum* (burdock) *Jappaceum* (bur-like). This last-mentioned fruit is very beautiful, and has an echinated capsule of a bright scarlet colour; the pulp is transparent and most delicious, surrounding one seed. Most of these fruits will be found figured and described in the *Gardener's Magazine*, vol. iii. p. 145. Malacca is said to be favourable for the culture of the coffee; the berries grown there being superior to those of Java or Sumatra. (*Ibid.*, vol. ii. p. 461.) Very picturesque villas and cottages have been formed by the British in most of the East Indian settlements. We may cite, as an example, Dr. M'Kinnon's cottage (*fig. 260.*), on Prince of Wales's Island, or Pulo Penang. The cottage is thatched with palm-leaves. Town-houses and large country-houses are commonly flat-roofed; and the roof, shaded by an awning, serves as a banqueting-place.



1406. *Siam* is a country without roads, and architecture is used only for religious edifices and the king's palaces;

gardens, therefore, cannot be expected. (*Crawford's Embassy to Siam, &c.*, p. 324.)

1407. In *Cochin-China* the vegetable productions are similar to those of corresponding latitudes in India. The earth-nut, or *Arachis hypogæa*, the yam, the maize, and the cocoa-nut, with rice, form the principal articles of food. Near Touran there is an extensive burying-ground among the sand-hills, close to the shore. The tombs consist of mere tumuli of loose sand, surrounded by a circular trench. A great number of the graves were open; for, it seems, it is the custom of the Cochin Chinese, after the body has been three years interred, to disinhume the bones and remove them to another situation, close to their dwellings: the ground in which they are there deposited being in a great measure viewed as a place of worship. (*Ibid.* p. 237.)

1408. *Singapore* is represented as having great facilities for gardening. "The soil and climate," Crawford observes, "are perfectly well adapted to the production of tropical fruits, such as the cocoa-nut, the orange, the mango (which is found wild in the forests), the mangosteen, the duku, the pine-apple," &c. &c. The produce, however, at present, is quite inadequate to the demand, and large quantities are imported from the vicinity. Besides fruits, the soil is also well adapted to the growth of all those green esculent plants and farinaceous roots which are natural to a tropical climate; such as different varieties of cucumbers, the egg-plant, different pulses, the yam, the batata, and many others. The common garden pea of Europe may probably be raised, with care; but it is in vain to attempt the culture of cabbage, cauliflower, artichoke, or potato. These are not raised in Java, Cuba, St. Domingo, or Jamaica, at a less elevation than 3000 feet above the level of the sea; and in Singapore, so much nearer the equator, their successful culture would require 4000. (*Ibid.*) The botanical and experimental garden of Singapore is under the care of Dr. Montgomerie. A few clove and nutmeg trees have been planted, which have already yielded fruit; but it may be safely predicted that the soil is not suited to the growth of either. Even pepper, which has been most extensively cultivated, does not seem to succeed. The only object of perfectly successful culture is the species of *Uncaria*, which yields the *Gambree*, or terra japonica, a hardy product, for which the soil of Singapore, as well as that of all the neighbouring large islands, seems peculiarly suited. (*Ibid.*) The alterations of season are so trifling, that there is a perpetual succession of fruits and flowers; and, therefore, every period of the year seems almost equally suited for conducting the labours of cultivation. The climate is at the same time free from storms and hurricanes, or even violent gusts of wind, calculated to overthrow or impede the labours of the horticulturist or husbandman. The place is secure from locusts, palmer-worms, Hessian flies, and similar insects; and

the absence of the elephant and tiger are also favourable circumstances. (*Ibid.*, p. 535.)

1409. *The gardens of the Islands of Japan*, according to Kæmpfer, display little of taste in design, but are full of the finest flowers and fruits. "Such," he says, "is the beauty of the flowers which ornament the hills, the fields, and the forests, that the country may even dispute the preference in this point with Persia. They transplant the most beautiful of their wild flowers into the gardens, where they improve them by culture. Colours are the grand beauties desired both in plants and trees. Chestnut-trees, lemons, oranges, citrons and peaches, apricots and plums, abound. The sloe, or wild plum, is cultivated on account of its flowers, which, by culture, acquire the size of a double rose, and are so abundant that they cover the whole tree with a snowy surface speckled with blood red. These trees are the finest of their ornaments: they are planted, in preference, around their temples; and they are also cultivated in pots or boxes for private houses, as oranges are in Europe. They plant the summits of the mountains and both sides of the public roads with long rows of fir trees and cypress, which are common in the country. They even ornament sandy places and deserts by plantations: and there exists a law in this island, that no one can cut down a tree without permission of the magistrate of the place; and, even when he obtains permission, must replace it immediately by another."

SUBJECT. 7. *Of the present State of Gardening in China.*

1410. *The gardening of the Chinese* has long been celebrated, both on account of the peculiarity of its taste and the care and assiduity displayed in its culture. We shall bring together what we have been able to collect on all its different departments.

Division I. *Chinese Gardening as an Art of Design and Taste.*

1411. *One of the earliest accounts of Chinese gardens* was given by Père Le Comte, who, as well as Du Halde, had resided in the country as a missionary. "The Chinese," observes Le Comte (*Lettre vi.*), "appear still more to neglect their gardens than their houses. They would consider it as a want of sense to occupy their grounds only in parterres, in cultivating flowers, and in forming alleys and thickets. The Chinese, who value order so little in their gardens, still consider them as sources of pleasure, and bestow some expense in their formation. They form grottoes, raise little hills, procure pieces of rocks, which they join together with the intention of imitating nature. If they can, besides these things, find enough of water to water their cabbages and legumes, they consider, that as to that material they have nothing more to desire, and content themselves with a well or a pond." Olof Toreen, a Swede, who visited China early in the eighteenth century, and has published an account of his travels, states, "that in the Chinese gardens are neither seen trees artificially cultivated, nor alleys, nor figured parterres of flowers; but a general confusion of the productions of verdant nature." (*Voyage of Osbeck to the East Indies and China, &c.*)

1412. *The imperial gardens of China* are described in the *Lettres Edifiantes et Curieuses, &c.*, in a letter dated Pekin, 1743. This letter was translated by Spence, under the fictitious title of Sir Harry Beaumont, whom Lord Walpole describes as having "both taste and zeal for the present style;" and was published in Dodaley's Collection in 1761. These gardens are described to be of vast extent, containing 200 palaces, besides garden-buildings, mock towns, villages, all painted and varnished, artificial hills, valleys, lakes, and canals; serpentine bridges, covered by colonnades and resting-places, with a farm and fields, where his imperial majesty is accustomed to patronise rural industry, by putting his hand to the plough, or, as it has been otherwise expressed, "by playing at agriculture once a year." Views of these gardens, taken by native artists for the Chinese missionaries, were sent to Paris about the middle of the eighteenth century, and engravings from them were published, by permission of the French court, in 1788, in a work entitled *Recueil des Plans des Jardins Chinois*. We have examined the plan of the imperial gardens (*fig. 261.*) with the utmost care, but confess we can see nothing but a mass of buildings, generally forming squares or courts, backed by peaked hills, and interspersed with pieces of water, sometimes evidently artificial, and at other times seemingly natural. The first jet-d'eau ever seen in China was formed in the imperial gardens by Père Bénolt, who went to Pekin as astronomer. The emperor was transported with it, and, instead of astronomer, made the reverend father the fountaineer.

1413. *The gardens of Woo-yuen* are thus described in Ellis's *Journal of an Embassy to China*, 1818:—"We stopped opposite the gardens of Woo-yuen, which, after a little hesitation on the part of the mandarins, we were allowed to visit. Although now much neglected, they were interesting as a specimen of Chinese gardening. The Chinese are certainly good imitators of nature, and their piles of rocks are not liable to the same ridicule as some modern Gothic ruins in England; indeed, they are works of art on so great a scale, that they may well bear a rivalry with the original: the buildings are

spread over the ground without any attention to effect being produced by their exterior, unconnected with the scenery; the object seems to be, to furnish pretexts for excursions within the enclosure, which is so disposed as to appear more extensive than it really is. Much labour has been expended upon the walks, which, in some places, resemble mosaic work. These gardens were a favourite resort of Kien-long, whose dining-room and study were shown to us; in the latter was a black marble slab, with a poem inscribed upon it, composed by his majesty, in praise of the garden. The characters were particularly well executed. The trees in the garden were chiefly the *O'lea fragrans* and some planes." (Vol. i. p. 433.)

1414. *The villa of Puanko-gua*, belonging to one of the principal resident merchants of Canton, is interesting as a specimen of Chinese taste in laying out grounds; the great object is to produce as much variety as possible within a small space. (*Ellis's Journal*, &c., vol. ii. p. 186.)

1415. *The Fatee gardens at Canton*, belonging to rich individuals, and the resort of the fashionables, "consist of straight walks lined with flower-pots, containing the curious and beautiful plants of the country." (Vol. ii. p. 186.)

1416. *The houses of the Chinese* are, for the most part, only one story high, and those of the lower orders have a mean and miserable appearance, while those of the rich have numbers of fine, ornamented, and airy apartments, with spaces between them to admit the light as well as the air. These spaces are always in front and at back, the light being seldom given at the sides; and the houses are surrounded by extensive and beautiful gardens, adorned with artificial lakes, rocks, cascades, buildings of various descriptions, walks, bridges, &c. In the ornamenting and beautifying of gardens the Chinese excel all other nations. By means of a variety of winding walks, they make a small place appear twice as large as it really is. Innumerable flower-pots, containing a great variety of beautiful asters, of which they are very fond, are sometimes arranged in a labyrinth, from which you cannot get out again without a guide. They seem to have a very extensive assortment of asters: one species is quite white, as large as a rose, with long pending leaves, which the Chinese use, in the season, for salad, justly esteeming them a

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very great delicacy. When the asters are all in full bloom, the pots arranged handsomely near a piece of water, and the walks and alleys well lighted, at night, with variously coloured lamps, a Chinese garden has the appearance of one of those enchanted places we read of in the Arabian tales. (*Dobell's Travels*, &c., vol. ii. p. 314.)

1417. *A plan of a Chinese garden and dwelling*, executed at forty-five leagues from the city of Pekin, was taken by Stornberg, a gardener, who was several years in that country, and is given by Kraft in his *Plans*, (&c., partie ii. pl. 95.) If this plan (fig. 261.) is really correct, it seems to countenance the idea of the modern style being taken from that of the Chinese. The house of the mandarin, its proprietor, contains an entrance under a triumphal arch (a), barracks or offices (b), fountains (c), entrance-gate for dignified persons (d), vases of odours (e), officers' dwellings (f), residences of those in waiting (g), fountains, (h), residence of the proprietor (i), apartments for mandarin ladies (k), triumphal arch (l), bagnio and room for sports (m), a pavilion on a rock (n), building for the practice of archery (o),

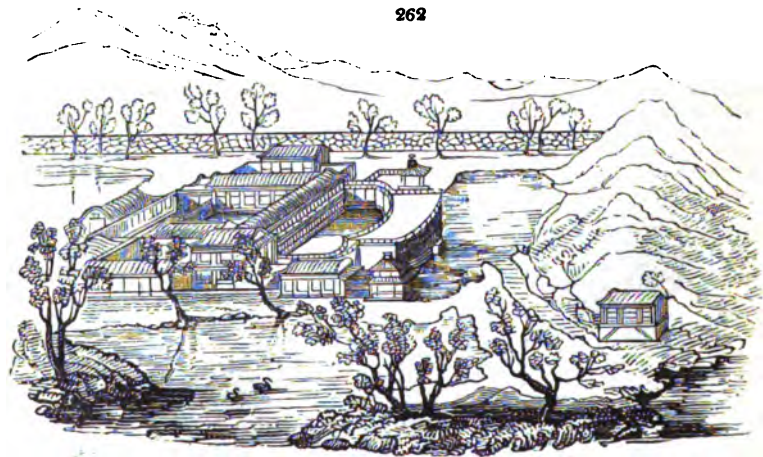


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green-house (*p*), pleasure-house (*q*), and a rock under which the river passes and forms a waterfall (*r*). (*Kraft*, p. 70.)

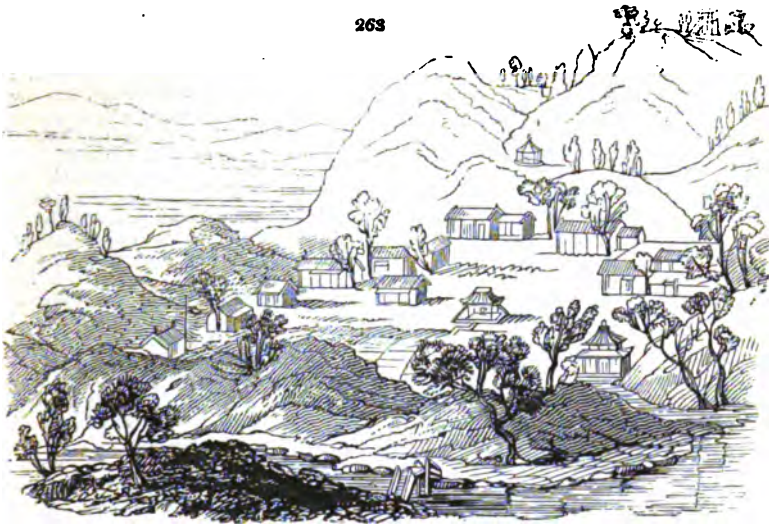
1418. *The gardens and palace of Shykinqua* are thus described by Mr. Main, from personal inspection, in the years 1793 and 1794; and the description is amplified, in order to convey a general idea of Chinese landscape-gardening. These gardens are situated in the southern suburbs of Canton, bordering the river. The stranger enters a vast assemblage of buildings for every purpose of life, of various sizes and characters. Among these, the seraglio for the old as well as for the young wives of the proprietor; and the chapel, where are deposited the ashes of his ancestors, are the most conspicuous and splendid. Proceeding, the stranger is conducted to the garden. Here no *coup d'œil* calls for admiration, no extent of undulating lawn, no lengthened vista, no depth of shadowy grove, no sky-reflecting expanse of water, — nothing presents itself but a little world of insignificant intricacy. The ground appropriated as a flower and pleasure-garden is a space of two or three acres, laid out in numberless little square plots, surrounded, parted, and re-parted, by low walls of brickwork, surmounted by broad copings, on which are set in order porcelain pots of all shapes and sizes, containing flowers and flowering shrubs. The exterior, as well as the interior walls of the garden, are covered with most ridiculously fantastic trellis-work (*fig. 262.*), on which are trained

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various climbing and creeping plants. The walks, or rather paths, are neither wide nor level enough for comfortable or even safe walking, — intentionally uneven, and broken into holes and foot-traps! The pieces or ponds of water, an indispensable feature in a Chinese garden, are thickly covered with "the green mantle of the standing pool," to obtain which they bestow no small pains! One of their favourite walks deserves particular description, because they consider it a *chef d'œuvre* of the gardener's art: a wall, eight or nine feet high, is built along one side of a pond, betwixt which and the wall a narrow irregular path is made, but so narrow, that it is with much difficulty a person can edge himself along it; and, as the water is permitted to reach the wall in different places by breaks made in the walk, there is even danger of slipping into the water almost at every step; and this difficulty is called "pleasure" to the walker himself, or at least to the beholders of his embarrassment! Another peculiarity in their garden-walks is, when leading through a group of trees and shrubs it must pass between the thickest of the stems, for no other purpose than to produce annoyance to the pedestrian. In short, except the beauty and rarity of the plants, the visiter finds nothing interesting in their style of gardening: no scope of ornamental disposition; no rational design; the whole being an incongruous combination of unnatural association. (*fig. 263.*) In one place a piece of craggy rock (real or artificial) is seen jutting out from among a tuft of the most delicate garden flowers; fantastic bridges without water, — unsightly excavations without character or beauty, — the whole being only a repetition of petty attempts at variety, on no greater scale than the patchwork of a citizen's court-yard. In some instances they appear to have a relish for some of the most striking features of uncultivated nature; such as antique trees (*fig. 264.*), rugged rocks, mossy caves, &c.; but these are all imitated on such a diminutive scale, that the attempts are truly ridiculous. This love of the grotesque not only appears in their gardens, but also is fre-

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quently seen in the yards of tradesmen in the city. A pile of rugged stones is placed in a corner ; on this are planted dwarfed trees and flowers ; and if it is wished to produce a resemblance of a grove of pines in miniature, the common *Equisetum* (horsetail) is employed for that purpose ! (*Gard. Mag.*, vol. ii. p. 136.)

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1419. *The national taste of the Chinese* in gardening must have had something characteristic in it, even to general observers ; and, from Sir William Temple's *Essay*, written about the middle of the seventeenth century, this character seems to have been obscurely known in Europe. He informs us, that though he recommends regularity in

gardens, yet, there may be more beauty in such as are wholly irregular. "Something of this sort," he says, "I have seen in some places, but heard more of it from others, who have lived much among the Chinese." Referring to their studied irregularity, he adds, "When they find this beauty in perfection, so as to hit the eye, they say it is shanawadgi; an expression signifying fine or admirable." It appears from this passage, that the Chinese style had not only been known, but imitated in England, nearly a century previous to the publication of the *Jesuits' Letters*, and at least sixty years before Kent's time. Sir William Temple retired to East Sheen in 1680, and died in the year 1700.

1420. *Sir William Chambers's account of the Chinese style* has given rise to much discussion. This author, afterwards surveyor-general, resided some time at Canton, and, on returning to England, gave a detailed account of Chinese gardening; first in the appendix to his *Designs of Chinese Buildings, &c.* in 1757, and subsequently at greater length in his *Dissertation on Oriental Gardening*, in 1772, commended, as G. Mason observes, by so good a judge as Gray. Sir William Chambers avows that his information is not derived entirely from personal examination, but chiefly from the conversation of a Chinese painter; and it has been very reasonably conjectured, that he has drawn, in some cases, on his own imagination, in order to enhance the reader's opinion of Chinese taste, with the laudable view of improving that of his own country. In his essay of 1757, which was published in French as well as English, and was soon translated, as Hirschfeld informs us, into German, he says, "the Chinese taste in laying out gardens is good, and what we have for some time past been aiming at in England." With the exception of their formal and continual display of garden-buildings, and their attempts of raising characters, not only picturesque and pleasing, but also of horror, surprise, and enchantment, Sir William's directions, especially in his second work, will apply to the most improved conceptions of planting, and forming pieces of water, in the modern style; or, in other words, for creating scenery such as will always resemble, and often might be mistaken for that of nature. But whatever may be the merits of the Chinese in this art, it may reasonably be conjectured, that their taste for picturesque beauty is not so exactly conformable to European ideas on that subject as Sir William would lead us to believe. Their decorative scenes are carried to such an extreme, so encumbered with deceptions, and what we would not hesitate to consider puerilities, and there appears throughout so little reference to utility, that the most mature and chastened taste of Europeans cannot sympathise with them. Chinese taste is, indeed, altogether peculiar; but it is perfectly natural to that people, and therefore not to be subjected to European criticism.

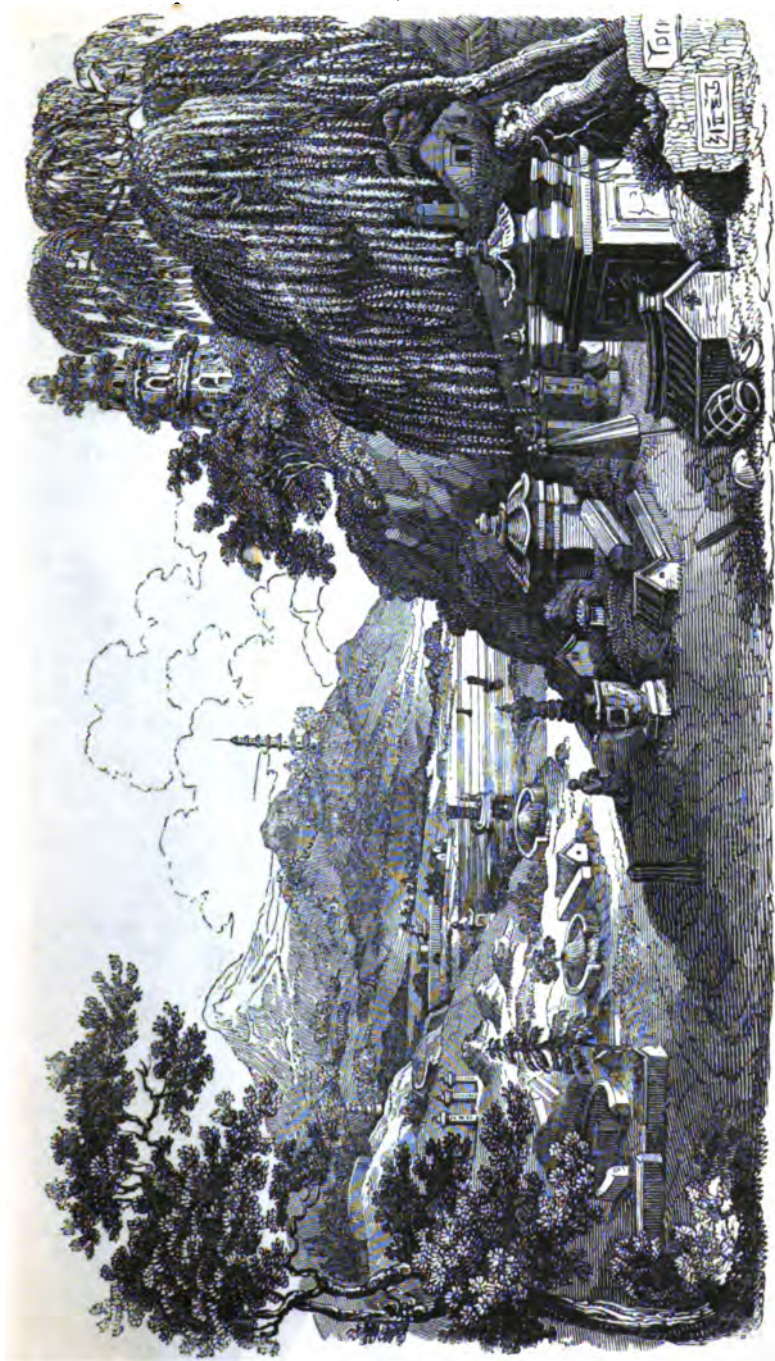
1421. *Lord Walpole's opinion of the Chinese gardens* is, that they "are as whimsically irregular as European gardens were formerly uniform and unvaried; nature in them is as much avoided as in those of our ancestors." In allusion to those of the emperor's palace, described in the *Lettres Edifiantes*, he says, "this pretty gaudy scene is the work of caprice and whim; and, when we reflect on their buildings, presents no image but that of unsubstantial tawdriness."

1422. *Lord Macartney's remarks* on these gardens show, that at least picturesque scenes are seen from them. "The view," he says, "from one of the imperial gardens might be compared to that from the terrace at Lowther Castle." This view is altogether wild and romantic, and bounded by high uncultivated mountains, with no other buildings than one or two native cottages. In what degree of estimation such a view is there held, does not, however, appear; it would be too much to conclude that, because it existed in that situation, it had been created or left on purpose, or was considered as eminently beautiful or desirable. "It is our excellence," observes his lordship, "to improve nature; that of a Chinese gardener to conquer her: his aim is to change every thing from what he found it, — a waste he adorns with trees; a desert he waters with a river or a lake; and on a smooth flat are raised hills, hollowed out valleys, and placed all sorts of buildings."

1423. *Cemeteries.* About Canton and Macao the high lands are very little cultivated, being generally set apart for burying the dead; those about Canton are entirely occupied as cemeteries, the low grounds, which can be covered with water, being the only ones which will produce rice. (*Dobell's Travels, &c.*, vol. ii. p. 191.) Sometimes, however, the Chinese choose a valley for a cemetery, as that of the Vale of Tombs near the lake See Hoo. (fig. 265.) The Chinese burying place near the Yellow River (fig. 266.) is a specimen of a cemetery on high ground.

1424. *Chinese taste in gardening*, it thus appears, partakes of the general character of the people, and is characterised by their leading feature, peculiarity. The love of the grotesque and of monstrosities is seldom accompanied in individuals of any country with enlightened views and liberal sentiments, which are almost always found combined with simplicity. The opinion of Mr. Main, a landscape-gardener, a naturalist, and a man of taste, who went to China, for the express purpose of studying Chinese gardening, warrants our conclusion.

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Division ii. *Gardening in China, in respect to its Horticultural Productions.*

1425. *On the first view of the coast of China*, says Mr. Main, "the stranger concludes that the inhabitants are a nation of gardeners. Even the fields, in the southern provinces, are almost all cultivated by manual labour, and every thing shows the indefatigable industry of the cultivators. On entering the mouth of Canton river, and having ascended to the Bocca Tigris (an old Portuguese name for a fortified part of the river), the banks begin to collapse, and to present to the exploring eye of the botanist their vegetable productions. He sees the general surface of the country, a level, widely-extended, and well-cultivated plain, intersected in all directions by navigable canals; diversified by abrupt and craggy hills, scattered here and there over the face of the country. Beneath the brow of one stands a grove of *Laurus Sassafras*; under the cultivated slope of another is seen the citron tribes, mixed with other fruits, and overhung by the majestic and splendid *Bombax Cebba*. Within and around the grotesque yet airy habitations which hang suspended, as it were, over the sedge margin of the river, is seen magnolias, ixoras, chrysanthemums, &c. in great profusion. After an interesting passage up the river, the stranger enters the suburbs of the city. Here he is surprised to see the number of flowers and flowering plants which every where meet his eye: every house, window, and court-yard are filled with them!" (*Gard. Mag.*, vol. ii. p. 135.)

1426. *Horticulture in China* is generally considered to be in an advanced state; but we have no evidence that the Chinese are acquainted with its scientific principles, and especially with the physiology of plants. The climate and soil of so immense a tract as China are necessarily various; and equally so, in consequence, the vegetable productions. Besides the fruits peculiar to the country, many of which are unknown to the rest of the world, it produces the greater part of those of Europe; but, except the oranges and pomegranates, they are much inferior. The orange was introduced to Europe from China, and the pine-apple to China from South America, by the Portuguese in the sixteenth century.

1427. *The Chinese are supposed to have a number of culinary vegetables peculiar to themselves.* They are said to cultivate edible plants, even in the beds of their rivers and lakes, and, among others, the pi-tsi or water chestnut (*Scirpus tuberosus* Rox.), which yields tubers of a farinaceous quality and an agreeable taste. The *Convólvulus reptans* Lour. grown in ditches, *Amarántus polygamus* and *tristis*, *Sinapis pekinénsis*, and some others used as pot-herbs. They have also a particular variety of *Brássica*, used both as a salad and in a boiled state. (*Abel's Journal*.) Le Comte, Du Halde, Eckeborg, and others, praise the manner in which the Chinese cultivate culinary vegetables, which, they say, are abundant in their gardens, and form the chief part of the nourishment of the lower orders. They add, however, that the greater part of their fruits do not equal ours; either because the Chinese are ignorant of the art of improving them, or because they do not give themselves the trouble. Their grand object is to cultivate corn and rice; and they are ignorant of botany. One of the authors of these remarks, Captain Eckeborg, has published, in the Transactions of the Academy of Sciences of Stockholm, a treatise on the rural economy of this people; and Count Lasteyrie has collected what is known on the same subject. The British works published after different embassies contain accounts of their modes of propagation, by inarching and local radications; of their dwarfing forest trees, producing double flowers, monstrous unions, and various other exertions in the way of conquering nature. It is a singular fact, that, with all this practical skill, the Chinese do not appear to be acquainted with the art of grafting, otherwise than by approach, nor with inoculation. John Livingston, a corresponding member of the horticultural society at Macao, considers the Chinese as entirely ignorant of the science both of horticulture and agriculture. They make no attempts to improve on old practices, or spread newly introduced plants; proofs of which are given by referring to the *Pekin Gazette*, "an official publication, in which all notices relative to any variation or change in their practices are made public," and to the circumstance of "potatoes and cabbages having been cultivated in the neighbourhood of Macao for upwards of half a century, and although highly profitable and productive, yet the method of growing them has not reached Canton, perhaps has not even extended five miles." It is impossible, this writer observes, to establish any distinction between the agriculture and horticulture of the Chinese merely from the plan of cultivation, the same ground being alternately cropped with grain and culinary esculents.

1428. *The fruits cultivated in China*, according to Mr. Main, are the following: — the grape, the pomegranate, two sorts of peaches, several sorts of plums, two sorts of pears, many varieties of oranges, &c., of cucumbers and melons, the chestnut, the capsicum, the avertroa, the plantain, the guava, the gourae, five sorts of dimocarpus, the jujube, the date palm, the loquat, the kismuchu, and the packlam.

1429. *The edible roots*, according to the same authority, are the following : — the common potato, lately introduced, the sweet potato (*Convolvulus Batatas*), the yam, the beet, the carrot, the onion, garlic, three or four sorts of water-lily, four or five sorts of arums, turnips, radishes, ginger, turmeric, and bamboo.

1430. *Edible leaves* : — beet, cabbage, two or three sorts, lettuces, endive, spinach, tea, olive, *Olea frâgrans*, and *Amarântus*. The last plant is used as spinach, and the leaves of the *Olea frâgrans* like those of tea.

1431. *Pods* : — peas, beans, water-lily seeds, rice, maize, and several other sorts of grain.

1432. *Fruits in China* are "so plentiful," says Dobell, who visited the country in 1830, "that there is less attention paid to them than in colder climates. Almost every month of the year has its peculiar fruits ; but those most esteemed are the oranges, mangoes, and litchis. They have pears of various sorts, peaches, plums, pine-apples, water-melons, bananas, plantains, longans, wampees, guavas, jacks, shaddockes, grapes, figs, &c. In the height of the season an orange costs only a cash or two, but it is always peeled, the rind being more valuable, for medicinal purposes, &c., than the orange itself. The sellers are remarkably expert at peeling them. Fruits are sold on stalls in every street ; the prices are oft-times marked on a piece of bamboo, so that the buyer can go and eat of what he likes, throw down his money on the stall, and walk off without uttering a single word. Vegetables are sold in the same manner, or cried through the streets ; but they are generally weighed. The buyer weighs for himself with his own *tychin* or steelyard, which he carries with him, and the seller weighs after him, to see that he is correct. In the art of cultivating vegetables the Chinese are not to be equalled ; and at Macao there are as fine potatoes and cabbages as in any part of the world. Potatoes do not succeed so well at Canton ; but, as the Chinese are not fond of them, this is doubtless owing more to the want of care than the difference of climate, in a distance of only ninety miles. (*Travels*, &c., vol. ii. p. 317.)

1433. *In the cultivation of culinary vegetables of all sorts*, the Chinese are not to be surpassed by any nation of the globe. Whoever has visited Whampoa must have seen a striking proof of this assertion in the gardens, which adorn the steep sides of hills of Dane's and French Islands, where they rise in regular gradation, like a flight of stairs, from the bases to the summits of the hills. It must cost immense pains to cultivate them ; and to water them, as the Chinese do, at least twice a day. These gardens exhibit, in the strongest manner, the persevering industry of the inhabitants, and delight the beholder with a rich vegetation, clothed in various shades of the liveliest verdure. (*Ibid.*, vol. ii. p. 193.)

1434. *The culture of tea in China* may be considered as belonging more to agriculture than to horticulture. It is singular that



neither Mr. Main nor Dr. Abel have been able to determine the species and varieties cultivated. Dr. Abel could not satisfy himself as to there being two species or one ; but thinks there are two species, the *Camellia Bohda* (fig. 267. a) and the *C. Sasângua* (b). Mr. Main says, that all the different sorts of tea are produced from the same "kind or variety" of the plant. All writers on the subject are agreed that the leaves of the true tea are adulterated by those of certain other plants. Mr. Main says, "Small proportions of leaves of other plants are sometimes added, but care is taken that it be not detected, as this is considered a

deterioration : these are the leaves of the *Olea frâgrans* (fig. 268. a), and, sometimes, those of the *San-cha-yu* (*Camellia Sasângua*, b) ; in the sort called pekoe, small silvery leaves may be observed, which appear to be those of the *To-kune* (*Azalea indica*, c) ; all, however, perfectly harmless, though they have subjected several English dealers to undeserved prosecution. The Chinese, however, deny that any of the latter leaves are ever intermixed. (*Gard. Mag.*, vol. iv. p. 455.)

1435. *The first gathering of the leaves* begins about the middle of April, and continues to the end of May ; the second from midsummer to the end of July ; the last during the months of August and September. When the leaves are gathered, they are put into wide shallow baskets, placed on shelves in the air, or wind, or mild sunshine, from morning till noon ; then, on a flat cast-iron pan, over a charcoal stove, ten or twelve ounces of the leaves are thrown at a time, stirred quickly with a short hand-broom twice or thrice, and then brushed off again into the baskets, in which they are equally and carefully rubbed between men's hands to roll them ; after which, they are



again put into the pan in larger quantities, over a slower fire, to be dried a second time. When fired enough, the tea is laid on tables to be drawn or picked over, putting aside all the unsightly and imperfectly dried leaves, in order that the sample may be more even and marketable. To make *singlo* or *hyson* the first two gatherings are chosen, and, as soon as picked from the trees, are put into the pan; next rolled, and spread thin, to separate the leaves, which adhere to each other; again well dried, spread, sifted, picked, and fired two or three times (especially if it is damp weather), before the tea is in a marketable state. We have had for many years two sorts of the tea plant in our gardens. Modern botanists have abolished the genus *Thea*, and placed it under the *Camellia* genus. It is curious, that, without any knowledge of the sexual system, the Chinese have done the same: *cha*, or *tcha*, is their name of tea, and *tcha fou* (tea flower) that of *Camellia*. But our botanists have overlooked one thing, that is, they have put them down as species, whereas one only, the *Bohea*, may be designated a species, and the *viridis* a variety only. It is indeed a question, whether even the Chinese themselves know the original kind; because the best varieties, obtained from long experience and cultivation, are called by them *the true*; the wild sort, found on the mountains of Ho-nan is called the *tchaw tcha*, or bastard tea. (*Gard. Mag.*, vol. iv. p. 456.)

1436. *Teas*, according to Dobell, are of four distinct families or stocks: called *bohea*, *ankay* or *twankay*, *hyson*, and *singlo*. The two former are the roots from which all the black teas spring, the *ankay teas* being always inferior to the *bohea*. There are five classes of both sorts. Plain *bohea*, *congou*, *campoi*, *souchong* (some kinds being scented with flowers and prepared in a particular manner, and those mixed with leaves being called *flowered teas*), and *pecho*. This last, which is the finest kind, is composed of the young leaves of the plants, and is gathered when they first push forth, while the white down is upon them, and just before they begin to expand. It is often erroneously supposed by Europeans to be the flower of the tea tree. *Pecho* is rarely seen perfectly white, being generally mixed with older leaves, which are brown. Of the finest sorts there is not more than two or three *peculs* (a *pecul* weighs 133½ pounds) brought annually to Canton. Black teas are dried on bamboo baskets, green teas are first moistened with a starch made of rice, and then rolled in the fingers and dried on copper plates. Some of the green teas are said to be coloured with Prussian blue, or smalt. Among the green teas *singlo* is always inferior to *hyson*; *twankay*, or *shin*, is the cheapest; and the other sorts are, young *hyson*, *gunpowder*, *gomec*, and *chulou*. (*Trav.*, &c., vol. ii. p. 334.)

1437. *The different qualities of the teas* depend on the seasons for gathering, and the method of preparing them. On this account different names are often given to teas grown on the same tree. The last preparation which all the teas undergo is called *firing*. This is putting them into cylinders of sheet iron, which are roasted or baked before the fire, until the tea has acquired the crispness necessary to preserve it, and to make it give out its odour. The best tea, if it gets damp, loses its fine smell. The coarser teas are packed by the feet, but the finer teas are put into the box by hand, and in both cases great care is taken to choose dry weather for packing them. This operation is performed in warm rooms close shut, to exclude the least moisture. When packed, the teas are enclosed in a leaden case, which is afterwards surrounded by the dry leaves of the sugar cane, and then put into a wooden box. A Chinese tea smeller first crushes the tea in his hand, and then breathes upon it to obtain the full smell. (*Dobell's Travels*, &c., vol. ii. p. 336.)

1438. *The introduction of the cultivation of tea* into countries lying in the same degree of latitude with China has long been an object with various politicians. Mr. Main is of opinion that there are various countries in Asia, America, Australia, and

even Europe, where it might be grown as well as in China; but that it is very difficult to say whether the cost of its manufacture would not greatly exceed its value.

1439. *The Chinese drink their tea without either milk or sugar*: they partake of it plentifully at their meals, and very frequently in the course of the day. One mode of using it, amongst the higher ranks, is formed by grating into the cup balls made of the most valuable leaves cemented together by some kind of tasteless gum. (*Gard. Mag.*, vol. iv. p. 457.)

Division iii. Gardening in China, in respect to its Floricultural Productions.

1440. *The culture of flowers and plants of ornament* seems very general in China. The beautiful varieties of *Camellia*, *Azalea*, *Rosa*, *Chrysanthemum*, *Pæonia*, and of various other genera, are well known natives of that country.

1441. *Green-houses are not unknown in China*. Wathen (*Journal of a Voyage to China*, &c., 1814) describes the villa (fig. 269.) of Pon-qu-a-qu-a, a retired merchant and



mandarin, as containing a green-house (a), an aviary (b), a banqueting room open on one side; a garden with the walks bordered with porcelain pots of orange trees and camellias; and an immense banyan tree (*Ficus benghalensis*).

Division iv. Chinese Gardening, as a Science, and as to the Authors it has produced.

1442. *The practice of the Chinese is entirely empirical*, though, as Mr. Main observes, they have some rude ideas of the sexual system. They are ignorant, however, of chemistry and physiology, without some knowledge of which no cultivator can have the slightest pretensions to be considered scientific. Notwithstanding this, the Chinese, like the Greeks and Romans, who, in their day, were equally ignorant with the modern Chinese of the sciences mentioned, have written books on gardening; for the existence of books on any art is no proof of its advancement, whatever it may be of its popularity.

1443. *Among the Chinese books on gardening and agriculture* is one entitled *Tehoung-kia-pao*. This work, in four volumes, begins, like that of Hesiod, with the elements of morality, and then proceeds to treat of all that is necessary to be known of the country, agriculture, laws, and medicine. This work formed part of the Chinese writings on agriculture which were excluded from the general proscription of books in the third century after the Christian era. The Chinese have a fine poem on gardening, published in 1086. The author is one of the first Chinese writers, and the greatest minister that it has produced. His garden, which gives a general idea of the style of Chinese gardening as an art of taste, contains only twenty acres of land. An apartment, containing 5000 volumes, is placed by the author at the head of its useful beauties. On the south is seen in the midst of the waters, cascades, galleries with double terraces, and hedges of rose and pomegranate trees; on the west, a solitary portico, evergreen trees, cottages, meadows, sheets of water surrounded with turf, and a labyrinth of rocks; on the north, cottages placed as if by chance, on little hills, and groves of bamboos with gravel walks; on the west, a small plain, a wood of cedars, odoriferous plants, medicinal plants, shrubs, citron trees and orange trees, a walk of willows, a grotto, a warren, islands covered with aviaries, bridges of wood and stone, a pond, some old firs, and an extensive view over the river Kiang. Such was the delightful spot where the author of the poem amused himself with hunting, fishing, and botany. At that time we had no garden in Europe to be compared to it, nor any man who could describe it in good poetry. Madame Dubocage translated a Chinese idyl into verse, entitled *The Labourer*, and which has the same date as this poem on gardening. The imposing ceremony of the commencement of the labours, by the emperor himself, in the beginning of spring, is still more ancient in China. It was established 150 years before the Christian era. The soldiers in China plough, sow, and reap. In the tribunals of the empire there is a president, superintendent, and director-general of agriculture. (*Olivier de Serres, Historical Introd. to the edit. of 1804; Gard. Mag.*, vol. i. p. 449.)

SECT. II. *On the present State of Gardening in Africa.*

1444. *As an art of design and taste*, there are but few specimens of gardening in Africa; and such as there are, in the same style which has prevailed from time immemorial, viz., that of the countries of the East. The horticulture of Africa is necessarily influenced by its tropical climate, and characterised by surface irrigation. We shall glance, in succession, at Egypt, the Mahometan states of the north of Africa, the western coast of Africa, South Africa, and the African Islands.

SUMMARY. 1. *On the present State of Gardening in Egypt.*

1445. *The country houses and gardens of the pacha*, and most of the rich inhabitants of Grand Cairo, are situated at Boulak, near Old Cairo. The gardens are said to be well stocked with date and other palm trees, and with the grape and some European vegetables. In general, however, European fruits and vegetables do not thrive, on account of the great heat and dryness of the climate. (*Brasen's Letters, &c.*) The gardens of Rosetta are very numerous, and contain nearly all the vegetables grown in Europe.

1446. *Shoobra, the country seat of Mohammed Pacha*, is thus described by Mrs. Lushington:—"Proceeding by a fine road, planted on each side with acacias and sycamores, whose growth, owing to the richness of the soil, kept pace with the impatient disposition of the pacha, who had, at one sweep, cut down the avenue of mulberry trees three years before, we arrived at the house, which is situated close to the Nile, and commands a fine prospect of the river and city. The exterior of the building exhibited nothing remarkable. On ascending a terrace a few feet square, we passed through a rough wooden door, such as is fit only for an outhouse, and found ourselves in the pacha's room of audience. The gardens of Shoobra, with their golden fruit and aromatic flowers, having been already described by former travellers, I shall pass on to the magnificent pavilion, which constitutes the chief embellishment of the place, and which was completed only a few weeks before my visit. This pavilion is about 250 feet long by 200 broad. On its sides run four galleries or colonnades, composed of elegant pillars of the finest white marble (of an order resembling the composite), surrounding a sunken court of six feet deep, paved throughout with the same beautiful material. At each corner of the colonnade is a terrace, over which water passes into the court below in a murmuring cascade, having on its ledges figures of fish, sculptured so true to nature, that, with the flowing stream, they appear to move. The whole supply of water rises again through a fountain in the centre, and re-appears in a beautiful jet d'eau, lofty, sparkling, and abundant. One seldom sees an exhibition of this character without apprehending a failure of water; but here the works are fed by the Nile, and the spectator is aware that its exuberance will not cease. In fine weather the pacha occasionally resorts to this splendid fountain with the ladies of his harem, who row about in the flooded court for the amusement of his highness, while he is seated in the colonnade. Great is the commotion when the ladies descend into the garden. A signal is given, and the gardeners vanish in an instant. We were all struck with the ruddy cheeks and healthy appearance of these men. They were principally Greeks; and the gay colours of their fanciful costume,—each with a nosegay or bunch of fruit in his hand,—combined with the luxuriant scenery around, gave them more the semblance of actors in a ballet representing a fête in Arcadia, than the real labourers of a Turkish despot." (*Journey overland from India, &c.*)

SUMMARY. 2. *Gardening in the Mahometan States of the North of Africa.*

1447. *In Morocco* gardening is practised chiefly as an art of culture. In the towns there are frequently gardens on the tops of the houses; and there is always a display of garden scenery, to some extent, in their neighbourhood. "The gardens, which extend for some distance round Laracke," says Capel Brooke, "are wild and luxuriant, producing abundance of figs, pomegranates, and oranges: the latter, in particular, are remarkably fine; and are equal, in flavour and size, to those of Tetuan. Our walk having made the party rather thirsty, we entered a large garden, which had formerly belonged to a Moor of rank, but was now suffered to run to ruin. The appearance of the grounds, in general, and of a shattered alcove, still showed some marks of the care that had once been bestowed upon them. Several of these gardens are very prettily situated on the slope of the hills which fall to the valley through which the Luccos winds along. The orange trees, which almost equalled British forest trees in dimensions, were completely gilded with the greatest profusion of beautiful tempting fruit; and, for a small present of about four-pence, I was allowed to pick near 150 of the finest oranges I ever saw: these lasted me, not only during the remainder of my journey, but some time afterwards. They were of a most delicious flavour, their skins

being as fine and thin as the smallest pot-orange." (*Travels in Spain and Morocco*, vol. ii. p. 88.)

1448. *The gardens of the palace of the sultan at Tetuan* are situated without the town, and contain a summer palace, and a banqueting-room thirty feet high. The fruits are oranges, citrons, and grapes. The ornamental fountains and basins of water are very fine; and the gardens command varied and extensive views of the distant scenery. (*Ibid.*) A valley in the neighbourhood of Tetuan is described by Capel Brooke as "rich and highly cultivated, consisting chiefly of a succession of luxuriant gardens, surrounded by lofty fences of cactus and aloë, overtopped by the towering cane, which presented so thick a barrier, that it was difficult to get even a peep at the beautiful retreats within. The luxuriance of the vegetation, and the appearance of some maize and barley, which were already several inches high, gave a look of spring to the season: and as we passed along, our senses were regaled with the delicious fragrance of orange blossoms, large jasmines, and white roses. Having crossed a river, which, during the rainy season, is very dangerous to ford, we arrived at the gate of the sultan's gardens; and, without dismounting, rode up a delightful trellis walk, shaded by vines, and loaded with grapes, which hung down in the most tempting manner possible. Having reached a second gate, or door, we dismounted, and entered a kind of alcove, before which was a spacious basin filled with water as clear as crystal, supplied by a stream which is conducted by a small channel through the gardens. This delightful spot is the retreat of the sultans of Morocco when they visit Tetuan. The view from the gardens is very beautiful, the mountains rising abruptly close to them; and, being well wooded, present a dark, wild, and striking contrast to the golden hues which meet the eye. The Tetuan oranges are celebrated as the best in Morocco; and the exportation of them is a considerable source of revenue to the governor, large quantities being sent over to Gibraltar. A good sweetmeat is made from the blossoms preserved. The Tetuan apples are good, and are superior even to those of Ronda, in Spain, their flavour being sharper than what might be expected from the climate, and resembling more the English apple. Both white and red wine is made by the Jews; the former somewhat resembling a light Malaga wine. The gardens of Kitain were laid out by the great and powerful pacha, Hamet, who built a summer palace, and a banqueting-room fifty feet in height, with arched galleries above, and a dome at top, surrounded by fountains and basins of water, the sides of which were shaded by orange and citron trees." (*Travels, &c.*, vol. ii. p. 233.)

1449. *At Tangier*, the gardens which belong to the European consuls are situated without the walls, and are said, by Capel Brooke, to "add greatly to the few enjoyments of a residence at Tangier. The two best worth visiting are those of the Swedish and Danish consuls. The former are close to the upper gates; and, from their commanding situation, afford a very striking view of the whole town, the Alcasaba, and the Straits of Gibraltar, terminated in the distance, on the European side, with that fortress. On entering the grounds, one cannot help being agreeably surprised, in a place like Tangier, where every thing is neglected and in ruins, not only at their beauty and extent, but at the order in which they are kept by the personal attention of Colonel Ehrinhoff, the Swedish consul-general, who is a skilful horticulturist. The Danish consul's gardens, which are more remote from the town, are exceedingly extensive, and present a striking character of wildness and picturesque beauty. In the centre is a lofty tower, from which a very extensive and interesting inland view is obtained. These gardens, which now belong to M. Schousboe, the Danish consul-general, were the property, in former times, of Ali the Great, pacha of Tangier, who erected the tower. (*Ibid.*, vol. ii. p. 293.)

1450. *Mount Washington* was the villa of the late American consul, Mr. Simpson, and is still in the possession of his family. The walk to this beautiful retreat, which is situated on very elevated ground, is exceedingly wild; and the interest is increased by the remains of an ancient aqueduct thrown over a picturesque glen. This aqueduct, which was built for the purpose of conveying water to Tangier, derived its supply from a spring which gushes from an elevated rock, and is distinguishable at some distance. A small country-house of the late English consul-general, Mr. Matier, is seen on the side of the hill. It is prettily situated, but has a desolate appearance, from not having been inhabited for some years. The road is merely a tangled broken path, winding up the side of the mountain, which is clothed with one continued thicket of arbutus, ilex, and gum cistus, and forms an impenetrable retreat for numerous wild boars, whose traces are visible at every step. In the surrounding valleys is found the algaroba, or locust tree, a bushy evergreen, which attains the size of a forest tree, and produces a pod resembling a gigantic kidneybean. This is of a sweet flavour; and, when dressed by the Moors, makes a dish by no means unpleasant to the taste. It is generally used, however, for feeding cattle. When dried, the pods are of a chocolate colour, and contain small, hard, reddish kernels, which will keep good for years. After a steep and

lengthened ascent, says Brooke, "we reached the summit, and were well repaid for our fatigue by the beauty of the view. The villa itself is deserted; but, looking down upon the ocean stretched at its feet, it commands a most enchanting view of the sea, hemmed in on one side by the dark gloomy barrier of the Barbary mountains, and on the other by the lofty rock and fortress of Gibraltar." (*Ibid.*, vol. ii. p. 296.)

1451. *The cemetery of Tangier*, which is beyond the walls (as is always the case in Barbary), is quite open, and extends to a considerable distance, containing almost as much space as is enclosed within the walls of the town. The ground, which is high and irregular, is in a state of nature, being overrun with scattered bushes; while the luxuriance of the vegetation almost entirely conceals the simple graves, which are merely surrounded by a border of stones, placed edgewise. The tombs, which consist generally of low white walls, are seen peeping out among the thickets of aloe and prickly pear, and have a pretty though mournful appearance. Here and there a white rag, suspended on a stick, denotes the humble resting-place of a saint of inferior fame; while, occasionally, the appearance of a small dome indicates one of greater reputation. The tomb and sanctuary of Sidi Mohammed el Hadje, who was a saint of very extended celebrity, strikes the eye at a distance, for no Christian is permitted to approach it; and its white cupolas, emerging from the thick surrounding foliage, render it a picturesque object. The wild and melancholy look of this Moorish burial ground is heightened by the mournful appearance of the Moorish women, who are to be seen at all hours, even at dawn of day, wandering through it. On the afternoon of Friday, the Mahometan sabbath, this burial-ground is resorted to by great numbers of women of all ranks, who, enveloped in their deadly-looking *hayks*, wander, like unearthly beings, along the tangled winding paths, visiting the graves of their departed friends, strewing them with flowers, and offering up prayers for their repose. Sometimes they sit by the side of the tombs for hours, lost in meditation, or in seeming converse with their departed friends; when their deathlike appearance presents to the imagination the form of a spirit newly risen from the grave, and, attired in its grave-clothes, hovering over the spot where its earthly remains have been laid. (*Ibid.*, vol. ii. p. 379.)

1452. *Algiers* is favoured with a fertile soil, and a climate which admits of the culture of all the products of the south of Europe. Of its gardening little is known; but it is said to have been much improved since the city was taken possession of by the French in 1830.

1453. *In Tripoli*, as in most of the countries on the African coast of the Mediterranean Sea, the gardens are said to have no regular walks, and to be very indifferently cultivated. "In their gardens," says the author of a *Ten Years' Residence in Tripoli*, "the Moors form no walks; only an irregular path is left, which you trace by the side of white marble channels for irrigation. Their form is generally square," as all suburban, or at least street gardens, necessarily must be; "and they are enclosed by a wall, within which is planted a corresponding line of palm trees." (*Nar.*, &c., p. 59.) "The country round Tripoli," says Cella, "abounds in palm trees, whose bare and rough stems, spreading tops, and pointed leaves harmonise with the parched and rugged aspect of the country, and furnish the principal part of the subsistence of the natives. Their fruit equalises the tables of the rich and poor; and, being produced without culture, is favourable to happiness. Among the plantations of palm trees are many delightful gardens, full of lemon and orange trees, and protected by thick and impenetrable fences of Indian fig trees; but, except oranges, all other sorts of European fruits at Tripoli are scarce, and far inferior to those of Britain." (*Narrative of an Expedition*, &c., p. 17.)

1454. *In Barca*, the suburban gardens of Derna are mentioned by travellers as worthy of notice; and the cemetery of Cyrene has long been celebrated. The latter country is remarked for its roses, and the elegance and variety of the flowers and flowering shrubs with which it abounds.

1455. *The houses of Derna* are surrounded by gardens producing abundance of grapes, melons, figs, bananas, oranges, greengages, and other fruits: they have also the advantage of being well sheltered by thick groves of date trees, which give a very pleasing appearance to the town, and add much to the comfort of the inhabitants, by forming a perpetual shade. A delightful stream of water gushes out of the rock above the town, passing through several streets in its course, and irrigating the gardens, and even the cornfields in its neighbourhood. The ravine, at the mouth of which the town is situated, is of considerable depth and extent, winding up far into the mountains: some of the gardens are formed on its sides, and about them a few trees occasionally appear, where the soil has been able to lodge. In the rainy season a considerable body of water rushes down from the mountains to the sea, and is sometimes so deep and so rapid as to become wholly impassable. At such times it separates one half of the town from the other, and occasions considerable inconvenience. In the summer, however, it is dry, and the market is held upon its shining bed. (*Beechey's Trav. in Africa*, p. 472.)

1456. *The principal burying-place of Derna is on the eastern bank of the ravine, distinguished, in particular, by a lofty and handsome tomb, raised on four arches, under which the body is placed, with its usual simple covering of snow-white cement, and the stone-carved turban at its head. (Ibid., p. 473.)*

1457. *The cemetery of Cyrene (fig. 270.) covers a terraced hill; and the rock, which*



rises perpendicularly from these terraces, is excavated into innumerable tombs, which have been formed with great labour and taste; and the greater number of them have been adorned with architectural façades, built against the smooth sides of the rock itself, contributing materially to increase the interest, and to add to the beauty of the drives. When the rock would serve for the porticoes in front of the tombs, without any addition of building, it was left in the forms required; and, if only a part of it would serve, the remainder was added by the architect. This mode of proceeding added greatly to the strength of the work, and was probably attended, at the same time, with a saving of labour. The outer sides of the roads, where they descended from one range to another, were ornamented with sarcophagi and monumental tombs; and the whole sloping space between the galleries was completely filled up with similar structures. These, as well as the excavated tombs, exhibit very superior taste and execution; and the clusters of dark green furze and slender shrubs with which they are now partly overgrown, give an additional effect, by their contrast of forms and colour, to the multitude of white buildings which spring up from the midst of them. Among the tombs which have been excavated on the northern face of the heights at Cyrene, are several, on a much larger scale than the rest, which appear to have been public vaults: others seem to have been appropriated to single families. Beechey found two with white marble sarcophagi, ornamented with figures, and wreaths of flowers in relief, which he suspected to be Roman. (*Ibid.*, p. 446.)

1458. *Of the state of horticultural science on the African coast of the Mediterranean, some idea may be formed from the following extract, given by Beechey, from a Moorish horticultural work:—"When a palm tree refuses to bear," says the Arab author alluded to, "the owner, armed with a hatchet, comes to visit it in company with another person. He begins by observing aloud to his friend, in order that the date tree may hear him,—"I am going to cut down this worthless tree, since it no longer bears me any fruit."—"Have a care what you do," replies his companion; "for I predict that, this very year, your tree will be covered with dates."—"No, no," cries the owner; "I am determined to cut it down; for I am certain it will produce me nothing:" and then, approaching the tree, he proceeds to give it two or three strokes with his hatchet. The friend again interferes, and begs him to try one more season; adding, that if it does not bear then, he will let him do as he pleases. The owner at length suffers himself to be persuaded, and retires without proceeding to further extremities. The threat, however, and the few strokes inflicted with the hatchet, have always the desired effect; and the terrified palm tree never fails to produce, the same year, an abundant crop of fine dates."* (*Kaswini, Chrestomathie Arabe*, tom. iii. p. 319.)

SUBJECT. 3. *Gardening on the Western Coast of Africa.*

1459. *Gardening can hardly be said to exist in a country which can scarcely be considered within the pale of civilisation; but it may be interesting to notice some of the flowers and fruits which are indigenous in the neighbourhood of that deleterious settlement, Sierra Leone. It is remarkable, that the pine-apple is very abundant in the woods here; and the fruit, Mr. George Don assures us, is, even in a wild state, equal*

or superior to any he has tasted in England. The pine-apple is always found in the shade; and when accompanied by much decayed vegetable matter and moisture, attains an extraordinary size of foliage, and forms an impenetrable thicket, destroying every other plant except the timber trees over it, and obstructing the progress of the passenger in every direction. The circumstance of the pine-apple always growing in the shade may afford a useful hint to the cultivators of that plant in our stoves. The peach of Sierra Leone (the *Sarcocéphalus esculéntus* of Afzelius) is one of the most valuable of the tree fruits. The plant grows in abundance in low places over the whole country, and generally attains the height of from ten to fifteen feet. The fruit is a large fleshy substance, with a brown granulated surface, and a hard but eatable core, about one fourth of the diameter of the fruit, and about the consistence of the centre of a pine-apple. Guava and banana trees are abundant at Sierra Leone; and tamarinds, limes, oranges, plantains, papaw, and a variety of pumpkins, have been introduced there by the settlers. The vine produces grapes twice a year. Among the ornamental plants, one of the finest is the *Combretum comósum*, which covers the low trees with one blazing surface of scarlet.

SUMMARY. 4. Gardening in South Africa.

1460. *Gardening, as an art of design and taste*, can hardly be said to exist in a newly colonised country; nevertheless, when the Dutch took possession of the Cape of Good Hope, about the middle of the seventeenth century, which is described in *Lockman's Travels of the Jesuits*, vol. i. p. 37., and thus noticed by Sir William Temple: — "It contained nineteen acres, was of an oblong figure, very large extent, and divided into four quarters by long and cross walks, ranged with all sorts of orange trees, lemons, limes, and citrons. Each of these four quarters is planted with the trees, fruits, flowers, and plants that are native and proper to each of the four parts of the world; so as, in this one enclosure, are to be found the several gardens of Europe, Asia, Africa, and America. There could not be, in my mind, a greater thought of a gardener, nor a nobler idea of a garden, nor better suited or chosen for the climate." Father de Premare says, "It is one of the most beautiful spectacles in the world." This garden was visited by Mr. Main in 1792, and he found it at that time used as a public mall. It was then rather neglected, except a small part appropriated to the private use of the governor. It was quite in the Dutch style, with quadrangular quarters, divided by walks, crossing each other at right angles. The oak and myrtle hedges are the principal ornaments of the place.

1461. *Cemeteries*. The Malays at the Cape of Good Hope, like the French, are particularly neat in decorating their churchyards, in which they have gardeners always at work, converting the loathsome dreary sepulchre into an inviting place of religious instruction. (*Penny Magazine*, vol. i. p. 51.)

1462. *The only indigenous fruits of the Cape*. Those that have been introduced into the colony are the grape, apple, cherry, plum, peach, nectarine, apricot, fig, orange, lemon, citron, pomegranate, almond, mulberry, guava, melon, and, in short, all the fruits esteemed by Europeans. No grapes of Europe are considered preferable to those of this colony. The colony of Capetown consists chiefly of vine-growers. They are of French extraction; possess farms of about 120 English acres; and the culture of the grape, with an elegant garden, generally occupies the whole. The lands are surrounded and divided by oak and quince hedges; and the vines, cultivated as in France and Germany, have the appearance of plantations of raspberries. The Cape market is richly supplied from these gardens. Between Table Bay and False Bay are the two farms producing the Constantia wine. Here most of the above fruits thrive; but gooseberries, currants, plums, and cherries do not succeed at all.

1463. *The ornamental plants of the Cape* are well known; among them may be reckoned almost all our heaths, diosmas, pelargoniums, a profusion of genera belonging to the families of *Iridæ* and *Amarylloideæ*, the splendid *Strelitzia*, *Mesembryanthemum*, *Aloe*, *Gnaphalium*, *Protea*, and many other genera.

1464. *The South African Institution*, established in 1829, is considered as having given some stimulus to botanical and horticultural pursuits; and it is hoped by Mr. Bowie, one of the most active members of this institution, and an able writer in its quarterly journal, that a botanic garden will soon be formed. (*Gard. Mag.*, vol. vi. p. 322.) Mr. Bowie is the author of some excellent papers on the cultivation of Cape plants, which will be found in the second, sixth, seventh, and eighth volumes of the *Gardener's Magazine*.

1465. *The cultivation of the interior of the country* is not without interest, and will be found in the *Encyclopædia of Agriculture*, § 1113. to 1139. The plants used by the natives as food, and for clothing and house-building, are also interesting; and some of their dwellings and utensils may afford hints for ornamental buildings in pleasure-grounds.

SUBJECT. 5. Gardening in the African Islands.

1466. *The Mauritius, or the Isle of France*, contains one of the oldest botanic gardens existing in the tropics; and which, while in possession of the French, was the source whence the nutmeg, clove, cinnamon, and other useful trees were sent to the West India Islands. This garden contains a very extensive collection, embracing most of the large-leaved plants of New Holland, many of the Cape plants, and the greater number of those from the East Indies and China. Mr. Newman, who was the curator in 1830, informs us that he maintains a correspondence with the gardens in most parts of the globe; and that he has almost exclusive communication with that great field of science, Madagascar. "The garden," he says, "although laid out in the oldest French style, has the advantage of being irrigated, thereby saving a number of hands, and effectually watering the plants in the driest seasons." (*Gard. Mag.*, vol. vi. p. 484.)

1467. *The cultivation of asparagus in the Mauritius* affords a proof of the great difference between the culture of a plant in a temperate climate and between the tropics. Asparagus in the Mauritius appears above ground a fortnight after being sown; and in two months shows flowers, which it does not in Britain in less than two years. From the time of sowing to that of cutting for the table occupies no more than ten or fourteen months; and at the end of two years the beds, being exhausted, are destroyed. In Britain, asparagus beds last half a century. In the Mauritius, asparagus is forced by inundating the beds with water: in Britain, the same effect is produced by covering them with warm dung. Three crops of peas from three successive generations are obtained in the same season. (*Ibid.*, p. 485.)

1468. *The Isle of Bourbon* contains a botanic garden, which has been richly endowed by the king of the French; and contains, besides the productions of the island, a splendid collection of African and Asiatic plants. It is situated on a rising ground in the middle of the town, and occupies fourteen English acres. Besides this, within the last three years there has been established a "jardin de naturalisation," or a garden expressly devoted to the purpose of inuring foreign plants to bear and thrive in the climate of the island; a most useful institution, and one to which we would call the attention of our Van Diemen's Land Society, as well as of the government and of our readers generally. It contains about eight English acres; and, together with the botanical garden, distributes upwards of 10,000 trees and shrubs annually among the colonists in this most improving little island. M. Brecan, a gentleman of high literary and scientific attainments, superintends the management of both gardens. (*Gard. Mag.*, vol. vii. p. 664.)

1469. *The Canary Islands* are celebrated for their honey, more especially that made by the bees on the Peak of Teneriffe. The inhabitants of every village in the neighbourhood of the Peak carry their bee-hives, which are formed of the hollow trunks of the dragon tree (*Dracæna*), in the month of May, and place them in the crevices of rocks. Millions of bees then swarm round the large and fragrant bushes of the white retama, or white broom (*Spártium nubigenum*), and very soon fill the hives. The honey, which is taken from them twice every summer, is always in great abundance; and neither *Hymettus* nor *Chamouni* have ever produced any thing equal to it; it is so pure and transparent, and its taste is so aromatic and delicious. (*Gard. Mag.*, vol. ii. p. 462.)

1470. *In Madeira, the garden products* are those of both hemispheres. Dr. Walsh remarks that, in general, grapes and potatoes rarely thrive together; the heat and dryness necessary to mature the one, being very inimical to the other; but in Madeira, where every stratum of elevation gives a different soil and climate, all plants and fruits grow up and prosper. He saw in the market-place at Funchal, figs (black and green), bananas in bunches, citrons, apples, pears, large red onions, peaches (hard and unripe, being preferred in that state), grapes of several qualities, including a small dark grape called *sinto*, the clusters of which sometimes weigh twenty pounds, the roots of *Caladium esculéntum*, the acidity of which, being volatile, is dissipated by boiling or baking; and the leaves, which, though forbidding in aspect, like those of the English cuckoo-pint, are yet boiled and eaten, and called Indian kale. The soil producing the best grapes is the poorest and most stony, resembling that of some of the best vineyards of the Rhine. (*Notices of Brazil*, vol. i. p. 34.)

1471. *The group of the Azores* is the most northern of those islands which dot the Atlantic: they are of volcanic origin, and for the most part fertile. The island of St. Michael, celebrated for its oranges, is by far the most productive. Not an acre of arable soil, Dr. Walsh observes, is lost; and "both European and tropical vegetation flourishes, side by side, in the most luxuriant manner. Wheat and bananas, figs and cabbages, oranges and potatoes, are equally abundant and excellent in their kind." (*Ibid.*, vol. i. p. 512.)

SECT. III. Gardening in North America.

1472. *The gardening of North America* is necessarily that of Europe, and, as is the case of other arts in every new country, the useful departments are more generally cultivated than the ornamental. B. M'Mahon, in his *American Kalendar*, says, "America has not yet made that rapid progress in gardening, ornamental planting, and fanciful rural designs, which might naturally be expected from an intelligent, happy, and independent people, possessed so universally of landed property, unoppressed by taxation or tithes, and blessed with consequent comfort and affluence." (*Pref.*) We shall notice the state of the art under the usual arrangement.

SUBJECT. 1. Gardening in North America, as an Art of Design and Taste.

1473. *Landscape-Gardening* is practised in the United States on a comparatively limited scale; because, in a country where all men have equal rights, and where every man, however humble, has a house and garden of his own, it is not likely that there should be many large parks. The only splendid examples of park and hot-house gardening that, we trust, will ever be found in the United States, and ultimately in every other country, are such as will be formed by towns and villages, or other communities, for the joint use and enjoyment of all the inhabitants or members. With a view to this end, and to this end only, are the gardens of the monarchs and magnates of Europe at all worth studying.

1474. *Hyde Park, on the Hudson*, according to a recent writer in the *Gardener's Magazine*, Mr. Gordon, is the first in point of landscape-gardening in America. Its proprietor, Dr. David Hosack, is a botanist, and a man of taste. The natural capacity of this seat for improvement has been taken advantage of in a very judicious manner; and every circumstance has been laid hold of, and acted upon, which could tend to beautify or adorn it. The mansion is splendid and convenient. The park is extensive, the rides numerous, and the variety of delightful distant views embrace every kind of scenery. The pleasure-grounds are laid out on just principles, and in a most judicious manner; and there is an excellent range of hot-houses, with a collection of rare plants, remarkable for their variety, cleanliness, and handsome growth. (*Gard. Mag.*, vol. viii. p. 282.) Mrs. Trollope, speaking of this villa, says, "Hyde Park is the magnificent seat of Dr. Hosack: here the misty summit of the distant Kaatskill begins to form the outline of the landscape; and it is hardly possible to imagine a more beautiful place." (*Domestic Manners of the Americans*, vol. ii. p. 206.) Mr. Stuart speaks in raptures of "the view over the most beautiful of all beautiful rivers, from the magnificent terrace in the front of Dr. Hosack's house, situated in the most enviable of the desirable situations on the river." Hyde Park, he says, "is quite a show place, in the English sense of the word." (*Three Years, &c.*, vol. ii. p. 549.)

1475. *The residence of General Van Rensselaer*, the most wealthy landed proprietor in the United States, consists of a mansion at the north end of Albany, with more of the accompaniments of garden, shrubbery, conservatory, &c., than is often seen in America; but no great quantity of land is devoted to what we call pleasure-grounds, though the estate of the proprietor extends twelve miles in every direction. (*Stuart's Three Years' Residence, &c.*, vol. i. p. 52.)

1476. *Woodlawn*. There is hardly an acre of Manhattan Island, says Mrs. Trollope, "but what shows some pretty villa or stately mansion. The most chosen of these are on the North and East Rivers, to whose margins their lawns descend. Among these, perhaps the loveliest is one (Woodlawn) situated in the beautiful village of Bloomingdale. Here, within the space of sixteen acres, almost every variety of garden scenery may be found. To describe all its diversity of hill and dale, of wood and lawn, of rock and river, would be in vain, for I never saw any thing like it." (*Dom. Man.*, &c., vol. ii. p. 183.)

1477. *Waltham House* (*fig. 271.*), the property of Theodore Lyman, in the state of



Massachusetts, is situated in a very flourishing country, about nine miles from Boston. The grounds round the house consist of a lawn of a mile in length, in front, upon which there are many fine oaks, English and American elms, lindens, and other valuable forest trees. A deep and clear stream of water, varying in breadth, runs the whole length of the lawn, and afterwards falls into Charles River. There is an extensive park, containing about forty deer, principally of the Bengal breed; to the left and rear of the house is the kitchen-garden, grapery, green-house, hot-house, wall for fruit, &c. (*Gard. Mag.*, vol. i. p. 205.)

1478. *The neighbourhood of Philadelphia* is rendered interesting by a succession of gentlemen's seats on the Delaware, which, says Mrs. Trollope, "if less elaborately finished in architecture and garden grounds than the lovely villas on the Thames, are still beautiful objects to gaze upon as you float rapidly past, on the broad silvery stream that washes their lawns. They present a picture of wealth and enjoyment that accords well with the noble city to which they are an appendage." (*Dom. Man. of the Amer.*, vol. ii. p. 153.)

1479. *The seat of Joseph Bonaparte*, near Bordentown, on the New Jersey shore of the Delaware, is in the midst of an extensive tract of land, on which the ex-monarch has built several houses, which are occupied by French tenants. The country is very flat, but a terrace of two sides has been raised, commanding a fine reach of the river; at the point where this terrace forms a right angle, a lofty chapel has been erected, which looks very much like an observatory. The highest part of this building presents in every direction the appearance of an immense cross; the transept being formed by the projection of an ample balcony, which surrounds a tower. (*Ibid.*, vol. ii. p. 154.)

1480. *Monte Video*, the residence of Daniel Wordsworth, Esq., says Mr. Stuart, "stands in a very fine situation, not less than 600 feet above the Connecticut River, and its beautiful meadow scenery. The approach to the house is about three miles in length, and is carried over a succession of small hills finely wooded. There is a handsome piece of water near the house, and a hill behind it; from a tower on the top of which there is a magnificent view, bounded by the hills of Massachusetts, of as rich and fertile a country as there is in the world, watered by a great river, the Connecticut, the windings of which are all in sight. Advantage has certainly been taken of the natural beauties of the place in laying it out—the road, the piece of water, and the grounds; but nothing about the place is kept in the handsome style of an English country residence." (*Three Years*, &c., vol. i. p. 363.)

1481. *Mount Vernon* was the seat of General Washington, "first in peace, first in war, and first in the hearts of his countrymen." This noble residence is situated on the banks of the Potomac; a magnificent river, which at the city of Washington "makes a beautiful sweep, and forms a sort of bay, round which the city is built. Washington was buried at Mount Vernon, and it is easy to distinguish from the river the cypresses that wave over his grave." (*D. M. of the A.*, vol. ii. p. 306.) Mr. Stuart informs us that the extent of this property is 10,000 acres. About five miles of the drive from Washington, pass through wooded ground belonging to the property. The situation of the house, on a fine bank of land above the Potomac, and the elevation and undulation of the neighbouring ground, are altogether very desirable, and afford great facilities for making Mount Vernon a magnificent place; but neither the house nor the offices, nor any part of the grounds, are in any thing like good order. Every thing seems to have remained unchanged, save by time, since Washington died. The narrow path at the top of the bank above the river, which was begun by him, just before he was carried off by sudden illness, remains in its unfinished state. The house at Mount Vernon contains only one apartment which would be considered good in Britain. (*Three Years*, &c., vol. i. p. 397.)

1482. *Monticello*, the seat of the immortal Jefferson, is situated on the summit of an eminence commanding extensive prospects on all sides. It is ascended by a spiral approach, laid out by the proprietor himself, and passing through fruit and ornamental trees, many of which were planted by his own hands. The southern declivity of the hill is covered with vineyards, the east and west sides by orchards, the north side by a forest, and the champaign lands below are devoted to the culture of corn and tobacco. In the extreme distance, looking from the south front of the house towards the left, appears Jefferson College, a magnificent quadrangle, of Grecian architecture, founded by the first modern statesman who duly appreciated the education of the mass of society and the evils of an established church. Jefferson was a skilful agriculturist, as is proved by many of his letters in his *Life and Correspondence*, and by several articles of his in the Transactions of American societies. It was fitting that such a man should have such a residence. (*Ibid.*)

1483. *Arlington*, the seat of Mr. Custie, the grandson of General Washington's wife, is a noble-looking place, having a portico of stately white columns; which, as the mansion stands high, with a background of dark woods, forms a beautiful object in the landscape. (*Domestic Manners of the Americans*, vol. ii. p. 330.)

1484. *Kaleirama* is about a mile from Washington, on high terrace ground, and is a very pretty place. It is not large, or in any way magnificent, but the view from it is charming; and it has a wood behind, covering about 200 acres of broken ground, that slopes down to a dark cold little river, so closely shut in by rocks and evergreens, that it might serve as a noontide bath for Diana and her nymphs. The whole of this wood is filled with wild flowers, but such as we cherish fondly in our gardens. (*Dom. Man.*, 2c., vol. ii. p. 390.)

1485. *Stonington* is about two miles from the most romantic point of the Potomac river; and Virginia spreads her wild but beautiful and most fertile paradise on the opposite shore. The Maryland side partakes of the same character, and displays an astonishing profusion of wild fruits and flowers. The walk from *Stonington* to the falls of the Potomac is through scenery that can hardly be called forest, park, or garden; but which partakes of all three. Cedars, tulip trees, planes, sumachs, junipers, and oaks of various kinds, shade the path. Below are Judas trees, dogwood, azaleas, and wild roses; while wild vines [*Vitis vulpinus?*] with their rich expansive leaves and sweet blossom rivaling the mignonette in fragrance, cluster round the branches; and strawberries, violets, anemones, heartsease, and wild pinks literally cover the ground. The sound of the falls is heard at *Stonington*, and the gradual increase of this sound is one of the agreeable features of this delicious walk. A rumbling, turbid, angry little rivulet, called the Branch Creek, flows through evergreens and flowering underwood, and is crossed *à plusieurs reprises* by logs thrown from rock to rock. The thundering noise of the still unseen falls suggests an idea of danger while crossing these rude bridges, which hardly belongs to them; and, having reached the other side of the creek, the walk continues under the shelter of evergreens another quarter of a mile, and then emerges on the rocky depths of an enormous river; and so large are the black crags that enclose it, that the thundering torrents of water rushing through, over, and among the rocks of this awful chasm, appear lost and swallowed up in it. (*Ibid.*, vol. ii. p. 4.)

1486. *At Charleston* the houses of the suburbs are, for the most part, surrounded by gardens, in which orange trees with most splendid ripe fruit, monthly roses in full bloom, and a variety of other flourishing plants, display themselves. The greater part of the habitations have piazzas and spacious balconies. Upon the walls and columns are creeping vines, and a great number of passion-flowers. (*Flint's Geography and History of the United States*, vol. ii. p. 4.)

1487. *At Savannah*, the seat of Thomas Young, Esq., is said by Mr. Gordon "to surpass all others in the south. It is rich in the choicest and most expensive plants that can be obtained either in America or Europe." (*Gard. Mag.*, vol. viii. p. 286.)

1488. *The Garden of Lewis Le Conte, Esq., near Riceborough*, is said by Mr. Gordon to be the richest in bulbs that he had ever seen. M. Le Conte is an excellent botanist and vegetable physiologist. He has also paid great attention to the subject of arboriculture. (*Ibid.*, vol. viii. p. 287.) The village of *Riceborough* (*fig. 272.*) is very

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picturesque. Most of the houses have verandas; and it is observed both by Captain Hall, and by Mr. Stuart, that the pride of India, the *Lagerstrœmia indica*, is planted along the streets, as well as in those of most of the southern towns, particularly Charleston and Savannah. (*Hall's Sketches*, 2c., and *Three Years in North America*, 2c.)

1489. *Country-house in the neighbourhood of the Falls of Niagara.* Captain Hall, in his *Travels in Upper Canada*, relates a curious anecdote of landscape-gardening in America. — A gentleman, wishing to form a country residence as expeditiously as possible, selected a certain spot in the midst of the wilderness, which, he conceived, from the nature of the ground, the description of trees which grew upon it, and the extent of view which it commanded, might be converted, with little trouble, from its wild state into a beautiful park, such as must have cost, in the ordinary process of old countries, at least one century, if not two, to bring to perfection. Some of the oaks and other trees were particularly beautiful, and of immense size; and he determined on removing only those trees which encumbered the ground, leaving the others in all their native beauty. The trees were marked accordingly; but the proprietor was unfortunately obliged to be absent when the thinning took place, and the workmen, who from their infancy had known nothing about trees, except that they ought to be cut down as fast as possible, could not conceive it possible that their employer wished so large a number of trees to be saved, and accordingly decided among themselves that he had made a mistake, and that the small number of trees marked to be cut down, were, in fact, those intended to be saved. The first thing, accordingly, that struck the master's eye, on his return, was the whole of his noble grove lying flat upon the ground, while only a dozen or two craggy oaks, pines, and hemlocks, destined for the fire, were left standing to tell the tale. (*Travels in North America*, vol. i. p. 267.)

1490. *The whole region of the Alleghany mountains is a garden.* "The magnificent rhododendron fringes every cliff; nestles beneath every rock, and blooms around every tree. The azalea, the sumach, and every variety of that beautiful mischief the kalmia, are in equal profusion." Cedars, firs, and the hemlock spruce attain here the greatest "splendour and perfection of growth." Oak and beech, with innumerable roses and wild vines hanging in beautiful confusion among their branches, were in many places scattered among the evergreens, and the earth was carpeted with various mosses, and creeping plants. Often, on descending into the narrow valleys, spots were found in a state of cultivation. These little gardens, or fields, were "hedged round with sumachs, rhododendrons, and azaleas; and the cottages were covered with roses. These valleys are spots of great beauty, and a clear stream is always found running through them, which is generally converted to the use of the miller." (*Domestic Manners of the Americans*, vol. ii. p. 276.)

1491. "I never saw so many autumn flowers as grow in the woods and sheepwalks of Maryland," says the same writer. "Let no one visit America without having first studied botany: it is an amusement that helps one wonderfully up and down hill, and must be superlatively valuable in America, both from the lack of other amusements, and the plentiful material for enjoyment in this." (*Ibid.*, vol. ii. p. 91.)

1492. *Public Gardens.* It is easy to foresee that America will one day be possessed of public gardens far superior to any now existing in Europe. Our grounds for this prediction are, that in America there are no other means by which the grandeur and magnificence of gardening can be displayed; that the Americans delight in doing every thing on the grandest scale; and that nature has bountifully supplied every description of material. Taste and wealth, which are rapidly accumulating, are all that are wanting to realise this view. In the mean time, all the old towns have public walks or gardens; and, in the new parts of the country, all nature, as Mrs. Trollope has remarked, is so beautiful, that there is no need of them.

1493. *At New York* "the principal promenade is the battery; and a more beautiful one no city can boast. It commands a fine view of the magnificent bay, and forms a termination to the splendid street called the Broadway, which runs through the whole city, and is ornamented by several handsome buildings, some of which are surrounded by grass and trees. The park in which stands the noble city-hall, is a very fine area." (*Ibid.* vol. ii. p. 158.) St. John's Park is of considerable extent, and has lately been thrown open to the inhabitants: it is tastefully and very judiciously planted, with the ornamental trees and shrubs indigenous to the country. (*Gard. Mag.*, vol. iii. p. 347.) There are a few trees in different parts of the city, observes Mrs. Trollope, and many young ones have been planted, and guarded with much care: were they more abundant, it would be extremely agreeable, for the reflected light of the fierce American summer "sheds intolerable day." The enclosure in the centre of Hudson's Square (New York) is beautiful. It is excellently well planted with a great variety of trees, and only wants our frequent and careful mowing to make it equal to any square in London. The iron railing which surrounds this enclosure is as high, and as handsome, as that of the Tuilleries; and it will give some idea of the care bestowed on its decoration, to know that the gravel for the walks was conveyed by barges from Boston, not as ballast, but as freight. (*Dom. Man.*, §c. vol. ii. p. 160.)

1494. *Hoboken*, on the North River, about three miles from New York, is a public walk of great beauty and attraction. A broad belt of light underwood and flowering

shrubs, studded at intervals with lofty forest trees, runs for two miles along a cliff which overhangs the matchless Hudson; sometimes it feathers the rocks down to its very margin, and at others leaves a pebbly shore, just rude enough to break the gentle waves, and make a music which mimics softly the loud chorus of the ocean. Through this beautiful little wood, a broad well-gravelled terrace is led by every point which can exhibit the scenery to advantage; narrower and wilder paths diverge at intervals, some into the deeper shadow of the woods, and some shelving gradually to the pretty coves below. At Hoboken there are various *repositres*, or smoking-houses; some not unpleasant to the eye: one, in particular, has quite the air of a Grecian temple; and, did they drink wine instead of whisky within it, might be inscribed to Bacchus. (*D. M.*, &c. vol. ii. p. 170.)

1495. *Promenade at Philadelphia.* There is a very pretty enclosure before the walnut-tree entrance to the state-house, with good well-kept gravel walks, and many beautiful flowering trees. It is laid down in grass, not in turf; which, indeed, Mrs. Trollope observes, "is a luxury she never saw in America. Near this enclosure is another of a similar description, called Washington Square, which has numerous trees, with commodious seats placed beneath their shade." (*Ibid.*, vol. ii. p. 48.) These and all the public squares of Philadelphia were laid out and planted, in consequence of a petition drawn up by Dr. Menze, and signed, on his personal application, by such a number of citizens, as produced the effect intended. (*Gard. Mag.*, vol. iv. p. 387.)

1496. *Waterworks at Fair Mount, near Philadelphia.* "Fair Mount is one of the prettiest spots the eye can look upon. A broad weir is thrown across the river Schuylkill, which produces the sound and look of a cascade. On the farther side of the river is a gentleman's seat, the beautiful lawn of which slopes down to the water's edge; and groups of weeping willows and other trees throw their shadows on the stream. The works themselves are enclosed in a simple but very handsome building of freestone, which has an extended front opening upon a terrace which overhangs the river: behind the building, and divided from it only by a lawn, rises a lofty wall of solid limestone rock, which has at one or two points been cut into, for the passage of the water into a magnificent reservoir, ample and elevated enough to send it through the whole city. From the crevices of this rock the catalpas was every where pushing forth, covered with its beautiful blossoms. Beneath one of these trees, an artificial opening in the rock gives passage to a stream of water, clear and bright as crystal, which is received in a stone basin of simple workmanship, having a cup for the service of the thirsty traveller. At another point, a portion of the water, in its upward way to the reservoir, is permitted to spring forth in a perpetual jet d'eau that returns in a silver shower upon the head of a marble naiad of snowy whiteness, admirably relieved by its dark rocky background, and the flowery catalpas which shadow it." (*Domestic Manners of the Americans*, vol. ii. p. 44.)

1497. *In the city of Washington* there are several squares newly planted; and some of the streets are bordered by rows of trees. The avenue of Pennsylvania, when the trees are a few years older, will be the finest street in the world; it leads to the capitol, a Grecian building, on the capitals of the columns of which the Indian corn takes the place of the acanthus.

1498. *At Baltimore*, the public walk is along a fine terrace belonging to a fort nobly situated on the Patapasco, and commanding the approach from Chesapeake Bay, and a magnificent view of the city and river. The terrace is ornamented with a profusion of evergreens and wild roses. (*Ibid.*, vol. ii. p. 303.)

1499. *At Cincinnati* there is a public garden, where the people go to eat ices and look at roses. For the preservation of the flowers, there is placed at the end of one of the walks a kind of sign-post, representing a Swiss peasant girl holding in her hand a scroll, requesting that the roses might not be gathered. (*Ibid.*)

1500. *At Boston* there are extensive public pleasure-grounds called the Common, consisting of seventy-five acres, in the very heart of the city. This piece of ground is well laid out, and contains many fine trees. The state-house, and the handsome houses of the city, surround it on three sides.

1501. *A public cemetery* was formed in 1831 at Mount Auburn, about three miles from Boston, and is easily approached either by the road, or the river which washes its borders. On the eligibility of the situation, and the manner in which it should be laid out, a writer in the *North American Review* has the following remarks:—"It affords every variety of soil and elevation which trees or flowers would require, with streams and meadows, from which ponds may be made for plants which love the water. The plants of every climate may find there a suitable home. It might be thought that it would require many years to cover it with verdure; but nature has anticipated this objection; it being already clothed with trees and shrubs of almost all descriptions which grow in this part of the country. The most striking part of this tract is a conical hill of considerable height, which commands an extensive and beautiful prospect. This is reached by a gentle ascent, which winds like a road round the hill, with valleys on each side, and is so exact in its bearing, that it is difficult to persuade one's self that man had

no agency in forming it. The top of the height is an admirable place for a monument intended to be seen at a distance, and the sides will afford room for the resting-place of many generations. The whole country would not afford a better spot for the purpose than this. It is consecrated already by many delightful associations in the memory of most of those who have left the university for many years past; and the plan proposed, instead of breaking up this favourite resort, would only render it better suited to aid the inspirations of science, feeling, or imagination. There is something unpleasant to many in the idea of cultivating the place of death. This may be owing to the old prejudice, which regards nature and art as opposed to each other. Nature, under all circumstances, was meant to be improved by human care; it is *unnatural* to leave it to itself; and the traces of art are never unwelcome, except when it defeats the purposes and refuses to follow the suggestions of nature. We trust that the public-spirited authors of this design will consider themselves as giving a direction to public taste; and that they will therefore not suffer the ground to be disfigured with dungeon-like tombs, which are only suited to the cellars of churches and burying-places of cities, where the dead cannot find room to lie dust to dust. The monuments also deserve regard. The stiff and ungainly headstone should be banished, to give place to the *cippus*, or some simple form suited to resist the elements, and receive inscriptions. But the ornaments of the sepulchre should be trees and flowers. Let the monuments be found in the noble forests of our land; let them not be such as the elements waste, but such as time only strengthens and repairs." (*North. Amer. Rev.*, Oct. 1831.)

1502. *The burying-ground at Newhaven* "is laid out with more care and attention, and is better kept, than any ground devoted to the same purpose in the United States. It is of considerable size, and formed into broad lanes, shaded by weeping willows, poplars, &c. The whole has a good effect; many of the monuments are fine, and a considerable number of them were brought from Italy. In short, the burying-ground at Newhaven is quite the *Père la Chaise* of the United States." (*Stuart's Three Years*, &c., vol. i. p. 365.)

1503. *The cemetery of the Episcopal church of the town of Guilford* is in a public square, and uninclosed. The graves are therefore trampled upon, and the monuments injured, both by men and cattle. On this cemetery Dr. Dwight makes the following judicious remarks:—"The design of locating places of burial in this manner was probably good. In its execution, however, it evidently defeats itself, while it is also a plain violation of propriety. Instead of producing those solemn thoughts, and encouraging those moral propensities, which it was intended to inspire, it renders death and the grave such familiar objects to the eye, as to prevent them from awakening any serious regard. Here, particularly, both the remains and memorials of the dead are presented to the mind in circumstances so gross, and indicative of so little respect in the living, as to eradicate every emotion naturally excited by the remembrance of the deceased, and give to those which remain a coarseness and commonness, destructive of all moral influence. Nor is it unreasonable to suppose that the proximity of those sepulchral fields to human habitations is injurious to health. Some of them have, I believe, been found to be offensive; and will probably be allowed to have been noxious. Even in cases where nothing of this nature is perceptible, it is far from being clear that effluvia too subtle to become an object of sense do not ascend in sufficient quantities to affect with disease, or at least with a predisposition to disease, those who, by living in the neighbourhood, are continually breathing this mischievous exhalation." (*Dwight's Travels in New England and New York*, 8vo, London, 1823, vol. ii. p. 489.)

1504. *In Virginia and Maryland* almost every family mansion has its little grave-yard, sheltered by locust and cypress trees; and one mansion on the Delaware, near Philadelphia, has the monument which marks the family resting-place, rearing itself in all the gloomy grandeur of black and white marble, exactly opposite the door of entrance. (*Domestic Manners of the Americans*, vol. ii. p. 153.)

SUBJECT. 2. Gardening in North America in respect to Botanic Gardens, and the Culture of Flowers and Plants of Ornament.

1505. *The American government* has shown itself not insensible to the advantages of encouraging among its subjects a feeling for other pursuits than those connected with mere mercantile speculations. Seated in a country rich beyond all others in stores of botanical wealth, it would have been indeed surprising if the study of botany had not been among the first of those objects which the American government felt itself bound to patronise. Accordingly, we find botanic gardens and professorships attached to the American universities, and expeditions fitted out for the purpose of making scientific discoveries. At one time the country was chiefly known by the investigations of Europeans; but now there are the native names of Hosack, Elliot, Nuttall, Torrey, Barton, Bigelow, and others, all of which deserve honourable mention for their exertions in the protection or prosecution of native botanical investigations, and some of whom are

held in high estimation even among Europeans. There is also a horticultural society established at New York. (*Gard. Mag.*, vol. i. p. 52.)

1506. *America is rich in botany, especially in trees.* Dr. Hosack, in the preface to his *Hortus Elginensis*, observes, "that although much has been done by the governments of Great Britain, France, Spain, Sweden, and Germany, in the investigation of the vegetable productions of America; although much has been accomplished by the labours of Catesby, Kalm, Wangenheim, Schoepf, Walter, and the Michaux; and by our countrymen, Clayton, the Bartrams, Colden, Muhlenburg, Marshall, Cutler, and the learned P. Barton of Pennsylvania, much yet remains to be done in this western part of the globe." There were in America, at an early period, men who recommended the necessity of instituting botanic gardens, as Lieutenant-Governor Colden and Dr. Middleton of New York, in 1769; and, upon the revival of the medical school in Columbia College, in 1792, a professor of botany was appointed, and Dr. Mitchell was appointed professor. Dr. Hosack succeeded Dr. Mitchell; and the result was, first, the latter professor's establishing a botanica garden at his own expense, and afterwards government purchasing it of him for the benefit of the medical schools of New York; and it is now known as the New York Botanic Garden.

1507. *The Botanic Garden of New York* contains twenty acres: the first catalogue was published in 1806, and the second in 1811, containing nearly 4000 species. (*Statement, &c. as to the Elgin Botanical Garden, by Dr. Hosack.* New York, 1811.)

1508. *The first systematic work upon the flora of North America* appeared in 1803, from the pen of André Michaux, under the title of *Flora Boreali-Americana*. Partial floras had been previously published by Walter, Clayton, Gronovius, and others; but the most extensive appeared in 1816, by F. Pursh, a Prussian botanist, who spent nearly twelve years beyond the Atlantic in botanic travel, and in the management of two botanic gardens; the last that of Elgin. From the preface to this work we are enabled to give the names of the principal botanic gardens in the United States. In British America there are none. The first gardens Pursh saw were the old established gardens of M. Marshall, author of a small treatise on the forest-trees of North America. These were rather on the decline. The botanic garden of J. and W. Bartram, on the banks of the Delaware, near Philadelphia (now Carr's nursery), was founded by their father, under the patronage of Dr. Fothergill. The garden of the American patriot, Hamilton, was in his time one of the richest in plants in America. Those of Dr. Hosack, Mr. Pratt, Mr. Fox, Dr. Wray, Mr. Oemler, Mr. Young, and M. Le Conte, are also all celebrated for their botanical riches. (*See Gard. Mag.*, vol. viii. p. 27.)

1509. *The Botanical Garden at Cambridge*, in the state of Massachusetts, was commenced in 1801, by subscription. The object of the establishment is the promotion of knowledge in native and foreign plants useful in agriculture, horticulture, and medicine, as well as the encouragement of the sciences of botany and entomology. There being no competent knowledge in the country as to what were the wants of a botanic garden, the professor, Peck, was sent to Europe, and returned with plans, and a collection of books. This garden suffered for some time from want of funds, and would long since have followed the fate of the Charleston public garden, founded by Dr. Hosack (which was purchased by the state at the price of 70,000 dollars), and would, like it, have been converted into a wilderness, had not the visitors applied for and obtained the aid of the legislature;—of a very enlightened legislature, who, not mistaking false maxims of economy for true ones, saw, in the destruction of a great public work, great loss; deeming that the riches and prosperity of a state are as much promoted, to say nothing of its reputation, by wise and generous establishments for the promotion of knowledge, as by any financial measures. (*New York Farmer*, vol. i. p. 185.)

1510. *A botanic garden at Baltimore* was commenced in 1830; and an extensive correspondence with the nurserymen and curators of botanic gardens in Europe will, it is hoped, soon procure for it a respectable collection. (*Gard. Mag.*, vol. vii. p. 668.)

1511. *The botanic garden of Montreal* is said, by De Roos, to exhibit the appearance of a beautiful park; it was, however, when he saw it, rather indifferently supported by the government. (*Personal Narrative, &c.* p. 133.)

SUBJECT 3. Gardening in North America, in respect to its Products for the Kitchen and the Dessert.

1512. *Horticulture*, Judge Buel observes, received but little attention in the United States, until quite a recent period; and, with occasional exceptions, was limited to the culture of common culinary vegetables and fruit. A young people must earn the means of procuring the luxuries and elegancies of horticultural refinement, before they can enjoy them. The wants and necessities of a new country are generally too imperious to leave much time, or to afford adequate means, for indulging extensively in the ornamental and scientific departments of gardening; and, perhaps, the republican principles of the government, and the habits of the people, have, in a measure, tended to retard

improvement in these higher branches. Most men are ambitious of popular favour; and here, where all are upon a political equality, whatever savours of singular ostentation or extravagance rather begets bad than good feelings. The Tartar conquerors conciliated the Chinese by conforming to the laws and customs of those whom they had conquered. But the greatest obstacle to improvement has been the want of prominent examples. There have been no royal gardens, no horticultural gardens, no botanical gardens (but in name), no public gardens, to stimulate and instruct those who might wish to cultivate taste, or acquire knowledge in this branch of rural improvement. Respectable private gardens were occasionally formed in the neighbourhood of large towns; but their number was too small, and the access to them too limited, to produce much influence towards general improvement. Four or five public nurseries are all that are recollected of any note, which existed in the States in 1810, and these were by no means profitable establishments. About the year 1815, a spirit of improvement in horticulture as well as agriculture began to pervade the country, and the sphere of its influence has been enlarging, and the force of example increasing, down to the present time. (*Gard. Mag.*, vol. iv. p. 193.)

1513. *The middle states of America*, says Coxe, "possess a climate eminently favourable to the production of the finer liquor and table apples; and the limits of that district of country which produces apples of the due degree of richness and flavour for both purposes are the Mohawk River in New York, and the James River in Virginia. Apples grow well in other places; but that exquisite flavour for which the Newton pippin and Esopus Spitzenberg are so much admired, and which has given such high reputation to the cider from the Hewe's crab, the white crab, the grey-house, winesop, and Harrison, can only be found within the limits here described. Cold and heat are equally necessary to the production of a fine apple, and neither must predominate in too great a degree. Some European cider fruits have recovered their reputation by being transplanted to the more genial climate of America, where the growth of trees compared with Europe is as five to three." The same author is of opinion, "that the numerous varieties of American apples have proceeded from seeds brought there by their European ancestors; and that none of the Indian orchards which have been discovered in America are more ancient than the first settlement of the Europeans on this continent."

1514. *The peach*, in North America, Coxe says, is subject to a malady which no remedy can cure nor cultivation avert. This is, a worm which destroys the roots and trunk of the tree. The only palliative is fresh soil. (*Preface*, p. 11.)

1515. *Plums and cherries* are cultivated in the United States, and woodcuts are given in Coxe's work of the principal sorts of these fruits, which are chiefly those well known in Britain. Some of these appear to have improved by change of climate, as well as the apples; as a proof of which, the Washington plum may be cited as an example.

1516. *The vine*, Dr. Dean observes (*New England Geographical Dictionary*, in loco *Massachusetts*, 1797.), "may, without doubt, be cultivated in every latitude of the North American states. There are wild grapes (*Vitis vulpina*) in the neighbourhood of Boston." He has known a good wine made from their juice; and seen excellent eating grapes produced in the American gardens, without any extraordinary culture. We have tasted an excellent wine made from the Isabella grape, grown in Prince's Nursery in Long Island; it reminded us of the hocks which we have drunk at Stuttgart and Heilbrunn, in Wirtemberg.

1517. *The melon* grows to a large size in the southern states, and ripens even in New England in the common way of planting, but is not so large nor so early as when raised on dung.

1518. *The orange family*, and certain palms, as we have seen (§ 1486.), grow freely in the open air in the south-west provinces; and there can be little doubt that their culture might be extended, were it found profitable to do so. This, however, is not the case; as North America is supplied with exotic fruits from the West Indian islands, at such a moderate rate, that pine-apples are sold in New York at threepence each. (*Gard. Mag.*, vol. viii. p. 360.) At New Orleans, Mrs. Trollope found "oranges, green peas, and red pepper, growing in the open air at Christmas." (*Dom. Man. of the Amer.*, vol. i. p. 9.) Mr. Gordon, on the 1st of January, 1828, was delighted with the orange trees in Florida, which he found bearing on their boughs four different crops, in various stages of growth, besides blossoms, and newly made shoots. In the same part of the country, on February 5th, he saw a pear ripened in the open air; and the day afterwards, hyacinths, violets, daffodils, and wallflowers, in full bloom, in the open garden, and unprotected from the weather. (*Gard. Mag.*, vol. iv. p. 396.)

1519. *Culinary vegetables* grow in the same perfection in North America as in England, except the cauliflower and some species of beans. Sea-kale and tart rhubarb are not yet generally cultivated; and Mr. Gordon found a gentleman at Charleston who had never seen a cauliflower. But, through the influence of the American horticultural societies, and the extensive correspondence of the American nurserymen with those of

Europe, since the peace of 1814, every thing European will soon become general in the New World. "Common vegetables," says Mrs. Trollope, "at New Orleans, are abundant and fine. I never saw sea-kale or cauliflowers; and, either from the want of summer rain, or the want of care, the harvest of green vegetables is much sooner over than with us. The Americans eat the Indian corn in a great variety of forms: sometimes it is dressed green, and eaten like peas; sometimes it is broken in pieces when dry, boiled plain, and brought to table like rice; this dish is called hominy. The flour of it is made into at least a dozen different sorts of cakes: mixed in the proportion of one third with fine wheat, it makes by far the best bread I ever tasted." (*Dom. Man. of the Amer.*, vol. ii. p. 99.) At Cincinnati Mrs. Trollope found "tomatoes (the great luxury of the American table in the eyes of Europeans) in the markets from June to December." She also found the Lima bean in great perfection. The fruit, she says, was bad: there were neither apricots nor nectarines; "the strawberries were very small; raspberries much worse; gooseberries very few, and quite uneatable; currants about half the size of those grown in Britain; grapes too sour for tarts; apples abundant, but very indifferent; and pears, cherries, and plums most miserably bad." The water-melons were abundant and cheap, but all other melons were inferior to those of France or England. (*Ibid.*, vol. i. p. 87.) Water-melons, musk-melons, squashes, sweet potatoes, cucumbers, &c. arrive at great perfection.

1520. Those who wish to grow sugar must go south of $29\frac{1}{2}^{\circ}$; cotton, south of 36° ; and for maize the best latitude is from 36° to 41° .

1521. Bees are generally kept in America; and the Charlie's Hope Hive, described at length in the *Gardener's Magazine*, vol. viii. p. 669., has become celebrated.

1522. Ice is in profuse abundance. "I do not imagine," says Mrs. Trollope, "that there is a house in the city of New York without the luxury of a piece of ice to cool the water, and harden the butter." (*Dom. Man. of the Amer.*, vol. ii. p. 182.)

1523. The first work after a settlement is to plant a peach and apple orchard, placing the trees alternately. The peach, being short-lived, is soon removed, and its place covered by the branches of the apple trees. (*Kingdom's Guide to America*, &c., p. 5.) The seeds of pumpkins are scattered in the field, when planting the corn, and no further trouble is necessary than throwing them into the waggon when ripe. They weigh from thirty to forty pounds each; and cattle and hogs are fond of them. In Maryland, Virginia, and the neighbouring provinces of the United States, peaches are propagated invariably from the stone. The fruit is used for feeding hogs, and distilled for brandy. In Virginia, the prickly pear abounds in the woods, and is reckoned a cooling, grateful fruit. (*Braddick, in Hort. Trans.* vol. ii.)

1524. In Lower Canada, fruit is neither remarkable for goodness nor cheapness, except strawberries and raspberries, which are very abundant. Apples and pears are sent from Montreal to Quebec, and sell for about the same price as in England. Oranges and lemons are imported from England, and are sometimes very scarce. Gooseberries, plums, and melons are plentiful; but currants, cherries, walnuts, and filberts are scarce.

1525. Upper Canada is very fertile. At Montreal are extensive orchards. Here the sugar-maple is abundant, and pierced for sugar when the sap begins to rise. A tree twenty inches in diameter will yield five pounds of sugar annually, sometimes for thirty years. Pot and pearl ashes are made from the felled trees. Beech yields at the rate of 219 lbs. for 1000 lbs. of ashes, and most other trees less. Sunflowers are abundant; but oil is not extracted from them, as in the United States. A great variety of fruit trees may be had at the nursery gardens at Montreal. The apples from thence are considered superior to any other. The peach trees are introduced into the orchards from York to Amherstburgh. Cherries, walnuts, chestnuts, hickory, hazel, and filbert nuts grow wild; as do gooseberries, strawberries, blueberries, cranberries, and black currants. In *Picken's Canadas*, &c., and *Pickering's Emigrant's Guide*, will be found some valuable information on the soil, native productions, and cultivated horticultural and agricultural plants of both Canadas, drawn from the most authentic sources.

SUBJECT. 4. American Gardening, in respect to Timber Trees and Hedges.

1526. Planting for timber or fuel it is not to be expected can be general in America; but the country not only affords a rich supply of species for the European planter, but some interesting information respecting the native succession of trees on the same soil, and the effect of the leaves of trees in autumn.

1527. The trees of America have been described by Michaux. The number of these which grow above thirty feet high, and which he has seen and described, is one hundred and thirty-seven, of which eighty-five are employed in the arts. In France there are only thirty-seven which rise to that height, of which eighteen serve to form timber plantations, and of these seven only are employed in civil and marine constructions. Michaux acknowledges his obligations to W. Hamilton, "an enlightened amateur of the sciences and arts," who pleases himself in uniting at his magnificent residence at

Woodlands, near Philadelphia, not only all the useful vegetables of the United States, but those of every country of the world, which may offer any interest in the arts or in medicine.

1528. *The natural succession of forest trees* on the same soil has attracted the attention of various persons from the time of Evelyn to the present day. Dr. Dwight, in his *Travels in New England*, has given some remarkable instances, which he found it difficult and, indeed, almost impossible to account for. Other writers, who have touched on the same subject, will be found enumerated in a valuable paper on the natural succession of forest trees, in the *Gardener's Magazine*, vol. v. p. 421.; and in the same work, vol. viii. p. 287., the problem is very satisfactorily solved by Lewis Le Conte, Esq. of Riceborough. This gentleman has, for above thirty years, given his attention to the natural succession of the different species of timber in America; and the following are the results of his observations:—

1529. *The pine lands* in the southern states have generally old oak grubs, which, by reason of the periodical fires, are prevented from becoming trees; notwithstanding, they still continue alive; and when land is turned out (that is, when the cultivation of land is relinquished), pines, being by nature unproductive of suckers, are consequently killed *in toto*; while the oak, now sole possessor of the soil, starts up and grows vigorously. On the other hand, land which had been solely occupied by oaks previously to its cultivation, is invariably of a superior quality to what is termed *pine lands*, and naturally is a longer period under cultivation before it is turned out; by which means the roots of the oaks are completely eradicated, while it is in a state of cultivation. The pine seeds, being winged, and thereby easily carried by the wind to a considerable distance, if the ground is free from the roots of other trees, are the first to establish themselves; and, being of a free and rapid growth, they take the lead of all other species of timber, and become the principal occupiers of the land; but when the roots of the oaks are not destroyed, they will take the lead, and resist the pine and other trees. All pine lands which originally had no oaks will invariably produce pines again, whether they have been under cultivation for a long or a short period.

1530. *The succession of wild cherries to beech* is thus accounted for. Birds, being naturally fond of the cherry, eat them with avidity, and swallow the stones of the fruit, which do not suffer, in their germinating qualities, while in the bowels of the bird; and as these frequently resort to beech woods, it naturally follows that they void these cherry-stones there; which either lie dormant (as they retain their vegetating powers for a length of time), or germinate, and remain in a diminutive state; but when the beeches are cut down, they advance rapidly, and become the principal occupants of the soil. (*Gard. Mag.*, vol. viii. p. 287.)

1531. *A pine barren in the southern states* of North America has been drawn (fig. 273.) and described by Captain Hall. "A considerable portion of the southern states of

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North America, and even as far as North Carolina, is covered with boundless forests of pine trees. These districts are called pine barrens; and, the soil being generally sandy, with a scanty supply of water, they are probably destined to remain for ever in the state of a useless wilderness. Upwards of 500 miles of our journey lay through these desolate forests; and I have, therefore, thought it worth while to give a sketch, which is sufficiently characteristic, of these singular regions. Occasional villages (fig. 274.) gave some relief to the tedium of this part of the journey; and whenever a stream occurred, the fertility of the adjacent lands was more grateful to the eye than I can find words to describe. Once



or twice, in travelling through the state of Georgia, we came to high knolls, from which we could look over the vast ocean of trees, stretching without a break in every direction as far as the eye could reach; and I remember, upon one of these occasions, thinking that I never before had a just conception of what the word forest meant." (*Hall's Sketches in Canada*, &c. No. xxiii.)



1532. *An American forest on fire* (fig. 275.) has also been depicted by the same accurate hand. "Sometimes the monotony of the pine barren was interrupted in no very pleasant style by the heat and smoke arising from the forest being on fire on both sides

of us. But, as it happened, we were never exposed to any danger, or to serious inconvenience, in consequence of these conflagrations. The sketch (*fig. 275*) shows the forest in the predicament alluded to. The tree in the foreground had caught fire near the ground; and having, I do not know how, been hollowed out in its centre, the flames had crept up and burst out some feet higher, so that they were roaring like a blast furnace, and rapidly demolishing the tree at the bottom, while the branches at top were waving about in full verdure, as if nothing unusual were going on below." (*Hall's Sketches in Canada, &c.*, No. xxiv.)

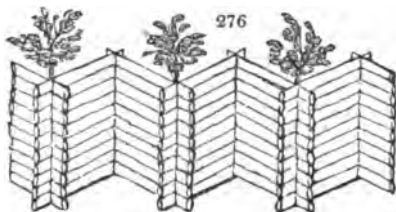
1533. *The autumnal colouring of trees in America* has been depicted in glowing language by Bartram, Michaux, Dwight, Flint, and by almost every writer on America of note. We shall quote Mrs. Trollope; not that her description is the best, but because, as she shows in her work an evident dislike to both the people and the country, she cannot be suspected of exaggeration. An autumn scene in Western America, says this lady, is resplendent in beauty. Round Cincinnati, in the autumn of 1828, "the maple or sugar tree first sprinkled the forest with rich crimson; the beech followed with all its harmony of golden tints, from pale yellow up to the brightest orange. The dogwood gave almost the purple colour of the mulberry; the chestnut softened all with its frequent masses of delicate brown, and the sturdy oak carried its deep green into the very lap of winter." These brilliant tints are increased by the peculiar clearness and brightness of the atmosphere. "By day and by night, the exquisite purity of the air gives tenfold beauty to every object." (*Dom. Man. of the Amer.*, vol. i. p. 145.)

1534. *The trees and shrubs of North America* are unquestionably the most splendid and beautiful vegetable productions of the temperate climates of the globe. Without the American magnolias, tulip trees, rhododendrons, azaleas, kalmias, vacciniums, andromedas, and other genera of these orders, not to mention numerous other genera, where would be the beauty of European pleasure-grounds? North America, indeed, has supplied more valuable materials for ornamental gardening than all the rest of the world put together.

1535. *Hedges* are only general in America in the neighbourhoods of the old towns; they are usually of hawthorn, but sometimes of the acacia, the poplar, the willow, and other rapidly growing trees.

SUBJECT. 5. *American Gardening, as empirically practised.*

1536. *Every cottage in America* has land attached, partly cultivated as a garden, and partly as a farm. The first operation of a settler is to construct his log house; the second, to clear a space, by felling trees for a garden; and the third, to surround it by a worm fence. (*fig. 276.*) The process has been described at length in the *Gardener's Magazine*,



by Mr. Hall, of Wanborough, Edward's county, Illinois; who thus describes his garden:—"The contents are three acres, sloping from the house to the east. The surrounding fence is formed without posts or rails, by laying rough timber, cut into regular lengths, one piece over another in a zigzag direction, such as we see sometimes done in timber-yards, with planks or deals." (*Gard. Mag.*, vol. i. p. 831.) Speaking of the gardens of farmers or small proprietors, Mr. Stuart says, they are universally of the most slovenly description, and full of weeds; nevertheless they are prolific in ordinary vegetables, cucumbers, melons, and orchard fruits. Near the barn, and sometimes in the orchards, is the burying-ground of the family, marked by a few gravestones. (*Three Years' Res.*, &c., vol. i. p. 80.)

1537. *Nursery establishments in America*, Mr. Buel observes, are increasing in number, respectability, and patronage. Selections of native fruits are made with better judgment and more care than they formerly were. Most of the esteemed European varieties have been added to our catalogues. The cultivation of indigenous forest trees and shrubs, esteemed for utility, or as ornamental, has been extending; and the study of botany is becoming more general, as well for practical uses as on account of the high intellectual gratification which it affords to the man of leisure or of opulence. The following nurseries have been described by Mr. Buel in *Gard. Mag.*, vol. iv. p. 193., by *Dr. Mease*, in vol. vii. p. 665., and by Mr. Gordon and Mr. Wynne, vol. viii. p. 277. and p. 272.

1538. *At and near New York* are Prince's Linnæan Garden at Flushing; according to Mr. Buel, the oldest, and according to Mr. Gordon, taking it altogether, one of the best, in the United States. Mr. Stuart says, "the variety of Magnolias in Prince's Nursery is prodigious." Bloodgood's Nursery, and that of Mills and Lawrence, are also at

Flushing; and the very complete one of the late M. Parmentier at Brooklyn. At Bloomingdale is the establishment of Mr. Hogg, and at Harlem that of Mr. Hoy. There are also the nurseries of Mr. Wilson, and of Mr. Bridgeman, near New York; and in the city there is the extensive seed establishment of Messrs. Thorburn, and those of Mr. Smith, Mr. Wilson, and Mr. Kenny.

1539. *At and near Philadelphia* are Bartram's botanic garden, now the nursery of Colonel Carr, and accurately described by his foreman, Mr. Wynne (*Gard. Mag.*, vol. viii. p. 272.); Messrs. Landreth and Co.'s nursery; and that of Messrs. Hibbert and Buist; besides some commercial gardens in which, to a small nursery with green and hot-houses, is added the appendages of a tavern. These tavern gardens, Mr. Wynne informs us, are the resort of many of the citizens of Philadelphia, more especially the gardens of M. Arran, and M. d'Arras; the first having a very good museum; and the latter a beautiful collection of large orange and lemon trees.

1540. *Among other nurseries*, in different parts of America, are the Albany nursery, at Albany, established by Mr. Buel, formerly a judge, in connection with Mr. Wilson, a practical gardener; the Burlington nursery, at New Jersey; Kenrick's nursery, at Newtown in the vicinity of Boston; Sinclair and Moore's nursery, at Baltimore; and M. Noisette's nursery, at Charleston.

1541. *Market-gardens* are not yet established in America on a large scale, but there are numerous small ones; and in the neighbourhood of all the larger towns, as in the neighbourhood of Liverpool in England, the superfluous produce of private gardens is sent to market. "Market-gardens," says a writer in the *Gardener's Magazine*, "are abundant in the neighbourhood of New York, and the markets are amply supplied with the choicest fruits and vegetables. Peaches are sold by the peck; and some of them, the Morrisina pound peach, weigh from ten to fifteen ounces. These fruits are all grown on standards, walls being very rarely used for ripening fruit in America." (*Gard. Mag.*, vol. iii. p. 347.)

1542. *The operative part of gardening, in North America*, is chiefly performed by what in England would be called country labourers; and in many cases, in all the more difficult operations of the art, every man is his own gardener. Of late, however, a number of professional gardeners have emigrated from England.

1543. *The American nurserymen* supply those of Europe with the seeds of American trees and shrubs to a great extent, and receive, in return, rare European, Cape, Australian, and Chinese plants, fit for the green-house. The chief regular exports are, we believe, camellias, pelargoniums, bulbs, and ericas. It is a fact not perhaps generally known, that the retail prices of the American nurserymen are as high as those of England, and that many American trees and shrubs are as cheap in Britain as in the United States; the cause is to be found in the high price of labour in the latter country, and in the want of capital.

SUBSECT. 6. *American Gardening, as a Science, and as to the Authors it has produced.*

1544. *Horticultural science in America* is in a great measure confined to the nurserymen, the botanists, and the professional gardeners who have emigrated from Britain; but by the press, and the horticultural societies which have been established at New York, Philadelphia, Boston, Albany, and other places, the science of gardening will soon be disseminated every where.

1545. *The American authors on gardening* are not numerous. The earliest work on practical gardening, so far as we are aware, is M'Mahon's *American Gardener's Calendar*, published about the end of the last century. Mr. M'Mahon was a seedsman at Philadelphia, and had "connected with the seed-trade a botanical, agricultural, and horticultural book-store." His work includes every department to be found in our calendars. Ample instructions are given for growing the pine, vine, melon, and other delicate fruits, and also for the forcing departments both of the flower and kitchen gardens; but we cannot gather from the work any thing as to the extent of American practice in these particulars. Some other authors will be found mentioned under the department of statistics; but the American gardening books are chiefly reprints from those of Europe.

SECT. IV. *Gardening in Spanish North America, or Mexico.*

1546. *The Mexicans were extremely well skilled in the cultivation of kitchen and other gardens*, in which they planted, with great regularity and taste, fruit trees, and medicinal plants and flowers. The last of these were much in demand; bunches of flowers being presented to persons of rank, kings, lords, and ambassadors, and also used in temples and private oratories. In the ninth chapter of Humboldt's work will be found an ample account of the useful plants of Mexico. It is singular that the potato, which one would have imagined should have been introduced from the southern continent to Mexico, should have been first carried there from Old Spain. It is not, Humboldt says, a native of Peru, nor to be found between latitudes 12° and 50°.

1547. *The royal gardens of Mexico and Texcoco*, and those of the lords of Ixtapalapan and Huantepec, have been much celebrated. One, belonging to the lord of Ixtapalapan, was laid out in four squares, and planted with great variety of trees, through which a number of roads and paths led; some formed by fruit-bearing trees, and others by espaliers of flowering shrubs and aromatic plants. It was watered by canals, and had in the centre a fish-pond four hundred yards in diameter, where innumerable waterfowl resorted. Hernandez says, this garden contained many foreign trees. The garden of Huantepec was six miles in circumference, watered by a river, planted with numerous species of trees and plants beautifully disposed, along with pleasure-houses. Many foreign plants were cultivated, and every kind of medicinal plant belonging to that climate, for the use of the hospital which they founded there. Cortes, in a letter to Charles V., in 1522, told him that this garden was the most extensive, the most beautiful, and most delightful, which had ever been beheld. Bernard Diaz and other authors concur in the same opinion. The Mexicans paid great attention to the preservation of woods, which supplied them with timber and fuel. (*History of Mexico*, vol. i. p. 379.)

1548. *The floating gardens of Mexico* have long been celebrated in history. According to the Abbé Clavigero, in his *History of Mexico*, when the Mexicans were brought into subjection to the Calhuan and Tepanecan nations, and confined to the miserable little islands on the lake, they ceased for some years to cultivate the land, because they had none, until necessity and industry together taught them to form moveable fields and gardens which floated on the waters of the lake. The mode of forming these of wicker-work, water-plants, and mud, may be easily conceived. The boat or basis is commonly eight perches long by three broad. They first cultivated the maize and useful plants only; but afterwards "there were among them gardens of flowers and odoriferous plants, which were employed in the worship of the gods, and served for the recreation of the nobles." At present they cultivate flowers, and every sort of garden-herbs, upon them, all of which thrive surprisingly. In the largest gardens there is commonly a little tree, and even a little hut to shelter the cultivator, and defend him from rain or the sun. When the owner of a garden wishes to change his situation, to remove from a disagreeable neighbour, or come nearer to his own family, he gets into his little vessel, and by his own strength alone if the garden is small, or with aid if it be large, he tows it after him, and conducts it where he pleases with the little tree and hut on it. That part of the lake where the gardens are, is a place of infinite recreation, where the senses receive the highest possible gratification.

1549. *The floating gardens, or chinampas*, mentioned by the Abbé Clavigero, says Humboldt, still exist. They are of two sorts: the one mobile, and blown here and there by the winds; and the other fixed, and united to the shore. The former alone merit the appellation of floating, and they are diminishing day by day. He assigns to them the same origin as the Abbé Clavigero; but thinks it probable that nature also may have suggested the first idea; and gives instances of small pieces of surface, netted with roots and covered with plants, being detached from the marshy shores of other American lakes, and floating about in the water. The bean, pea, apple, artichoke, cauliflowers, and a great variety of other culinary plants, are cultivated on them.

1550. *The above description of these gardens by Humboldt* falls greatly short in singularity to that previously given by the Abbé Clavigero; and that of Mr. Bullock falls equally short of the former; so that what was considered one of the wonders of the world thirty years ago, when it has undergone the test of close examination, comes at last to be little more than an ordinary appearance; and a chinampa in the Mexican lake differs only from a small osier holt in the Thames, in being planted with cabbages and potatoes, instead of willows. "The chinampas are artificial islands, about fifty or sixty yards long, and not more than four or five wide, separated by ditches of three or four yards in width; and are made by taking the soil from the intervening ditch, and throwing it on the chinampa; by which means the ground is raised generally about a yard, and thus forms a small fertile garden, covered with culinary vegetables, fruits, and flowers. Mexico receives an ample supply from these sources." (*Bullock's Mexico*, p. 174.)

1551. *A conventual garden at Mexico* is described by Humboldt (*Voyage, &c.*, liv. iii. chap. 8.), in 1803, as one of the finest he had ever seen. The convent was a very picturesque building; and in the garden were immense groves of orange trees, peaches, apples, cherries, and other fruit-trees of Europe.

1552. *The botanic garden of Mexico* is situated in one of the courts of the viceregal palace of the city. It is laid out with paved walks, bordered with ornamental pots of flowers, and shaded with creepers trained over them on trellis work. The walks diverge from a large stone basin in the centre, constantly supplied by a fountain with water; which, in small rivulets, is employed to irrigate every part of the garden. All the fruits, both of Europe and India, flourish in it. (*Bullock's Mexico*, p. 182.)

1553. *Bees are cultivated in Mexico*, and the species employed are without stings. The bees, the honeycomb, and the hive, Captain Hall observes, "differ essentially from

those in England. The hive is generally made out of a log of wood, from two to three feet long, and eight or ten inches in diameter, hollowed out, and closed at the ends by circular doors, cemented closely to the wood, but capable of being removed at pleasure. Some persons use cylindrical hives made of earthenware, instead of the clumsy apparatus of wood; these are relieved by raised figures and circular rings, so as to form rather handsome ornaments in the veranda of a house, where they are suspended by cords from the roof, in the same manner that the wooden ones in the villages are hung to the eaves of the cottages. On one side of the hive, half-way between the ends, there is a small hole made, just large enough for a loaded bee to enter, and shaded by a projection, to prevent the rain from trickling in. In this hole, generally representing the mouth of a man or some monster, the head of which is moulded in the clay of the hive, a bee is constantly stationed." (*Travels in Mexico*.)

Sect. V. Gardening in South America.

1554. *The gardening of South America*, it may easily be conceived, is of a very inferior description, from the low state of civilisation, and the bounties of a fine climate. The latter supplies almost every thing in the shape of fruits and flowers, with little or no care; and the gourd, which forms a principal culinary vegetable, is proverbial for the little culture it requires, for its rapid growth, and for its ample produce. We have only been able to collect a few scattered fragments of the efforts of man in our art in this new and rising country; and these we shall consider, first, as relating to gardening, as an art of design and taste; and, secondly, as an art of culture.

SUMMARY. 1. Gardening in South America, as an Art of Design and Taste.

1555. *Landscape-gardening*, in all countries where aristocratical or religious prejudices exist, will necessarily be confined to the palaces of the monarchs, the châteaux of the magnates, or the episcopal residences.

1556. *The grounds of the palace of S. Christovão, near Rio*, Dr. Walsh informs us, display little taste. The palace, originally a private house, is a long edifice, having a façade of two large pavilions, united by an open veranda. It is situated on an eminence, highly susceptible of picturesque improvement; but it stands alone, quite naked, the spirit of the people being here as conspicuous as elsewhere, in improving the country by cutting down trees, but never planting them. The approach passes through an open screen, a fac-simile of that at Syon House, badly executed from an exact model; spoiled from the unsuitableness of the situation; and rendered ridiculous by being surmounted by pine-apples, not as architectural members, but standing on long branching stalks as unnatural as they are mean. In the front of the building is a court-yard, with a circular fountain in the centre, surrounded by low, whitewashed walls, like a common farm-yard. (*Notices of Brazil*, p. 456.)

1557. *The palace of Lima* had a good deal the air of a native court in India; exhibiting the same intermixture of meanness and magnificence in style, which, while it displays the wealth and labour it has cost, betrays, at the same time, the want of taste and judgment in the design. The entrance was by a dirty court, like that of a stable-yard. (*Capt. Hall's Chili, Peru, and Mexico*, in 1820, 1821, and 1822.)

1558. *The gardens in the neighbourhood of Pedro Alces*, a Brazilian town containing about fifty houses, in the Mato country, about half-way between Rio Janeiro and Villa Rica, are described by Dr. Walsh as picturesque in appearance, and rich in the fruits and culinary vegetables of both hemispheres. The white houses of the town were scattered through the greensward interspersed with trees. The garden of one of these houses inspected by Dr. Walsh "was filled with the productions of both hemispheres, and all climates. Bananas and apple trees, walnuts and calabashes, were growing luxuriantly side by side; vines and peach trees were loaded with fruit; and the latter so abundantly, that the branches were broken to the ground with their weight. Under this luxuriance of fruit above were plots of European vegetables below; large flat Dutch cabbages, and different kinds of lettuces, were flourishing among melons and pine-apples; and the whole presented a most graceful picture. Among the trees was a cactus, with stems as thick as a man's thigh, and ascending to the height of thirty feet, deeply ribbed, and from the furrows burst an immense profusion of blossoms." (*Notices of Brazil*, vol. ii. p. 248.)

1559. *A Chilian country-house*, belonging to a native Chilian, but of Spanish descent, is described as containing an outer entrance with a mud floor, a rude unfinished roof, a richly carpeted drawing-room, from the windows of which could be seen the gravel walks of a garden stretching under trellised vines, and shaded by a broad belt of lofty walnut trees. (p. 144.) At another country-house, the vines were planted in the manner of those at the Cape of Good Hope, in rows like gooseberry bushes, and supported only here and there as occasion required. The olive groves were covered with fruit. (*Hall's Mexico*, &c.)

1560. *Public walks and promenades.* The garden at Rio Janeiro, called *Passeio Publico*, or public walk, is situated on the sea-shore. From the front of the Calabouça to that of N. S. da Gloria, is a fine sweep of strand; and near the middle of the arch, the public garden was laid out by the viceroy Vasconcellos, a name to which Rio seems much indebted. It consisted, in 1890, of broad walks, bordered with large trees, some native and some foreign, forming a dense and delightful shade, and enclosing apartments within planted with fruit or flowering trees, and shrubs. Among the former are mangoes, yambos, and gramixams, yielding, in their seasons, a vast quantity of delicious fruit, which every one is allowed to gather and eat. Among the latter is the poinciana, a species of Brazil wood, whose yellow and orange flowers are exceedingly beautiful; the coral tree, with long spikes of scarlet flowers, as large as those of the horsechestnut; and the magnificent bombax, covered at one time with a profusion of large purple flowers, like rich tulips, and at another with huge pendent pods of silk. Near the middle of the garden is an octagonal temple, intended for a botanical lecture-room, where the professor explained the structure and qualities of the various plants in the garden: it is now, however, entirely out of repair. (*Dr. Walsh's Notices of Brazil*, vol. i. p. 477.)

1561. *The Alameda, or public walk*, of Mendoza, is situated at the foot of the Andes, and commands a noble prospect. It has two fine rows of poplars on each side, with a stream of water running between them. (*Brandt's Journal of a Voyage to Peru*, p. 53.)

1562. *Cemeteries.* The burying-ground attached to the English chapel at Rio lies at the north extremity of the town, at the bottom of a small but beautiful bay called the Gamboa. It consists of three or four acres of land, surrounded by a wall, with a few trees still standing within the area, and it is proposed to plant a great number. The situation is extremely beautiful, on an inclined plane, sloping towards the sea, and commanding an extensive prospect of the bay and islands. In the centre stands a small chapel, used only on the occasion of funerals, in which is read a part of the burial service. The emperor proposed to establish similar cemeteries near Rio, on the extensive scale of Père la Chaise.

SUBJECT. 2. *Gardening in South America, in respect to Botanic Gardens, as an Art of Culture.*

1563. *Some of the finest flowers of British gardens* are natives of South America, especially annuals. We need only mention the georgina, the marvel of Peru, the calceolaria, and the schizanthus. Beautiful shrubs are not less numerous, but they are generally inmates of our green-houses.

1564. *The botanic garden* of Rio is situated about eight miles from the town; though, as Dr. Walsh remarks, it is more properly a garden of recreation than of science. There are very few of the immense variety of indigenous plants to be found here, and not the smallest attempt is made at classification. In 1809, a great number of plants were brought to this garden from the Isle of France. Among these were camphors, cloves, mangoes, and other fruits and spices, till then unknown in Brazil. They soon grew vigorously; and, as every person is invited to take plants from the garden, these trees were speedily established throughout the country. In 1810, a number of plants were brought from the celebrated gardens of Gabriella, in Cayenne; and, shortly afterwards, the tea plant was introduced from China, and a colony of natives invited over to superintend its cultivation. In order to encourage and extend the growth and cultivation of all these foreign plants, their produce is exempt for ten years from all tithes and taxes. The road to this garden from Rio, Dr. Walsh describes as very delightful. "It passes along the beautiful bay of Botá Fogo, and by the fine lake of Rodrigo de Freitas, where one side is bounded by the magnificent ridges of the Corcovado, and the other by the romantic scenery of the bay and lake. The garden is a rich flat, comprising about fifty acres, divided into compartments by avenues of exotics, among which the Sumatra nut is the most conspicuous. It is of rapid growth, yields abundance of shade with its ample leaves, and such a profusion of fruit that the walks were covered with large nuts, which give an immense quantity of oil for various useful purposes. Next in abundance is the bread-fruit, which thrives with equal luxuriance, bearing among its immense foliage a spherical fruit, in size, shape, and colour, like pendulous loaves of bread. But the compartments which are the most interesting are the tea plantations. These occupy several square plots, of about half an acre each, but do not seem to have answered the expectations formed of them. The shrubs are stunted, cankered, and moss-grown, and the Chinese, to whose care they were originally intrusted, have abandoned them."

1565. *The botanic garden at Buenos Ayres* was established in 1826, chiefly through the influence of John Hallet, Esq., the consul-general of the South American states in London. M. Sack, a German gardener of superior acquirements, was appointed curator; and took out with him an extensive collection of European plants and seeds. The unsettled state of Buenos Ayres, M. Sack informs us in the *Gardener's Magazine*, has hitherto prevented this garden from effecting much good either for America or Europe.

1566. *The botanic garden of the Curacoas* was established in 1828, by Mr. Fanning, for the collection of native plants, with a view to their transmission to Europe in exchange for others which may be deemed suitable for the southern hemisphere. The garden is small, but is neatly laid out in squares; the walks are well proportioned, and some of them are beautifully shaded with the banana; the towering stems and expanding leaves of which, with their rich and delicious fruit, have an appearance more splendid than can be imagined by any one who has never been out of Europe. (*Gard. Mag.*, vol. vi. p. 484.)

1567. *A Chilean flower-garden*. When Captain Hall was at Santiago, he visited a lady in the evening, who expressed great regret, owing to its being dark, that she could not show him her garden, which, she said, was "the pride of her life." In a few days afterwards he paid her a visit in the daytime, when the good lady was delighted, and led the way with great glee to her favourite spot. "It certainly," Captain Hall observes, "was a brilliant spectacle; for in these climates, where nature does so much, the least assistance multiplies the effect in a manner of which, in cold regions, we have no conception. But our good dame, who thought of nothing less than letting nature have her course, had planted her flowers, and cut her walks and borders, in the forms of beasts, birds, and fishes. Not only had she displayed the figures of the animals in a sort of relief, by raising and depressing the soil, but she had attended minutely to the appropriate colours of each, by the careful distribution of the proper flowers; and, to do her justice, the spot looked more like a menagerie than a garden." (*Capt. Hall's Chili, &c.*, vol. i. p. 175.)

1568. *The tea shrub* of China, first introduced into the Rio botanic garden, has begun to be cultivated in the interior of the country on a large scale; and one proprietor had, in 1825, a plantation of 4000 plants. (*Asiat. Jour.*)

1569. *Hedges* are to be found in Brazil, in those districts which are cultivated, and in which the original forests have been almost entirely superseded by bananas, mangoes, and other fruit-bearing trees. The hedges are formed of a species of mimosa, and they are regularly clipped, Dr. Walsh informs us, like the hawthorn hedges of England. (*Notices of Brazil*, vol. ii. p. 299.)

SECT. VI. Gardening in the West India Islands.

1570. *The gardening of these islands* is almost entirely limited to the department of culture; some design and taste, indeed, is displayed near the houses of the native proprietors, but that consists chiefly in planting trees for shade. There is no green turf in the West Indies, except on the mountains; and there is no necessity for either turf or gravel in a country where none of the inhabitants ever walk out if they can help it. Pine-apple plants, and also ripe pine-apples, are frequently sent from the West Indies to Europe, and commonly arrive, after a voyage of from six weeks to two months, in a fit state for planting, or the dessert. The native products of these islands are various and excellent, and they have been greatly increased by fruits and spices, introduced from the East Indies, and other places. Among these it may be sufficient to mention the pine-apple, bread-fruit, mangosteen, durion, and cinnamon. There is a large botanic garden at St. Vincent's, and others at Trinidad and Martinique, supported by their respective governments.

1571. *Jamaica*. The botanic garden of Jamaica was originally begun by Hinton East, Esq., and afterwards bought by government, and enlarged so as to contain seventy acres. One of the objects of its establishment was to preserve, without artificial means, the productions of various climates. Such a project could only be executed in a tropical latitude, where the various elevations of the ground would regulate the required temperature. The site chosen for this purpose is about seven miles from Kingston, on the side of the Liguanea Mountain, the summit of which is 3600 feet above the level of the sea. Here, ascending from the base, are found the productions of the various countries of the earth: every change of situation represents a change of latitude, and the whole surface of the mountain may be clothed with the appropriate vegetation of every climate, from the pole to the equator. By means of this noble and useful establishment, the vegetable productions of various climes have been naturalised to the soil, and the plantations of Jamaica have been enriched with many valuable trees, shrubs, and plants, which were heretofore unknown in the island: of these may be mentioned cinnamon, mangosteen, mangoes, sago, bread-fruit, star-apple, camphor, gum-arabic, saffraas, &c. (*Edwards's Jamaica*, p. 188.) In the year 1812, the whole was sold by the House of Assembly, for the small sum of 4000*l.*, to an apothecary in Kingston. The present botanic garden of Jamaica is situated at Bath; and its present curator, Thomas Higson, Esq., is an active correspondent of the different gardens both of America and Europe. The Jamaica Society for the Encouragement of Arts and Agriculture give premiums for the raising of horticultural productions, both to free persons and slaves; but none of the ornamental departments of gardening are at all attended to by this society.

1572. *St. Vincent's*. The botanic garden of St. Vincent's is thus noticed by Bayley: — "It is about half a mile from Kingston. At its entrance formerly stood the residence of Dr. Anderson, and during the time this gentleman had charge of the garden it was in a most rich and flourishing condition. Since his death, however, it has fallen off gradually, and is at present (1830) going to ruin. The only improvement that has taken place is the destruction of the manager's house, and the erection, by the colony, of a very pretty cottage in its stead. The garden is no longer in a state of cultivation, though it still contains many scarce and valuable treasures; among which are the clove, the nutmeg, and the cinnamon, with many other trees and shrubs. It is said that horses are allowed to wander over the garden, grazing on and trampling down the shrubs and flowers. The colony has entirely given up the place; and, as the manager's salary has been withdrawn, there is no longer any attention paid to it." (*Bayley's Four Years' Residence in the West Indies*, p. 221.) A fuller account of this garden will be found in the *Gardener's Magazine*, vol. iv. p. 501.

1573. *In the island of Grenada* there is an agricultural society, the Cariceon Tree-planting Society, and a cemetery, occupying a hill, and containing many handsome tombstones among wild bushes and shrubs. (*Bayley's Four Years' Residence in the West Indies*, p. 510.)

SECT. VII. Gardening in Australia.

1574. *The gardening of Australia*, like that of every other newly colonised country, will depend jointly on the gardening knowledge of the settlers, and on the capabilities of the climate. The climate of Australia includes all the desirable climates of the world, from that of Van Diemen's Land, which resembles the climate of the south of England, to that of Sydney, which admits of the culture of tropical fruits in the open air. The botanical riches of Australia, and the singular aspect of its native plants, are well known. It has few, indeed scarcely any, native fruits; but it admits of the growth of all the fruits cultivated in the open air in Europe, and these have already been introduced and disseminated; while, in the botanic garden at Sydney, the pine-apple, the sugar-cane, the bread-fruit, and the banana, may be seen in the open garden, protected, during six weeks or two months, by a covering of glass, but without flues.

1575. *Sydney*. A list of the fruits cultivated in the Sydney botanic garden in 1827, is given in the *Gardener's Magazine* (vol. v. p. 280.), which proves the genial nature of the climate, and induces us to infer that, at some future period, New Holland will be the first country in the world for fruits and flowers. This is confirmed by the different reports of the Agricultural and Horticultural Society of New South Wales, which will be found in the work referred to. Gardening, as an art of taste, is of course in its infancy in this colony; though something appears to have been done about the residence of the governor at Sydney.

1576. *Western Australia, or the Swan River*, is said to possess, in some places, an excellent soil, and a climate suitable for all the productions of Europe, including those palms and that species of sugar-cane which are cultivated in Spain. The government garden at Perth is really well worth the inspection of the curious. His excellency takes great interest in it. There are several rare specimens of various descriptions of plants, amongst which we observed the tea tree. We are aware that the banana will flourish here; also the pine-apple: the melon has been raised in great perfection; and we have, this season, some fine shoots from the cocoa nut. We venture to assert that, the next year, there will be a superabundance of vegetables, and at a very low rate. The colonists see now what can be done; and, we have the pleasure to say, appear to be going about the matter in real earnest. (*Morning Chronicle*.)

1577. *Van Diemen's Land*. Some gardeners have lately emigrated to this colony; and, judging from the *Hobart Town Almanack*, and from various letters in the *Gardener's Magazine*, all the European vegetables and fruits thrive as well there as in Britain. The country residence of Dr. James Ross, the editor of the *Hobart Town Courier* and *Hobart Town Almanack*, and an ardent botanist, is thus described by himself: — "The situation is a fine sloping valley, commanding heavenly views of the Derwent, Hobart Town, and the harbour and shipping. One part of the ground is so steep, that 100 wooden steps are requisite to facilitate the ascent. Here no deciduous tree, covering the sward with its autumnal ruins, reminds us of the decay of all things. My arbours of 'cool recess' and serpentine walks, formed out of the native shrubbery, are clothed in perpetual green, which borrows vernal freshness from a copious spring gushing forth at the highest point, and visiting in its descent every plant and flower." (*Penny Magazine*.)

BOOK II.

GARDENING CONSIDERED AS TO ITS PROGRESS AND PRESENT STATE UNDER DIFFERENT POLITICAL AND GEOGRAPHICAL CIRCUMSTANCES.

1578. *Every art must be affected by the government under which it is exercised*, either directly by its laws and institutions, or indirectly by the state of society as modified by their influence. Gardening and agriculture differ from other arts in being still more affected by climates than by governments: the influence of the latter is temporary or accidental, while that of the former is absolute and unchangeable.

CHAP. I.

Gardening, as affected by different Forms of Government, Religions, and States of Society.

1579. *All governments may be reduced to two classes*,—the primitive, or those where the people are governed by the will or laws of one or a few persons, independently of the people; and the rational or representative, or those where they are governed by laws formed by a congregated assemblage of their own body. The former are calculated for rude and ignorant ages, when man, in a state of infancy, is governed by a king, as children are ruled by their parents; the latter, for more enlightened times, when a people, like children arrived at manhood, are capable of thinking for themselves and acting in concert.

1580. *Society is either fixed or free*. In a fixed state, property is hereditary, and one part of the people are independent, and the other dependent; in a free state, men may belong to either class, according to their talents and the chances of life. In the former case, a man's condition in society depends on chance; in the latter, on chance and skill combined.

SECT. I. *Gardening, as affected by different Forms of Government and Religion.*

1581. *Gardening, as an art furnishing a part of the necessities of life*, may be practised under any form of government; and wherever there is some liberty and security of property, its productions of necessity and comfort will ensure its use. Wherever civilised man has a house, he will always have an accompanying spot for roots and legumes; and wherever he enjoys a farm, he will desire orchards or vineyards for fruits or wine, and copsewoods and forest trees for fuel and timber: shelter, shade, and ornament will follow in due time. Under paternal forms of government, the taste of the monarch will generally be indiscriminately followed by such of his subjects as can indulge in it; and thus fashion will assume the province of reason. Such a government must be favourable or unfavourable to the arts, according to the taste of its chief. Monarchs generally love splendour more than elegance or use; and in gardening are less likely to render its useful productions common among their subjects, than to increase the luxurious enjoyments of a few wealthy courtiers. This was exemplified in Louis XIV., who set the fashion not only in France but in Europe; but never, in all probability, added a foot of ground to the garden of a single cottager, or placed an additional cabbage or potato on his table. Under republican governments, the first tendency of public feeling is to economy; and, consequently, to discourage those arts, or branches of arts, which minister to luxury. Gardening, under such circumstances, will be practised first, chiefly as a useful art, and afterwards, partly as an art of elegance and taste, rather than one of splendour and magnificence; and more for its substantial benefits and scientific objects, than for its extraordinary productions and peculiar gratifications. In the beginning of the French revolution, we find the compilers of the *Encyclopædia* (see the vol. *sur l'Aratoire et Jardinage*) holding light the productions of forcing-houses and the taste for double flowers. In America, the same simplicity of taste prevails, and also in Switzerland.

1582. *Gardening, in all its branches*, will be most advantageously displayed where the people are free. The final tendency of every free government or society is to conglomerate property in irregular masses, as nature has distributed all her properties; and this irregularity is the most favourable for gardening both as a necessary, convenient, and elegant art. A republican or representative government and a commercial people may be reckoned a case highly favourable to the arts; of which Holland, Genoa, and Venice, formerly, and this country, at present, may be adduced as examples. Under mixed governments, where there is a representative body, and a first or executive magistrate, his taste will naturally have considerable influence on that of the people; as in Charles the

Second's time in England : unless, as sometimes happens, the king or executive officer's taste is behind that of the people ; in which case, if the people be free and enlightened, the arts of design and taste will, as they ought, become a republic, governed by its own laws. This last state has in some degree taken place in England since the accession of the Brunswick line, a fine illustration of which is given by Eustace (*Towr*, vol. i. p. 608.), in comparing the taste exhibited in the royal palaces built or altered by this race, with that displayed in the residences of private English gentlemen since the revolution.

1583. *The religion of a people is calculated to have some effect on their gardening.* Those religions whose offices are accompanied by splendour and show, and which have numerous fêtes and spectacles, will be favourable to the culture of flowers and plants of ornament ; and those which forbid, at certain seasons, the use of animal food, will in some degree encourage the production of fruits and culinary vegetables. Where those alternating days of rest, of such antiquity in society, and so conducive to the comfort of the labouring classes (*Graham's Sabbath*, pref.), are to be spent wholly or partly in recreative enjoyments, encouragement will be given to public gardens of different kinds ; but where they are to be spent in a devotion founded in fear, and consequently gloomy and austere in its offices, such a religion cannot be said to encourage gardening. The religions of Italy and Scotland afford examples of each of these cases.

Sacr. II. *Gardening, as affected by different States of Society.*

1584. *In mixed states of society, where property is in few hands,* and the population consists chiefly of lords of the soil and of slaves, the immensely rich may accomplish great designs, which shall astonish by their magnificence ; but taste among such a people is not likely to be refined : works of art are only prized as marks of wealth ; their merit is not understood ; and therefore, declining in interest after the first burst of surprise, they are soon viewed with indifference, and afterwards neglected or destroyed. Gardening, in such circumstances, is not likely to be improved in any of its branches, nor the use of gardens rendered general among any part of the population. Russia and Poland may be referred to as examples.

1585. *In free states of society, where commerce is a leading pursuit,* and property is irregularly distributed among all classes ; where there are wealthy, rich, and thriving citizens, and where the comforts of life are known and relished by every class, gardening is likely to prosper in all its branches. The first-rate gardens of the wealthy will be an example to the rich, act as a premium to operative gardeners and artists, and encourage commercial gardens. The fine gardens displayed by the wealthy commercialist will act as a stimulus to the independent gentleman, too apt to be stationary in his improvements. The retiring tradesman will aspire to the same excellence as the merchant, and stimulate him in his turn. Cottage-gardens will be found real ornaments to the country, and supply useful food and agreeable fruits to the labouring class of society, who, as they become more enlightened, will prefer employing their leisure hours in this way, rather than in grosser pleasures or habits. This was formerly the state of Holland, and is, in some degree, at present, that of Britain.

1586. *In free states of society, where agriculture is chiefly followed,* where property continues much divided, and mankind, as will always be the case under such circumstances, are sober and rational, the useful branches of gardening will be generally practised and much improved. Wholesome culinary vegetables will be enjoyed by all classes, and agreeable fruits by most of the inhabitants. Switzerland may be referred to as an example.

1587. *Times of peace and commercial prosperity,* under any government or state of society, will be more favourable than their opposites. The long and flourishing peace of the first two empires, Sir W. Temple observes, gave earlier rise and growth to learning and civilization, and all the consequences of them, in magnificence and elegance of building and gardening ; whereas Greece and Rome were almost perpetually engaged in quarrels and wars, either abroad or at home, and so were busy in actions done under the sun, rather than those under the shade.

1588. *In mixed states of society, where a part of the population are privileged orders or hereditary proprietors,* and the rest partly free and partly dependent, gardening is likely to be encouraged, more especially as an art of design. The proprietor of an entailed territory may be said to enjoy a sort of tangible immortality ; for, by establishing in his person and estate a sort of local and corporeal connection between his ancestry and posterity, he sees neither beginning nor ending to his life and property. Such a being is anxious to distinguish his little reign by some permanent improvement ; and those which are most likely to answer his purpose will be building or gardening. However distant the expected benefits of his efforts, they are sure to be enjoyed ; and even if he exceeds his income, and contracts debts which he cannot pay, he knows that the labour and property of others, which he has embodied on his estate, will remain for its benefit, and that posterity will give him credit for zeal and ambition. But partial rights of this sort are

much more injurious than beneficial to society, by giving the privileged party a legal title to contract debts which he is not able to pay. They are remains of those feudal or primitive institutions which, as mankind become enlightened, will be swept away, with various other antiquated customs and absurdities, till man at last, whatever may be the circumstances of fortune or family under which he may be ushered into society, will be left to sink or rise in wealth and respect according to his personal merits. Though the nobility of Britain have fewer exclusive privileges than those on the Continent, yet there are not wanting instances of these privileges being abused; and, as an example of a man creating sumptuous gardens, and forming fine collections of plants, without being able to pay for them, or liable to be put to personal inconvenience on that account, we may refer to George the third duke of Marlborough.

CHAP. II.

Gardening, as affected by different Climates, Habits of Life, and Manners.

1589. *All gardening is relative to climate and purpose.* It is obvious that gardening, in so far as respects the culture of plants, must differ in different climates, some of which will be found favourable for fruits, others for flowers, for culinary vegetables, and for timber trees. Considered as an art of design, and as furnishing agreeable views, and scenes for exercise or recreation, it will be found to vary, not only with the climate, but with the surface of the country, and the habits and manners of society.

SECT. I. *Influence of Climate, in respect to Fruits, culinary Plants, Flowers, Timber Trees, and horticultural Skill.*

1590. *The gardening of every country must vary according to the climate; and the practice of the art in one country cannot be applied to any other, unless that other greatly resemble the former in climate.* "Useful hints," Neill observes, "may, no doubt, be occasionally drawn from observing the modes in other countries. But it is scarcely necessary to remark, that, in warm climates, the practice must differ very widely from that which obtains in the temperate or the cold. In the former, the plants which require to be fostered in our stoves either grow spontaneously, or are cultivated in the open fields; while the greater part of our common pot-herbs refuse to flourish in sultry regions. Again, the far northern countries of Europe, Sweden, Norway, and Russia, possess peculiarities of climate; snow covers the soil throughout the winter, and the summers are uninterruptedly bright and warm. Even in Britain, such is the difference of climate between the favoured counties of the south-west of England, and that part of the island which lies to the north of the Cheviot Hills, that the same rules cannot be applied to both, without very considerable modification. The horticulture of the north of France, of Belgium, Holland, and Denmark, may in general be considered as approaching to that of South Britain; and these countries may frequently afford mutual lessons to each other, each availing itself of the other's discoveries, and adopting its improvements."

1591. *The finest climate for fruits, according to Sir William Temple, is that of Assyria, Media, and Persia.* "Those noble fruits, the citron, the orange, and the lemon, are the native product of those noble regions; and though they have been from thence transplanted and propagated in many parts of Europe, yet they have not arrived at such perfection, in beauty, taste, or virtue, as in their native soil and climate." "The reason of it can be no other than that of an excellent and proper soil being there extended under the best climate for the production of all sorts of the best fruits; which seems to be from about twenty-five to about thirty-five degrees of latitude. Now, the regions under this climate in the present Persian empire (which comprehends most of the other two, called anciently Assyria and Media) are composed of many provinces, full of great and fertile plains, bounded by high mountains, especially to the north, watered naturally with many rivers; and those, by art and labour, divided into many more and smaller streams; which all conspire to form a country, in all circumstances, the most proper and agreeable for the production of the best and noblest fruits. Whereas, if we survey the regions of the western world, lying in the same latitude, between twenty-five and thirty-five degrees, we shall find them extend either over the Mediterranean Sea, the ocean, or the sandy barren countries of Africa, and that no part of the continent of Europe lies so southward as thirty-five degrees; which may serve to discover the true reason why the fruits of the East have been always observed and agreed to transcend those of the West." "Persia," Chardin observes, "is the first country of the world for beautiful and superb flowers, properly so called." The same observation will apply to the whole of India; but it is to be observed, that the flowers of these and other hot and dry countries are less odoriferous than in such as are temperate, and have a comparatively moist atmosphere. Moisture is

favourable for conveying all odours; or, at least, for strengthening their impression on the olfactory nerves.

1592. *The most suitable climate for culinary or herbaceous vegetables* is one temperate and moist; and, in this respect, Holland, England, and the more temperate parts of France and Flanders, are before the rest of Europe. Sir William Temple, who lived much in Holland and the adjoining countries, says gardening, in his time, was there in the greatest perfection. The second country in Europe for culinary gardening and flowers appears to us to be Lombardy; and, considering that it is highly favourable for fruits, it may, as already observed, be considered the most propitious country in Europe for horticulture and ornamental gardening. There appear to be, also, corresponding situations in America, China, and New Holland, especially in the latter country, which may one day become a second America. Wherever the fruit of the gooseberry and strawberry, and the bulb of the turnip and the head of the cabbage attain a good size, there the climate may be considered highly favourable to the growth of kitchen crops, most kernel-fruits of Europe, and florists' flowers; but a warmer and drier climate is required for the richer stone-fruits, and most of those of the torrid zone.

1593. *The most suitable climate for timber trees*, when durability is an object, is a dry and rather elevated region. The resinous tribe produces the best timber in cold mountainous regions in every part of the globe. The oak, the chestnut, and the mahogany, delight in strong soils and moderate temperatures, such as skirt the bottoms of mountains. In general, no species of timber is found to be durable which has been produced in low, moist, warm situations.

1594. *Climates highly favourable for the productions of gardening are often unfavourable to the progress of the art.* In Persia and some parts of America, where the finest peaches are produced, the art of grafting is unknown or not practised; and in general, in the hot countries, where melons, gourds, and other rapid-growing annuals so readily produce their fruit, the culture of culinary leaves and legumes is neglected. In the West India islands and great part of America, the gourd serves the purposes of the cabbage, turnip, lettuce, and spinach; and, with garlic, onions, and yams, constitutes their principal culinary crops. Chardin, after enumerating the natural products of Persia, says, "We are not to conclude from thence that they have the finest gardens in the world: on the contrary, by a very general rule, there, where nature has been most abundant and liberal in her productions, art is proportionably rude and unknown; for, nature having gardened so well, almost nothing is left for art."

1595. *Climates and soils comparatively unfavourable for fruits and plants are naturally conducive to skill in gardening.* A very variable and unsettled climate, Neill observes (*Gen. Report of Scotland*, ch. ix.), tends to call into action all the powers of the mind, and to produce habits of increasing attention; and, where a gardener is able to raise tolerable crops, both of the more tender fruits and vegetables, in climates and situations adverse to the production of either, he has doubtless more real merit in accomplishing his object, even though the articles should be somewhat inferior in quality, than he who, in a propitious soil and climate, raises them to the utmost perfection. Yet the merits of such a gardener are often overlooked; and the master, through ignorance or indifference, or a niggardly penuriousness of approbation, receives that as an effort of mechanical routine, which is due to a rare union of science, skill, and indefatigable attention.

1596. *The climate and country of England*, Sir W. Temple considers as highly favourable for gardening. "Perhaps few countries," he says, "are before us in the number of our plants; and I believe none equals us in a variety of fruits which may be justly called good; and, from the earliest cherry and strawberry, to the last apples and pears, may furnish every day of the circling year. For the taste and perfection of what we esteem the best, I may truly say, that the French, who have eaten my peaches and grapes at Shene, in no very ill year, have generally concluded that the last are as good as any they have eaten in France, on this side Fontainebleau; and the first as good as any they have ate in Gascony: I mean, those which come from the stone, and are properly called peaches; not those which are hard, and are termed paves; for these cannot grow in too warm a climate, nor ever be good in a cold, and are better at Madrid than in Gascony itself. Italians have agreed my white figs to be as good as any of that sort in Italy, which is the earlier kind of white fig there; for, in the latter kind and the blue, we cannot come near the warm climates, no more than in the Frontignac or Muscat grape. My orange trees are as large as any I saw when I was young in France, except those of Fontainebleau; or what I have since seen in the Low Countries, except some very old ones of the Prince of Orange's; as laden with flowers as can well be; as full of fruit as I suffer or desire them; and as well tasted as are commonly brought over, except the best sorts of Seville and Portugal. And thus much I could not but say in defence of our climate, which is so much and so generally decried abroad. The truth is, our climate wants no heat to produce excellent fruits; and the default of it is only the short season of our heats and summers, by which many of the latter are left behind and im-

perfect with us. But all such as are ripe before the end of August are, for aught I know, as good with us as any where else. This makes me esteem the true regions of gardens in England to be the compass of ten miles about London, where the incidental warmth of air from the fires and steams of so vast a town, makes fruits, as well as corn, a great deal forwarder than in Hampshire [unless we except the south side of Portsdown Hill, which is one of the earliest spots for ripening corn in England] or Wiltshire, though more southward by a full degree."

Sect. II. *Influence of Climate and Manners on Gardening, as an Art of Design and Taste.*

1597. *Taste in gardening depends jointly on the state of society and on climate.* Since the introduction of the modern or natural style of gardening into Britain, it has been a common practice to condemn, indiscriminately, every other taste as unnatural and absurd. If by unnatural, an allusion is made to the verdant scenery of uncultivated nature, we allow that this is the case; but we would ask, if, for that reason, it follows that ancient gardens were not as natural and reasonable in their day, as any of the manners and customs of those times? Gardening, as a liberal art, is destined to create scenes in which both beauty and use are combined: admitting, therefore, that both styles are alike convenient, to say that the modern only is beautiful, is to say that there is only one sort of beauty adapted to gardening; or that there is no beauty but that of the picturesque; or that all former ages were, and that every country, except Britain, now is, in a state of barbarism with respect to this art. If we take the term natural in a more extensive sense, and apply it to the climate, situation, condition, and manners of a people; and if we allow these to be natural, why may not their gardening be natural, as well as their particular customs and dress? The gardening we now condemn so unreservedly, has subsisted, as we have seen, from the earliest ages in warm climates; and still prevails there, as well as in more temperate countries, whose inhabitants are not altogether ignorant of the modern style. It may, therefore, be said to have grown up with mankind; and, at all events, must be perfectly suited to the wants and wishes of the inhabitants of such countries.

1598. *The fitness and beauty of any style must depend on the purposes to which it is applied, and the kind of rural beauty already prevalent in the country of its adoption.* The gardens of the East, we have every reason to believe, were used more as arbours or conservatories are in this country, than as places of exercise and active enjoyment. The object was repose, indolent recreation, sedentary or luxurious enjoyment. To breathe the fresh air, shaded from a tropical sun; to inhale the odour of flowers; to listen to the murmur of breezes or fountains, to the singing of birds; or to observe the minute beauties of the surrounding foliage, were, and still continue to be, the ordinary class of beauties desired in an Eastern garden. A higher and more voluptuous kind consisted in using it as a banquetting-place, bath, or seraglio, as is still the case in Turkey and Persia; in feasting the eyes with the sight of dancing beauties; in ravishing the ears with concerts of vocal or instrumental music, and in firing every sense with wine. Exercise was incompatible with that languor of body, which is attendant on a warm climate and a distant prospect; inconsistent with security from wild beasts, and that privacy which selfishness or jealousy might dictate. "The Persians," Chardin observes, "do not walk in gardens so much as we do, but content themselves with a bare prospect, and breathing the fresh air. For this reason, they set themselves down in some part of the garden at their first coming in, and never move from their seats till they are going out of it." (*Travels*, ch. vi.) "Nothing surprises the people of the East Indies so much as to see Europeans take pleasure in exercise. They are astonished to see people walk who might sit still." (*Kinderley's Letters from the East Indies*, p. 182.) Add to this, that the natural surface of warm countries is generally so parched with heat, as to be far less agreeable to look on than the verdure of a limited space, kept luxuriant by water. "Before the end of May," Russel remarks, "the whole country round Aleppo puts on so parched and barren an aspect, that one would scarcely think it capable of producing any thing but the very few plants which still have vigour enough to resist the extreme heats." (*Russel's Aleppo*, p. 13.) If to these we subjoin the use of fruit, and, what is common to every exertion of man, a desire of obtaining applause for the employment of wealth and skill, we shall include every object sought in an Eastern garden. An Eastern garden, therefore, appears to have been a collection, in one spot, of all those beauties which are found scattered about in general nature, in order to adapt them to the use and enjoyment of man.

1599. *The plan of an Eastern garden was well calculated to attain the ends in view.* Moderate extent and immediate connection with the house are necessary and obvious ingredients in the design. The square form was adapted for the enclosure as the simplest; the trees were ranged in rows, to afford continuity of shade; and the walks laid out parallel between them, to admit uninterrupted progress; that walk parallel to and close under the house was formed into a raised platform or terrace, to give elevation and dignity to the house, to afford the master a commanding view of the garden, and to

serve as a connecting link between art and comparative nature. By leaving open plots or squares of turf in the areas, formed by intersecting rows of trees, a free circulation of air was facilitated; and the same object, as Pliny informs us, was promoted by the quincunx, which admits the breeze from every quarter of the compass more readily than any other disposition. A picturesque or natural arrangement would have stagnated the air, and thus have defeated one of the grand purposes in view. The same reasons would guide them in their choice of spreading broad-leaved trees; and, to thicken their boughs, or deprive them of such branches as were too low, or tended to destroy the balance of the tree, the pruning-knife would be occasionally applied. Water in every form suggests the idea of coolness; but, agitated in cascades, fountains, or jets d'eau, it is used to the best advantage, and the heat of the atmosphere is moderated in proportion to the evaporation which takes place. In still ponds or basins it has another property, that of reflecting the objects around it. Buildings, as arbours, aviaries, covered seats, banqueting-houses, baths, and grottoes, would become requisite for their respective uses, and would abound in proportion to the wealth or rank of the owner. Fruit trees would be introduced in appropriate situations, for the sake of their fruit; and a choice of odoriferous flowers and shrubs would fringe the margin of the walks, to admit of a more easy inspection of their beauties, and a nearer contact of their odours with the olfactory nerves: they would also be disposed in greater profusion, in curious knots or parterres near to the house, or in front of the resting-places or banqueting-rooms. In time, even artificial objects of value, as dials, statues, vases, and urns, would be added, in order to create as much variety and interest in a small spot as was consistent with its utility. Such we have found to be the general arrangement of Eastern gardens; and as there seems no more obvious way of attaining the wants of those to whom they belonged, we may pronounce it to be perfectly reasonable and natural.

1600. *As to the more extensive paradises or parks in which wild beasts were admitted, and even whole regiments exercised, we have but few authentic particulars respecting them.* Those of Assyria must be regarded as royal extravagancies, calculated to excite astonishment and admiration at their magnitude, and the art and expense employed in their construction; and, if any reliance is to be placed in the account given by ancient authors of the hanging gardens of Babylon, their design will be found singularly to unite this object with the minor beauties of the confined garden; to combine the splendour of magnificence with the delights of the justest feelings of nature. They were situated over, or, according to some, adjoining to, King Nebuchadnezzar's palace, or on a platform supported by lofty pillars, on the banks of the Euphrates, in the middle of the city of Babylon. They are said to have contained groves, fountains, and, in short, every object which we have mentioned, as appertaining to the more ordinary description of Eastern gardens. The king's object, in forming these gardens, is said to have been, to gratify his Median queen by that sort of verdant scenery and distant prospect to which she had been accustomed in the more romantic country of her birth. The height, then, would give that commanding prospect of the water and shipping of the Euphrates and the city, as well as the gardens within and without its walls, which she particularly desired. The air in that elevated region would be more cool than below; the noise and bustle of the city would cease to be offensive; the whole would be more exposed to breezes and winds; and the mind, deriving so much enjoyment in so singular and elevated a situation, must have experienced emotions at once sublime and romantic. But a faint idea of these gardens will be excited, by imagining the quadrangle of Somerset House crowned with a portion of Kensington gardens; or of the summer garden of Petersburg placed over the Kremlin in Moscow.

1601. *How, and with what propriety, the Eastern style came afterwards to be adopted in Greece, Italy, France, and finally in England, is our next enquiry.* The principle or instinct of imitation would be the first cause why the more distant nations, whether colonies from the East or returning travellers or conquerors, adopted this style. This is so obvious as to require no comment beyond what will be furnished by individual enquiry into our earliest tastes, habits, and predilections in dress, amusements, furniture, and other matters of common life. The next principle is that of use or fitness, which would vary in application, proportionably to the distance, and to the different circumstances, of the imitating country. Thus, it would not exactly apply in Greece or Italy, where the climate was more temperate, active exercise more congenial, and the habits of the wealthy, for a long time at least, comparatively frugal. Add to this, that verdant landscapes, shade, breezes, rills, waterfalls, and lakes, with their accompaniments of odours, murmurs, singing-birds, reflections of objects, were more liberally distributed over the face of general nature. The more active character of man in such countries would, in time, also appropriate to their use from this natural abundance, a greater variety of fruits and legumes.

1602. *The Eastern style assumed a variation in its character under the Romans.* The necessarily different culture required for perfecting fruits and culinary vegetables in a

different climate, would give rise to the orchard and kitchen-garden. This would simplify the objects of the ornamental garden, which would thus exhibit less a collection of natural beauties, than the display of art, the convenience of taking exercise, here a pleasure rather than a fatigue, and the gratifications of shade, cool breezes, and aromatic odours. A prospect of the surrounding country was desired, because it was beautiful; and where, from various circumstances, it was interrupted by the garden or its boundary fence, mounds or hills of earth were raised, and, in time, prospect-towers appended to the houses. Greater extent would be required for more athletic recreations, and would be indulged in also by the wealth and pride of the owner, for obvious reasons. Abridgment of labour would suggest the use of the shears, rather than the more tardy pruning-knife in thickening a row of trees. A row of low trees, so thickened, would suggest the idea of a row of clipped shrubs. Hence at first hedges; and subsequently, when art and expense had exhausted every beauty, and when the taste had become tired of repetition, verdant sculpture would be invented, as affording novel, curious, and fantastic beauty, bordering, as do all extremes, upon absurdity. A more extended and absolute appropriation of territory, than what we may suppose to have taken place in the comparatively rude countries of the East, would lead to agricultural pursuits, and these again would give rise to the various arrangements of a Roman country residence which we know to have existed, and which it would be superfluous to describe. Various other circumstances might be added; but enough has been stated to show that the gardening of the Romans was perfectly natural to them, under the circumstances in which they were placed; and, as it suited their wants, and produced scenes which they found to be beautiful, it was, therefore, in the justest taste. To have imitated the scenery of nature, or studied picturesque beauty in a garden, would have been merely adding a drop to the ocean of beauties which surrounded them. Expense incurred for this purpose could never have procured applause to the owner; since, the more like nature the production, the less would it excite notice. All that was left for man to do, therefore, was to create those beauties of art, convenience, and magnificence, which mark out his dwelling-place, and gratify his pride and taste by their contrast with surrounding nature.

1603. *The gardening of the Romans was copied in France and Britain*, with few variations beyond those dictated by necessity and the difference of climate. It was found to be perfectly beautiful and agreeable; and would have continued to prevail, had Britain continued in similar circumstances to those in which she was at the time of its introduction. But such has been the progress of improvement in this country, that the general face of nature became as it were an ancient garden, and every estate was laid out, bounded, and subdivided, by stripes of wood, rows of trees, canals, ponds, walls, and hedges. The credit or distinction to be obtained here, by continuing to employ the ancient style, could be no greater than what the Romans would have obtained by imitating nature. In their case, all the country was one scene of uncultivated, in ours it was one scene of cultivated, beauty. In this state of things the modern style was adopted, not solely from a wish to imitate the gardening of the Chinese, or to display a high degree of refinement in taste, but from the steady operation of the same motives which produced and continued the ancient style, a desire of distinction.

1604. *The modern style of gardening is inevitable to countries not generally under cultivation.* The English style cannot long please in such countries as Sweden, Poland, and America, otherwise than from its novelty, or as giving rise to certain associations with the people whose name it bears. What delight or distinction can be produced by the English style in Poland, for example, where the whole country is one forest, and the cultivated spots only so many open glades, with the most irregular and picturesque sylvan boundaries? But let a proprietor there dispose of the scenery around his residence in the Roman or French manner; let him display a fruit or kitchen garden bounded by high stone walls; a farm subdivided by clipped hedges and by ditches; and a pleasure-ground of avenues, stars, circles, fountains, statues, temples, and prospect-towers, and he will gratify every spectator. The view of so much art, industry, and magnificence, amid so much wild and rude scenery, must awake so many social ideas of comfort and happiness, and so much admiration at the wealth and skill employed, that a mind of the greatest refinement and the justest taste would feel the highest degree of pleasure, and would approve as much of such a country-residence in the wilds of Poland or America, as he would of the most natural and picturesque residence of England, amid the highly artificial scenery of that country.

1605. *The modern style is not an improvement on the ancient manner, but the substitution of one style for another.* Part of the prevailing antipathy to the ancient style proceeds from a generally entertained idea, that the modern is an improvement on it, in the same way as a modern plough is an improvement on the clumsy implements of our ancestors; but the truth is, the two styles are as essentially and entirely different in principle, as painting and architecture; the one being an imitative, and the other an inventive art. The more the ancient style is improved and perfected, the more it will differ from the

modern style; and neither the improvement nor the neglect of the modern style will ever bring it a step nearer the ancient manner.

1606. *Landscape-gardening agrees with ancient gardening in no other circumstance than in that of employing the same materials.* It is an imitative art, like painting or poetry, and is governed by the same laws. The ancient style is an inventive and mixed art, like architecture, and governed by the same principles. The beauties which architecture and geometric gardening aimed at, were those of art and utility, in which art was every where avowed. The modern style of gardening, and the arts of poetry and painting, imitate nature; and, in doing so, the art employed is studiously concealed. Those arts, therefore, can never be compared, whose means are so different; and to say that landscape-gardening is an improvement on geometric gardening, is a similar misapplication of language, as to say that a lawn is an improvement of a cornfield, because it is substituted in its place. It is absurd, therefore, to despise the ancient style, because it has not the same beauties as the modern, to which it never aspired. It has beauties of a different kind, equally perfect in their manner as those of the modern style, and equally desirable under certain circumstances. The question, therefore, is not, whether we shall admit occasional specimens of obsolete gardening, for the sake of antiquity, but whether we shall admit specimens of a different style from that in general use, but equally perfect in its kind. (*Ed. Encyc., art. Landscape-Gardening.*)

1607. *An enlightened mind will derive pleasure from every style.* "When I perceive a man," observes Sir Samuel Egerton Brydges, "incapable of deriving pleasure from more than one style of composition, and dogmatizing on its exclusive merit, I pity his weakness, and despise his presumption. When he narrows his curiosity, either to what is old or what is new; when he confines his praise either to the dead or to the living, though in both cases he is ridiculous, perhaps his folly is more evinced in the last." (*Censura Literaria*, vol. viii. p. 214.) It is the privilege of the man, who has opened to his mind by observation and study all the springs of pleasant association, to delight by turns in the rudeness of solitary woods, in the cheerfulness of spreading plains, in the decorations of refined art, in the magnificence of luxuriant wealth, in the activity of crowded ports, the industry of cities, the pomp of spectacles, and the pageantry of festivals. (*Ed. Rev., 1806.*)

1608. *We may therefore conclude that gardening, as an art of design, must be considered relatively to the climate and situation of the country, and habits and manners of the people, where it is employed; and that the ancient and modern styles, viewed in this light, are each perfectly natural, and equally meriting adoption, according to relative circumstances; less than from any positive beauty or advantages of either manner.* We are consequently of opinion, that the ancient style, divested of some ingredients which relate to warm climates, and purified from the extravagancies of extremes in decoration, would be in much better taste in some situations, even in Britain, than the modern style; and that this latter style cannot, for a long series of years, afford any other satisfaction in many parts of other countries than what arises from the temporary interest of novelty, or of accidental association.

SECT. III. *Of the Climate of Britain, in respect to Gardening.*

1609. *Britain, France, Holland, and the north of Italy, are unquestionably the best countries in Europe for European gardening; and of these, the best parts are such as combine hills and plains, rocks, rivers, and prospects.*

1610. *The preference of Britain, as to government and civilisation, and its equality at least as to soil and surface, will not be disputed.* As to climate, Charles II., in reply to some who were reviling it, said, he thought "that was the best climate where he could be abroad in the air with pleasure, or at least without trouble and inconvenience, the most days of the year, and the most hours of the day;" and this, he thought, could be done in England more than in any other country he knew of in Europe.

1611. *Gravel and turf.* There are, says Sir William Temple, "besides the temper of our climate, two things particular to us, that contribute much to the beauty and elegance of our gardens; which are, the gravel of our walks, and the fineness and almost perpetual greenness of our turf. The first is not known any where else, which leaves all their dry walks, in other countries, very unpleasant and uneasy. The other cannot be found in France or in Holland as we have it, the soil not admitting that fineness of blade in Holland, nor the sun that greenness in France, during most of the summer; nor indeed is to be found but in the finest of our soils."

1612. *Neatness and greenness,* says Horace Walpole, "are so essential, in my opinion, to the country, that in France, where I see nothing but chalk and dirty peasants. I seem in a terrestrial purgatory, that is neither in town nor country. The face of England is so beautiful that I do not believe Tempe or Arcadia were half so rural; for both lying in hot climates must have wanted the moss of our lawns." (*Letters*, colli., 1796.)

1613. *That which prevents the gardening of Britain from attaining to a much higher*

degree of perfection as an art of taste, is not any natural deficiencies in our climate or soil, nor the want of means to make the most of them, but the want of taste in the proprietors; for, after all that has been done and written, there appears to be few who have a just relish for that sort of beauty in pleasure-grounds which is properly called picturesque, or such as a painter might introduce in a picture. We do not allude to any objects or arrangements which would interfere with utility; but to such a disposition of forms as painters call grouping, connection, harmony, and, above all, to that general result which is called unity of expression or character.

PART II.

GARDENING CONSIDERED AS A SCIENCE.

1614. *Knowledge, in the infancy of every art, is necessarily confined to particulars, but after long observation and experience, the mind begins to generalise facts; and this is the first step towards the foundation of theory, or science; which is nothing more than the substitution of rational principles of action, for habits founded on custom or prejudice. A number of generalised facts being accumulated, the next process of the mind is to classify or systematise them; this is the highest effort in the progress of knowledge; and that art will be the most perfectly understood as a science, in which the greatest number of facts, or, in other words, the most extensive range of experience and observation, is generalised and arranged in a connected system.*

1615. *Unfortified by the light of science, the practical man has no other assurance for the success of the future, than the experience of the past, and no resource for unforeseen events but ordinary expedients; he thus resorts to rules drawn from precedents, which, of course, can apply only to peculiar cases, instead of resorting to general principles which are capable of being applied to every case. Industry may be baffled, and hope defeated, by a thousand contingencies from causes incident to every process of art, and to every operation of nature. By these the mere routine-practitioner is deranged, or thrown off his guard; whilst the man of science refers events to their true causes, suggests the adaptation of measures to meet every case; and knowing the laws of nature to be immutable, operates on her materials with confidence in the result. Science alone, however, without practical experience, will not ensure success, and may at first end in disappointment. But "where theoretical knowledge and practical skill," as Dugald Stewart observes, "are happily combined in the same person, the intellectual power of man appears in full perfection, and fits him equally to conduct with a masterly hand the details of ordinary business, and to contend successfully with the untrod difficulties of new and hazardous situations." (*Elements of the Philosophy of the Human Mind*, p. 232. 2d edit.)*

1616. *The science of every art must necessarily depend on the end or object for which that art is practised; on the nature of the materials employed to procure or attain those ends; and on the nature of the agents made use of by human skill to operate on those materials. The object of the art of gardening is twofold: that of cultivating vegetables for use or ornament in domestic or general economy; and that of forming arrangements of external scenery, beautiful as such, and suitable for personal recreation. The first object, therefore, to be ascertained on this subject, should be the wants, desires, and taste of that society for which the gardening is intended; the second, the study of the vegetable kingdom; the third, the study of the natural agents of garden culture; the fourth, that of the artificial agents of garden culture; and the fifth, that of the operations of garden culture. The first branch of the science of gardening, or the study of the wants and tastes of the society for which the gardening is intended, may be considered as ascertainable by every individual, from his own observation and experience; that is, from the circumstance of his being himself a specimen of that society for the time being. This branch, therefore, does not require farther consideration in a work like the present. The second, third, fourth, and fifth branches of this science will form the contents of the four following books.*

BOOK I.

ON THE STUDY OF THE VEGETABLE KINGDOM.

1617. *The study of plants comprehends the following objects; viz. their nomenclature, or the power of distinguishing one kind from another; their description, or the*

mode of conveying intelligence respecting them; their classification, or the mode of arranging them, in order that they may be studied in masses; the formation of herbariums for their systematic study; their organology, their physiology, their geographical distribution, and the principles of vegetable culture. To each of these subjects we shall devote a chapter; not for the purpose of treating upon them at length, but in order to point out such of their leading features as may impress on the mind of the young gardener, the immense importance, to him, of studying them, in all their details, from the botanical works which will be referred to.

CHAP. I.

Of the Nomenclature of Plants.

1618. *The nomenclature of plants* includes the names of their different parts, and the names of the classes, orders, tribes, genera, species, varieties, and sub-varieties, under which they are arranged. Our authorities for this chapter are, chiefly, Smith, De Candolle, and Lindley.

SECT. I. *Names of the different Parts of Plants.*

1619. *Glossology, or the names of the parts of plants.* All the arts and sciences require to express, with brevity and perspicuity, a crowd of ideas unused in common language, and unknown to the greater part of men. Botany, having to describe an immense number of beings, and each of these beings having a great variety of organs, requires a great variety of terms. Nearly all botanists are agreed as to these terms; and, in order that they may be universally understood, and remain unchanged in meaning, they are taken from a dead or fixed language. A plant in flower, surveyed externally, may be perceived to be composed of a variety of obvious parts, such as the root, the stem, the branch, the leaf, the flower, the fruit, and perhaps the seed; and other parts less obvious, as buds, prickles, tendrils, hairs, glands, &c. These, with their modifications, and all the relative circumstances which enter into the botanical description of a plant, form the subject of glossology, the details of which, involving the definition of some hundreds of terms, are here omitted; because, to those conversant with them, it would be of little use; and those who have them still to learn will find it more convenient to have recourse to some elementary work, where most of them are illustrated by figures. See *Lindley's Introduction to Botany*, *Smith's Introduction*, and *Grammar of Botany*, and similar works. The first, as being the most recent, may be recommended as the most eligible work for a young gardener. Mr. Lindley has very beautifully arranged the characteristic terms of botany, as either individual or collective. The individual are either absolute or relative: the absolute being those which relate to figure, division, surface, texture, size, duration, colour, variegation, and veining; and the relative, those which relate to estivation, direction, and insertion. The collective terms relate to arrangement and number. This mode of grouping the terms together is calculated materially to facilitate the labour of acquiring them; and we have pointed it out to the young gardener, to impress upon his mind the great superiority of Mr. Lindley's *Introduction* to every other. Being the latest work of the kind, indeed, it would have been a reflection on the professor, if it had not been also the best.

SECT. II. *Names of Plants collectively and individually.*

1620. *The nomenclature of plants, collectively and individually.* The whole vegetable kingdom is divided into classes, orders, genera, species, and varieties. A class is distinguished by some character which is common to many plants; an order or a tribe is distinguished by having some character limited to a few plants belonging to a class; a still more limited coincidence constitutes a genus; and each individual of a genus, which continues unchanged when raised from seed, is called a species. A variety is formed by an accidental deviation from the specific character, and easily returns by seed to the particular species from which it arose.

SUSSECT. 1. *Names of Classes and Orders.*

1621. *The names of the classes and orders of Linnaeus and Jussieu* being exclusively used at the present time, we shall pass over those of the earlier botanists. The names of the Linnaean classes and orders are, as far as practicable, expressive of some common character belonging to all the plants which compose them, and consist only of one word for the class, and another for the order, both compounded from the Greek. There are exceptions, however, to the first rule in several of the classes of the sexual system, as in *Icosándria*, *Monœcia*, *Dioœcia*, which contain plants that have not the circumstances

expressed in the title. The names of natural orders may be taken from such genera as may serve to recall the general relations of each tribe or order. The name of the order, and generic name, however, are at no time to be precisely the same, from the manifest impropriety and confusion of arranging a thing under itself. Thus, in the natural method of Linnæus, the order *Pálme* has no genus of that name. In the method of Jussieu, the name of an order is composed from the name of one of the most characteristic genera of that order, by terminating in *aceæ*, such names as end in *a*, or *as*, or even *us*; or by converting the terminations *us* or *um*, into *ee*; as, *Rosaceæ* from *Rôsa*, *Rhâmneæ* from *Rhâmnus*, *Menispérmeæ* from *Menispérnum*, &c. But this rule, Mr. Lindley observes, "is not very strictly adhered to; many well-known old names, not constructed upon this principle, being still retained; such as *Salicariæ*, *Leguminosæ*, *Carophyllææ*, *Graminææ*, *Pálmeæ*, &c." (*Introducet*. p. 458.)

SUBJECT. 2. Names of Genera.

1622. *Linnaeus laid down certain canons for naming plants*; among which, one was, that a fixed and almost universally studied language, such as the Greek or Latin, should exclusively be used; but modern botanists consider it of little real importance what name an object bears, provided that name serves to distinguish it from every thing else. It is now a universal practice to convert the aboriginal names of plants into scientific generic names, by adding Latin terminations to them. "The advantage of this practice to travellers," Professor Lindley observes, "is very great, because it puts them in possession of a certain part of the language of the country in which the plants are found." He adds, "that the difficulty of constructing generic names from the classical languages, which shall express the peculiarities of the species they represent, renders a well-sounding 'unmeaning' name by far the best that can be contrived." (*Introducet*. p. 457.) When generic names are formed from the names of individuals, their terminations are Latinised according to certain rules adopted by grammarians; and in doing this, considerable liberties are sometimes taken with uncouth names. Thus, the elegant Tournefort made *Gundelia* from *Gundelscheimer*; which induced Sir J. E. Smith to choose *Goodenia* for his friend Dr. Goodenough; though it was, when too late, suggested to him that *Goodenovia* would have been preferable. Some difficulty has arisen respecting French botanists, on account of the additional names by which their grandeur, or at least their vanity, was displayed during the existence of the monarchy. Hence, *Pittonia* was applied to the plant consecrated to Pitton de Tournefort; but Linnaeus preferred the name by which alone he was known out of his country, or in learned language, and called the same genus *Tournefortia*. A fanciful analogy between botanists and the plants named after them has been made by Linnaeus in the *Critica Botanica*. Thus, *Bauhinia*, after the two distinguished brothers John and Caspar Bauhin, has a two-lobed or twin-leaf. *Scheuchzeria*, a grassy alpine plant, commemorates the two Scheuchzers, one of whom excelled in the knowledge of alpine productions, the other in that of grasses.

SUBJECT. 3. Names of Species.

1623. *Specific names should be formed on similar principles to the generic ones*; but some exceptions are allowed, not only without inconvenience, but with great advantage. Such as express the essential specific character are unexceptionable, as *Banksia serrata*, *integrifolia*, *dentata*, &c.; but perhaps those which express something equally certain, but not comprehended in that character, are still more useful, as conveying additional information, like *Ixora alba* and *coccinea*, *Scleranthus annuus* and *perennis*, *Alëtris fragrans*, *Saxifraga cœrnea*, &c.; for which reason it is often useful that vernacular names should not be mere translations of the Latin ones. Comparative appellations are very good, as *Banksia ericifolia*, *Andrœmeda salicifolia*, *Saxifraga bryoides*, *Axonopus cimicinus*, *Elymus Hystrix*, *Pedicularis Scœptrum*. Names which express the local situations of different species are excellent; such as *Melampyrum arvense*, *pratense*, *memoratum*, and *sylvaticum*, *Carex arenaria*, *uliginosa*, and *sylvatica*, as well as *aquatica*, *maritima*, *rupëstris*, *alpina*, *nivalis*, used for many plants. But names derived from particular countries or districts are liable to much exception, few plants being sufficiently local to justify their use. Thus, *Ligusticum cornubiense* is found, not only in Cornwall, but in Portugal, Italy, and Greece; *Schwënkia americana* grows in Guinea as well as in South America. Such, therefore, though suffered to remain on the authority of Linnaeus, will seldom or never be imitated by any judicious writer, unless *Tröllius europæus* and *asiaticus* may justify our naming the third species of that genus, lately brought from America, *americanus*. The use of a plant is often commodiously expressed in its specific name, as *Brassica oleracea*, *Papaver somniferum*, *Inocarpus edulis*; so is likewise its time of flowering, as *Primula vëris*, *Leucodjum vërnium*, *æstivum*, and *autumnale*, and *Erânthis hyemalis*.

1624. *When a plant has been erroneously made a distinct genus, the name so applied to it*

may be retained for a specific appellation, as *Lathræa Phelypæa*, and *Bartsia Gymnandra*; which may also be practised when a plant has been celebrated, either in botanical, medical, or any other history, by a particular name, as *Origanum Dietamnus*, *Artemisia Dracunculus*, *Laurus Cinnamomum*, *Selinum Carvifolia*, *Carcia Papaya*. In either case the specific name stands as a substantive, retaining its own gender and termination, and must begin with a capital letter.

1625. A specific name is occasionally adapted to some historical fact belonging to the plant, or to the person whose name it bears, as *Linnaea borealis*, from the great botanist of the north; *Murraya exotica*, after one of his favourite pupils, a foreigner; *Browallia demissa* and *elata*, from a botanist of humble origin and character, who afterwards became a lofty bishop. These may be considered as the conceits of the botanists of the last age, and belong rather to the time than to the individuals.

1626. When species are named after individuals, the rule of construction is this: if the individual is the discoverer of the plant, or the describer of it, the specific name is then to be in the genitive singular; as *Caprifolium Douglasii*, *Carex Menziesii*,—Messrs. Douglas and Menzies having been the discoverers of these species; and *Plânera Richardi*, the species so called having been described by Richard: but if the name is merely given in compliment, without reference to either of these circumstances, the name should be rendered in an adjective form, with the termination *anus*, *a*, *um*; as *Pinus Lambertiana*, in compliment to Mr. Lambert: and, for this reason, such names as *Rosa Banksiae*, and *R. Brunonii* are wrong; they should have been *R. Banksiana* and *R. Brunoniana*. (*Lindley's Introd.* p. 458.)

1627. Names sanctioned by general use are for the most part held sacred among botanists. The study of natural history is, from the multitude of objects with which it is conversant, necessarily so encumbered with names, that students require every possible assistance to facilitate the attainment of those names, and have a just right to complain of every needless impediment. The names established throughout the works of *Linnaeus* are become current coin; nor can they be altered without great inconvenience. Those who alter names, often for the worse, according to arbitrary rules of their own, or in order to aim at consequence, which they cannot otherwise attain, are best treated with silent neglect. When, however, solid discoveries and improvements are made in the science; when species or genera have been confounded by *Linnaeus* himself, and new ones require to be separated from them, the latter must necessarily receive appropriate appellations; as also when a totally wrong and absurd name has by mistake been given, as *Begonia capensis*. In such cases names must give place to things, and alterations proceeding from such causes must be submitted to. (*Smith's Introduction*, ch. 22.)

SUBSECT. 4. Names of Varieties and Subvarieties.

1628. The names which botanists give to varieties are of the simplest description; they always convey an idea of the variation which has taken place, and are used in addition to the specific name. Thus we have *Caltha palustris*, the species, and *palustris flore pleno*, the double-flowered *caltha*, &c. As a series of species are commonly numbered 1, 2, 3, &c., so the varieties of a species are generally, for distinction sake, designated by the letters of the Greek alphabet, thus: *Brassica oleracea*, the species; *a. capitata*, the first variety; *β. rubra*, the second variety; *γ. sabauda*; *δ. sabellica*, &c.

1629. Subvarieties of plants are accidental modifications of varieties of a very temporary and fluctuating nature. They are generally produced by culture, and are more especially known in garden-fruits, culinary vegetables, and what are called florists' flowers. The differences among subvarieties are generally so slight, or so difficult to define, as not to admit of the application of scientific names. Botanists, therefore, pay no attention to them; but gardeners, to whom they are of considerable importance, have found it necessary in some way or other to distinguish them, and they generally apply the name of the person or place, by whom or where, they were originated. Thus *Pyrus Malus* is the crab or apple, *P. Malus* var. *domestica*, the cultivated apple. *Pyrus Malus* var. *domestica* subvar. *Downton pippin*, apple raised from seed at Downton. *P. M. v. d.* subvar. *Kirk's fame*, &c. *Brassica oleracea* var. *capitata*, common white cabbage. *B. o. var. c.* subvar. *Battersea* early common cabbage, an early variety raised at Battersea. *Dianthus Caryophyllus* is the clove pink. *D. C. var. flore pleno* is the carnation. *Dian. Cary.* var. *fl. pl.* subvar. *Hogg's seedling*, a variety of carnation raised by Hogg. *D. C. fl. pl.* subvar. *Lady Jane Grey*, a variety of carnation named after Lady Jane Grey. A refinement on this sort of nomenclature consists in adding the name of the person who originated the subvariety, to the name of the person or place after whom or which it was named; thus Hogg's *Lady Jane Grey*, Duncan's *Cheshire hero*, &c. "To raise a fine new variety of any florist's flower, to name it after some great personage, and with that name to couple your own, is the greatest honour, says Emmerton (*Treatise on the Auricula*), which a florist can aspire to."

1630. *Names of subvarieties which indicate something of their properties* are to be preferred, as Black July-grape, Bitter-sweet-apple, &c.; or such as indicate the place or time where or when they were originated or abound, as Deptford onion, Claremont nuptials primrose, or the Afflicted queen carnation.

1631. *Names of hybrids* are composed of the specific names of both parents: thus *Passiflora cæruleo-racemosa*, is applied to a hybrid passion flower, raised by fertilising the pollen of *P. cærulea*, with that of *P. racemosa*. When the hybrid partakes more of the properties of one parent than of the other, the specific name of the prevailing species is repeated; as *P. cæruleo-racemosa racemosa*; a hybrid between *P. cærulea* and *racemosa*, partaking most of the nature of the latter species. As, however, it has been found that some hybrids are not only capable of reproducing themselves by seeds, but of cross impregnating with other hybrids through a second, and perhaps through several, series; this mode of designating the genealogy of a hybrid, becomes in such cases impracticable, as the hybrid of the latest series would require a lengthened line of names. To prevent this inconvenience, practical botanists have latterly usually named hybrids after their originators, or the places at which they were originated; thus *Potentilla Russelliana*, *Potentilla Mackayana*, *Potentilla Hopwoodiana*, *Calceolaria Youngii*, *Lupinus Marshallianus*, *Rhododendron alta-clerense*, because raised at Lord Carnarvon's, at High Clere; and frequently a name is applied which only expresses in general terms that the plant is of hybrid origin, as *Oenothera bifrons*: the terms *hybrida*, *ambigua*, *intermedia*, &c., are of this last kind.

CHAP. II.

Phytography, or the Description of Plants.

1632. *Plants are described by the use of language alone, or, by the use of language and figures, or models, or dried plants conjoined.* The object of description is to enable any person to recognise a known species after its station has been discovered in a classification; and also to put those who have never seen the plant to be described, in possession of the facts necessary to acquire a just notion of its structure and affinities. (*Lind. Introd.* p. 432.) We constantly find travellers, and others, attempting to describe plants in vulgar language; "but their accounts are often so vague, that no distinct idea can be formed of the subject of their descriptions, which remains an enigma, until some botanist, following their steps, shall happen to be able to put its characters into scientific language." (*Ibid.*)

1633. *Plants are distinguished from each other by their characters*, which are of two sorts: the one is called essential, and is most commonly employed for orders and genera; the other is called differential, and is chiefly used in discriminating species. The differential character conveys information respecting the differences between one thing and another, and the essential character expresses those peculiarities which are known to be essential. "In constructing essential and differential characters in Latin, it is customary to use the nominative case for genera and orders, and the ablative for species; but in English the nominative only is employed in both cases." (*Ibid.* p. 439.)

1634. *Collections of botanical descriptions* may be of different sorts, as

1. *Monographs*, or descriptions of one genus, tribe, or class, as Lindley's *Monographia Rosarum*. 2. *Floras*, or an enumeration of the plants of any one district or country, as Smith's *Flora Britannica*. 3. *Gardens*, or an enumeration, descriptive or nominal, of the plants cultivated in any one garden, as Aiton's *Hortus Kewensis*. 4. *General works*, in which all known plants are described, as De Candolle's *Systema Naturale*, Willdenow's *Species Plantarum*, and Persoon's *Synopsis Plantarum*.

All these classes of books may be with or without plates or figures; and these, again, may be of part or of the whole plant, and coloured or plain, &c.

Herbariums. Some botanists have substituted dried specimens for figures, which is approved of in cases of difficult tribes or genera; as in the grasses, ferns, mosses, fungi, and other lower orders of plants, &c.

1635. *Collections of abridged descriptions of plants in what are called gardens (Horti) or catalogues*, form one of the most useful kinds of botanical books for the practical gardener. The most complete of these hitherto published is our *Hortus Britannicus*, from its more extensive use of abbreviated terms than any other work of the kind, and from the use of numerous pictorial signs. A single line of this catalogue expands into a long paragraph of ideas in the mind of the botanist or gardener, and might easily be rendered a *Species Plantarum*, by introducing short specific characters in single lines on the page opposite the catalogue lines, as in Galpine's *Compendium of the British Flora*. It might farther, by subjoining notes to all the useful or remarkable species at the bottom of every

page, be rendered a history of plants, including their uses in the arts and manufactures, and their culture in agriculture and gardening. Such a work is our *Encyclopædia of Plants*, having, in addition, engravings of one or more species of all the different genera.

CHAP. III.

Taxonomy, or the Classification of Plants.

1636. *Without some arrangement, the mind of man would be unequal to the task of acquiring even an imperfect knowledge of the various objects of nature.* Accordingly, in every science, attempts have been made to classify the different objects that it embraces, and these attempts have been founded on various principles. Some have adopted artificial characters; others have endeavoured to detect the natural relations of the beings to be arranged, and thus to ascertain a connection by which the whole may be associated. "It was formerly supposed," Lindley observes, "that the organs of fructification were more constant in their character, and less subject to variation, than any other part of the plant; and hence they were exclusively adopted as a means of classification. But modern investigations have shown that characters drawn from the mode in which plants grow, and from certain anatomical peculiarities, are of much higher value; so that the organs of fructification are now chiefly employed for the distinction of genera, or of orders and tribes." (*Lind. Introd.* p. 308.)

1637. *Two kinds of methods have been adopted in arranging vegetables; the natural and the artificial.* A natural method is that which, in its distribution, retains all the classes or groups obviously alike; that is, such into which no plants enter that are not connected by numerous relations, or that can be disjoined without doing a manifest violence to nature. An artificial method is that whose classes are not natural, because they collect together several genera of plants which are not connected by numerous relations, although they agree in the characteristic mark or marks assigned to that particular class or assemblage to which they belong. Any artificial method is easier than the natural; as in the latter it is nature, in the former the writer, who prescribes the rules and orders to be observed in distribution. Hence, likewise, as nature is ever uniform, there can be only one natural method: whereas artificial methods may be multiplied almost endlessly according to the several different relations under which bodies are viewed.

1638. *The object of both methods is to promote our knowledge of the vegetable kingdom: the natural method, by generalising facts and ideas; and the artificial method, by facilitating the knowledge of plants as individual objects.* The merits of the former method consist in the perfection with which plants are grouped together in natural families or orders, and these families grouped among themselves; the merits of the latter consist in the perfection with which plants are arranged according to certain marks by which their names may be discovered. Plants classed according to the natural method may be compared to words arranged according to their roots or derivations; classed according to an artificial method, they may be compared to words in a dictionary. The natural system does not, like the Linnæan, or any other artificial system, depend upon the modifications of any one part of a plant more than another. Its groups are constructed on a careful examination of all the circumstances of the structure of a plant which can be recognised. "Groups formed upon this principle will necessarily consist of species having a greater resemblance to each other than to any thing else;" and, consequently, a knowledge of the structure, habits, qualities, or other important peculiarities, of a single species, gives an accurate general idea of all the others which a group contains. The study of the natural system is an essential part of the education of a young gardener, and one which will require his undivided attention for some time. We shall give a short outline of both systems.

SECT. I. *The Linnæan Arrangement.*

1639. *The main object of the artificial system of botanical arrangement is to facilitate the discovery of the names of plants.* For this purpose some one organ, common to plants in general, is fixed on; and, according to certain conditions in which this organ is found, individual species are referred to their places in the system, as words, by their initial letters, are referred to their places in an alphabetical dictionary. In the progress of artificial systems, different organs have been fixed on by different botanists; but those which have been most extensively employed are the corollas by Tournefort, and the stamens and pistils by Linnæus. The system of Tournefort has been a good deal employed in France, and may be considered as the artificial system of that country; that of Linnæus has been employed in most other countries, and is justly esteemed by far the most perfect artificial system which has hitherto been produced.

1640. *The application of the Linnean system in practice*, Sir J. E. Smith observes, is, above all other systems, easy and intelligible. Even in pursuing the study of the natural affinities of plants, this botanist affirms "that it would be as idle to lay aside the continual use of the Linnean system, as it would be for philologists and logicians to slight the convenience, and indeed necessity, of the alphabet, and to substitute the Chinese character in its stead." (*Introduct. to Bot.*) "The student of the Linnean artificial system," he elsewhere observes, "will soon perceive that it is to be understood merely as a dictionary, to make out any plant that may fall in his way." (*Gram. of Bot.*) "If we examine," says Decandolle, "the artificial systems which have been hitherto devised, we shall find the most celebrated of them, that which was proposed by Linnaeus, to possess a decided superiority over all others; not only because it is consistently derived from one simple principle, but also because the author of it, by means of a new nomenclature, has given to his terms the greatest distinctness of meaning." (*Elements of the Philos. of Plants, by Decandolle and Sprengel.*) Whether or not subsequent advances in science may enable botanists to dispense with the Linnean system altogether, it is not for us to affirm.

1641. *According to the Linnean system*, all plants are furnished with flowers, either conspicuous or inconspicuous. The plants with conspicuous flowers are arranged according to the number and position of their stamens and pistils; those with inconspicuous flowers are arranged according to the situation of the flowers on the plant, or according to other circumstances in the plant itself.

1642. *To discover the name of a plant by the Linnean system*, therefore, all that is necessary for a beginner is to possess a specimen

of it in flower, and to be able to know its different parts by the names given them by botanists. To discover the class, order, and genus of a plant, it is only necessary to be able to distinguish and name the different parts of the flower. These parts are as follows:—The calyx or cup (*fig. 277. a*), which is that leaf, or those leaves, by which the flower is usually enclosed when in bud, and which, when the flower is expanded, appear under it. The corolla (*corona*, a crown), which is the coloured leaf, or leaves, of a flower (*fig. 277. b*).

The stamen (or first principle of any thing), which is the thread-like process, or processes, immediately within the leaves of the corolla (*fig. 278.*). It consists of two parts; the filament or thread (*a*), and the anther (*b*): this anther contains what is called the pollen, or fructifying meal (*c*). The pistil, which is found in the centre of the flower (*fig. 279.*), and consists of three parts: the germen, or rudiments of the fruit or seed (*a*); the style (*b*); and the stigma or summit (*c*), which crowns the style, and is destined to receive the fructifying pollen.

1643. *The pistil and stamen* are the essential parts of a flower. The corolla or the calyx may be wanting, and yet the flower will be termed perfect, because the absence of those parts is no obstacle to reproduction. Even the style and the filament may be absent without preventing the formation or ripening of the fruit; and there are many flowers which have the anther sitting close to the corolla, &c., without a filament, and the stigma to the germen without a style; but the anther, the germen, and the stigma are essential.

1644. *The seed* is contained in the pericarp, or seed-vessel, which is the germen when grown to maturity. The name of the seed-vessel varies according to its form, substance, &c.; but the word pericarp (*peri*, about, *karpos*, a fruit) is applicable to all its varieties. The receptacle is the base or medium which connects the other parts of the fructification. (*Magazine of Natural History*, vol. i. p. 293.) The size, figure, form, texture, and condition of the surface of seeds afford characters of considerable service in distinguishing nearly allied species of plants; and characters extensively useful are derivable from their internal structure. Dr. Brown, we believe, was the first to make effective application of this last-mentioned principle of distinction, in characterising the genera of the class Tetradynamia, in the *Hortus Kewensis*. The principle has subsequently been adopted by Smith, in his digest of the same class of plants, in the third volume of his *English Flora*, but more extensively by Decandolle than any one, in his arrangement of the plants of the natural orders Cruciferae and Leguminosae. See an explanation of his terms, in p. 498. and 511. of our *Hortus Britannicus*.

1645. *The following Table*, and degree of knowledge conveyed in the preceding observations, will enable a beginner to discover at least the class and order of any plant which he may find in flower.

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279



FIRST GRAND DIVISION. — *Plants with conspicuous flowers (Phanerogamia).*

In the same flower, Male and female organs distinct, Stamens not united either above or below, (Generally of equal length,		CLASSES.		ORDERS.	
In Number,	One,	{	1. Monandria (mones, one, <i>over</i> , a man). Example, <i>Mitum capitatum</i> .	{	2. Monogynia (mones, one, <i>gyn</i> , a woman). Digynia (dis, twice, <i>gyn</i> , a woman).
	Two,		2. Diandria (dis, twice, <i>over</i> , a man). <i>Ferula Chamaedrye</i> .		3. Monogynia, Digynia, Trigynia (<i>tris</i> , thrice, <i>gyn</i> , a woman).
	Three,	{	3. Triandria (<i>tris</i> , thrice, <i>over</i> , a man). <i>Poa ann.</i>		3. Monogynia, Digynia, Trigynia.
	Four,		4. Tetrandria (<i>tetrs</i> , four, <i>over</i> , a man). <i>Cornus sanguinea</i> .		3. Monogynia, Digynia, Tetragynia (<i>tetrs</i> , four, <i>gyn</i> , a woman).
	Five,	{	5. Pentandria (<i>pent</i> , five, <i>over</i> , a man). <i>Lythamchia Aphemerum</i> .		6. Monogynia, Digynia, Trigynia, Tetragynia, Pentagynia (<i>pent</i> , five, <i>gyn</i> , a woman). Polygynia (<i>poly</i> , many, <i>gyn</i>).
	Six,		6. Hexandria (<i>hex</i> , six, <i>over</i> , a man). <i>Scilla bifolia</i> .		4. Monogynia, Digynia, Trigynia, Polygynia
	Seven,	{	7. Heptandria (<i>hept</i> , seven, <i>over</i> , a man). <i>Affcaulis Hippocistum</i> .		4. Monogynia, Digynia, Tetragynia, Heptagynia (<i>hept</i> , seven, <i>gyn</i> , a woman).
	Eight,		8. Octandria (<i>oct</i> , eight, <i>over</i> , a man). <i>Fuchsia coccinea</i> .		4. Monogynia, Digynia, Trigynia, Tetragynia.
	Nine,	{	9. Enneandria (<i>enne</i> , nine, <i>over</i> , a man). <i>Rhus Rhamnaceum</i> .		3. Monogynia, Trigynia, Hexagynia (<i>hex</i> , six, <i>gyn</i> , a woman).
	Ten,		10. Decandria (<i>deca</i> , ten, <i>over</i> , a man). <i>Saxifraga umbrosa</i> .		5. Monogynia, Digynia, Trigynia, Pentagynia, Decagynia (<i>deca</i> , ten, <i>gyn</i>).
Of unequal length,	Two long, and two short,	{	11. Dodecandria (<i>dodeca</i> , twelve, <i>over</i> , a man). <i>Sempervivum tectorum</i> .	{	6. Monogynia, Digynia, Trigynia, Tetragynia, Pentagynia, Decagynia (<i>dodeca</i> , twelve, <i>gyn</i> , a woman).
	Four long, and two short,		12. Icosandria (<i>ikosa</i> , twenty, <i>over</i> , a man). <i>Oxycantha</i> .		3. Monogynia, Di-pentagynia (<i>dy</i> , two, <i>pent</i> , five, <i>gyn</i> , a woman), Polygynia
Stamens united,		{		{	
by the filaments,	into one body,	{	13. Polyandria (<i>poly</i> , many, <i>over</i> , a man). <i>Clematis arvensis</i> .	{	3. Monogynia, Digynia, Trigynia, Pentagynia, Polygynia.
	into two bodies,		14. Didynia (<i>dis</i> , twice, <i>dynamis</i> , power; superiority of two stamens). <i>Turcicum thiodium</i> .		2. Gynodioecia (<i>gyn</i> , male, <i>and</i> , <i>and</i> , <i>gyn</i> , a woman), Angioecia (<i>angio</i> , a vessel, <i>and</i> , <i>gyn</i> , a woman).
	into many bodies,		15. Tetradynia (<i>tetrs</i> , four, <i>dynamis</i> ; superiority of four stamens). <i>Raphanus sativus</i> .		2. Siliculium (<i>siliqua</i> , a silicle), Silipium (<i>siliqua</i> , a silicle).
	by the anthers or tops, into a cylinder	{	16. Monadelphina (<i>mones</i> , one, <i>adelphos</i> , brother). <i>Melva fragrans</i> .	{	7. Triandria, Pentandria, Heptandria, Octandria, Decandria, Dodecandria, Polyandria.
Male organs (stamens) attached to, and standing upon, the female (pistil).	into one body,		17. Diadelphina (<i>dis</i> , twice, <i>adelphos</i> , a brother). <i>Ononis arvensis</i> .		4. Pentandria, Hexandria, Octandria, Decandria.
	into many bodies,	{	18. Polyadelphina (<i>poly</i> , many, <i>adelphos</i> , brother). <i>Hypocistum quadrangulum</i> .		4. Decandria, Dodecandria, Icosandria, Polyandria.
In different flowers,	on the same plant,		19. Syngamia (<i>syn</i> , together, <i>gamos</i> , origin). <i>Cichorium pectinatum</i> .	{	5. Polygynia equalis (equal), Polygynia superflua (superfluous), Polygynia fructifera (fruitful, in vein), Polygynia necessaria (necessary), Polygynia segregata (separated).
	on different plants,	{	20. Gynandria (<i>gyn</i> , a woman, <i>and</i> , <i>and</i> , <i>gyn</i> , a woman). <i>Ophrys sphegodes</i> .		3. Monandria, Diandria, Hexandria.
on the same or different plants along with hermaphrodite flowers,	on the same plant,		21. Monocia (<i>mones</i> , one, <i>okos</i> , house). <i>Cucurbita Pepo</i> .	{	8. Monandria; Diandria, Triandria, Tetrandria, Pentandria, Hexandria, Polyandria, Monadelphina.
	on different plants,	{	22. Dioecia (<i>dis</i> , twice, <i>okos</i> , house). <i>Cannabina sativa</i> .		14. Monandria, Diandria, Triandria, Tetrandria, Pentandria, Hexandria, Octandria, Decandria, Dodecandria, Icosandria, Polyandria, Monadelphina, Gynandria.
	on the same or different plants along with hermaphrodite flowers,		23. Polygynia (<i>poly</i> , many, <i>gamos</i> , marriage). <i>Gleditsia trinanthos</i> .		2. Monocia, Dioecia.

SECOND GRAND DIVISION. — *Plants with inconspicuous flowers (Cryptogamia).*

Reproductive organs scarcely visible, so that they have not been distinctly described,	{	34. Cryptogamia (<i>kyptos</i> , concealed, <i>gamos</i> , marriage).	

9. Filices (*filix*, fern), Equisetaceae (*equis*, horse, *seta*, hair), Lycopodiaceae (*lyco*, wolf, *pod*, foot), Marattiaceae (*mar*, L. F. Maratti), Araceae (*ar*, root), Hepaticae (*hep*, the liver), Aqueceae (*aque*, sea weed), Lichenes (*lich*, crust), Fungi (*fungus*, a mushroom).

SECT. II. *The Jussieuian, or Natural, System.*

First Grand Division, VASCULAR
with spiral vessels and cellular



LA'RES (vas, a vessel; plants
tissue), or COTYLEDONEÆ.

First Class, DICOTYLEDONEÆ (dis,



two, and *kotylédōn*; cotyledons two).

Subdivision I. *Dichlamydeæ* (dis,
calyx



two, and *chlāmys*, a coat or covering;
corolla distinct).

Subclass 1. *Thalymifloræ* (*thalamus*,
pistillum) — The orders are:
cea, *Anonaceæ*, *Menispermaceæ*,
peltideæ, &c.



a bed, *flos*, a flower; stamens under
Ranunculaceæ, *Dilleniaceæ*, *Magnoliid-*
Berberideæ, *Podophyllaceæ*, *Hydro-*

Subclass 2. *Calycifloræ* (*calyx* and
lastrineæ, *Rhámneæ*, *Brunideæ*,
Aquilarineæ, *Terebinthaceæ*, *Le-*



flos; stamens on the calyx). — *Co-*
Samydeæ, *Homalimeæ*, *Chaillietideæ*,
gumindeæ, &c.

Subclass 3. *Corollifloræ* (*corolla*
Epacrideæ, *Symplocineæ*, *Styra-*
Brexiææ, *Oléineæ*, *Jasminææ*,



and *flos*; stamens on the corolla). —
cineæ, *Myrsineæ*, *Sapoteæ*, *Ebenaceæ*,
Strýchnææ, &c.

Subdivision II. *Monochlamydeæ*
and corolla
Plantagineæ, *Nyctagineæ*, *Amaran-*



(*monos*, one, *chlāmys*, a coat; calyx
not distinct).
thaceæ, *Phytolaceæ*, *Chenopodeæ*, &c.

Second Class, MONOCOTYLEDONEÆ
(one). *Cycadeæ*, *Hydrocharideæ*,
Orchideæ, &c.



(*monos*, one, and *kotylédōn*; cotyledon
Alismaceæ. *Butomeæ*, *Juncagineæ*,

Second Grand Division, CEL-
plants with cellular tissue
(a priv. and *kotylédōn*; desti-



LULA'RES (*cellula*, a little cell,
only), or ACOTYLEDONEÆ
tute of a cotyledon).

First Class, FOLIA'CEÆ
Filices, *Equisetaceæ*,



(*foliaceus*, leafy; habit).
Lycopodineæ, &c.

Second Class, APHY'LLÆ (a,
Algæ, *Li-*



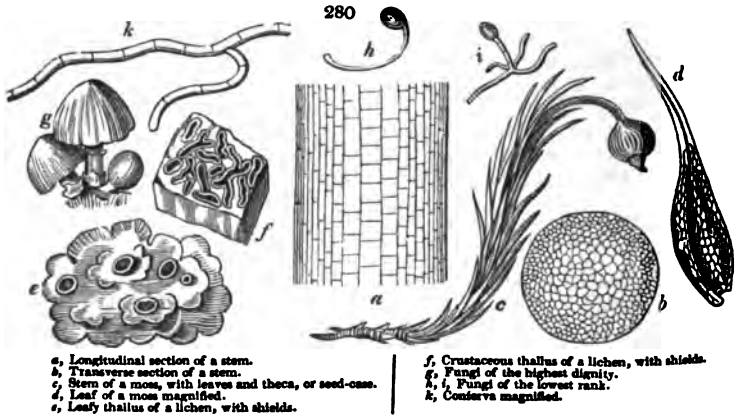
priv., *phyllon*, a leaf; leafless).
chènes, *Fungi*.

1646. *The difficulties connected with the adoption of the Natural System are these, — that the characters of many of the orders are at present imperfectly known, and that they all depend upon a consideration of many points of structure which are not to be determined without much labour and a considerable degree of practical skill in the use of the microscope and the dissecting knife. But the facilities which the habit of viewing natural bodies with reference to the relations they bear to other bodies, and not as insulated individuals merely possessing certain peculiarities by which they may be referred to some station in an artificial system, ultimately gives to the investigations of the naturalist, are so great, that difficulties of the nature just alluded to should not be suffered to influence the botanist in determining which line of study he will follow, whether that pointed out by Linnæus, or that traced by the hand of nature. By the artificial system of Linnæus, indeed, no great difficulty exists in determining the number of stamens or styles possessed by a given plant, or the nature of their combination, and from the knowledge so obtained, in referring them to their class and order in the Linnæan system. But when this step has been gained, what more has been acquired than the bare knowledge that the plant in question possesses a certain number of stamens and styles? No possible notion can be formed of the relation it bears to other plants of the same nature, of the qualities it probably possesses, or of the structure of those parts not under examination — the fruit, for example; and, finally, if it were wished to convey an idea of the plant to a stranger, no means would be in the possession of the Linnæan botanist of doing so, except by stating that the plant belonged to Pentándria Monogýnia for example, which is stating nothing. But what would be the condition of the student of the natural affinities of plants in a similar case? It is true he would be obliged to consult more characters than the two unimportant ones of Linnæus: it would be necessary to ascertain if his subject was Vascular or Cellular; if Vascular, whether it was Monocotyledonous or Dicotyledonous; if Dicotyledonous, whether the leaves were opposite or alternate, stipulate or exstipulate;*

whether the flowers were monopetalous, polypetalous, or apetalous, the nature and station of the stamens, the condition of the ovarium, and so on. But when he *has* ascertained thus much, only let it be remembered, for a moment, how much he has gained indirectly as well as directly. Perhaps he has discovered that his plant belongs to Rubiaceæ; he will then have learned that all vegetables with opposite entire stipulate leaves, and a monopetalous superior corolla, are also Rubiaceous. If a fragment of the leaves and stem only of such a plant were afterwards submitted to him for examination, he would recognise its affinities, and remember that it was Rubiaceous; and, being aware of that fact, he would be able safely to infer that its calyx and corolla would be of a particular nature; that if the roots afforded any colour for dyeing, it would be red; that the medicinal properties of the bark, if any, would be tonic, astringent, and febrifugal; and that its seeds would be of the same nature as those of coffee; and, finally, its geographical position would be tolerably certain to him. The most complete introduction to the natural system which has yet been published, either in this country, or on the Continent, is that by Professor Lindley.

1647. *Plants considered with reference to their general structure* are separated into two grand divisions, called CELLULARES and VASCULARES. — The Cellulares answer to the Linnean Cryptogamia, and are also called Acotyledonæ; the Vasculares answer to the rest of the Linnean system, which is sometimes called Phanerogamia and Cotyledonæ.

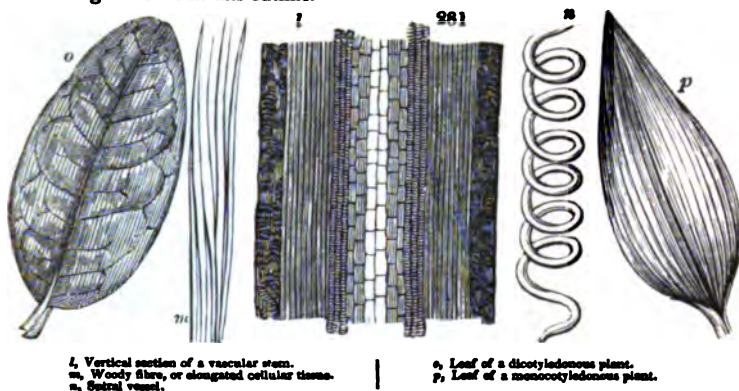
1648. *Cellulares, Cryptogamous, or Acotyledonous*, plants, are all, therefore, different terms denoting the same combination of vegetables. The first term is here adopted in preference to the others, as expressing the most obvious character upon which the division depends, namely, the cellular, not vascular, structure of the plants composing it. Cellular plants are formed entirely of cellular tissue (*fig. 280.*), without spiral vessels; or in more



familiar terms by having no veins in their leaves if foliaceous, and not forming wood; they also are destitute of perfect flowers. The lower tribes, such as Fungi and Algæ, are destitute of leaves, and in some points approach the animal kingdom so nearly as to be scarcely distinguishable. In the highest tribe, Ferns, apparent veins are formed in the leaves; but as they are not supplied with spiral vessels, they cannot be considered more than analogous to the veins of other plants. Ferns, however, hold the intermediate station between Cellulares and Vasculares, and are chiefly retained among the former on account of their perfect accordance in other respects. In the whole of Acotyledons, it is unnecessary to examine the seed for the purpose of determining whether it has one cotyledon, several cotyledons, or none, the structure of the perfect plant giving the most obvious and satisfactory evidence.

1649. *Vasculares, Phanogamous, or Cotyledonous*, plants, are also separated into two great classes called Endogenes or Monocotyledons, and Exogenes or Dicotyledons, both which are distinguished as accurately by their obvious physical structure as they are by the minute and obscure peculiarities of the seed. They are all formed with cellular tissue, woody fibre, and spiral vessels (*fig. 281.*), and their leaves are traversed by veins; the last character is sufficient for practical purposes, if it is remembered that they also bear perfect flowers (that is, flowers furnished either with stamens, or pistillum, or both), which will always prevent their being confounded with the highest tribes of Cellulares. The probability of a third division, intermediate between the monocotyledonous and the dicotyledonous plants, may be inferred from the very peculiar structure of *Aristolochia*, *Trichopodium*, *Bragantia*, *Trimeriza*, and, perhaps, some other genera; but this idea, sug-

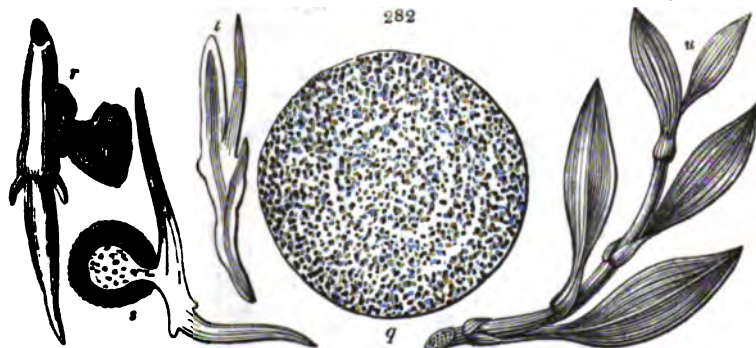
gested by Mr. Lindley (*Bot. Reg. Dec. 1832*.) is not yet sufficiently matured to allow of our making use of it in this outline.



1. Vertical section of a vascular stem.
2. Woody fibre, or elongated cellular tissue.
3. Spiral vessel.

4. Leaf of a dicotyledonous plant.
5. Leaf of a monocotyledonous plant.

1650. *Endogenes*, or *Monocotyledonous* plants, are the first remove from *Cellulæres*, and hold an intermediate rank between them and *Exogenes* or *Dicotyledonous* plants, in which vegetation acquires its highest form of development. They were formerly characterised by having a single cotyledon; but this circumstance is not only not absolute, but difficult of determination, except after minute analysis. The real difference in the seed of them and *Dicotyledons* is this, that in *Monocotyledons* there is only one cotyledon (*fig. 282. s*);



6. Transverse section of a monocotyledonous stem.

7. Germination of a monocotyledonous seed.

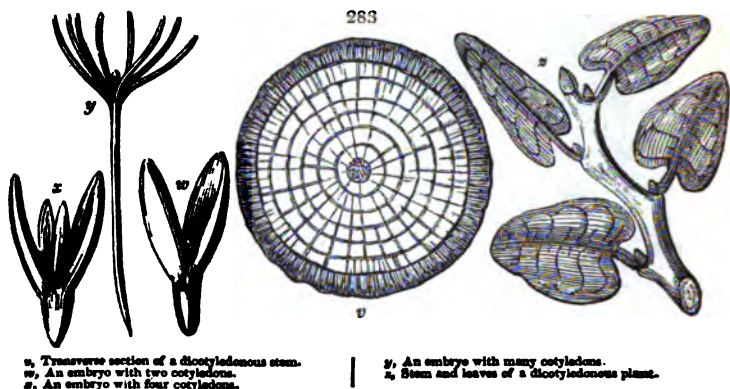
8. Section of stem, to show the cotyledon remaining in the axis.

9. Section of a germinating embryo of a grass, to show the two alternate cotyledons of unequal size; the back and front lobes represent these, the middle lobe is the plumula.

10. Stem and leaves of a monocotyledonous plant.

or, if two, that they are alternate with each other (*s*), while in *Dicotyledons* they are always opposite, and more than one, sometimes several, as in *Pinus* (*fig. 283. y*). The physiological structure of the two classes is, however, that by which they are familiarly distinguished, and exhibits a beautiful proof of the harmony that exists between the great features of vegetation and their first principle, the seed from which they originate. In *Endogenes* or *Monocotyledons*, there is no distinction between wood and bark (*fig. 282. q*); in *Exogenes* or *Dicotyledons*, the wood and bark are distinctly separated (*fig. 283. v*). In *Monocotyledons* the wood and cellular tissue are mixed together without any distinct annual layers of the former being evident; in *Dicotyledons* the wood and cellular tissue have each their particular limits assigned them, a distinct layer of the former being annually deposited. In *Monocotyledons* there are no radiations from the medulla to the bark; in *Dicotyledons* the radiations are generally distinctly marked. In *Monocotyledons* there is generally no articulation between the leaves and the stem, while in *Dicotyledons* the leaves are always jointed with the stem, from which they fall off, leaving a scar behind. In *Monocotyledons* the veins of the leaf pass in parallel lines from the base to the apex, in *Dicotyledons* they diverge from the midrib towards the margin at various angles; in the former they are unbranched, the principal veins being connected by nearly simple secondary veins; in the latter they are much branched, ramifying in many directions, and giving the surface of the leaf a netted appearance. In exception to

these remarks, a few monocotyledons are known to exist, the veins of whose leaves are considerably reticulated.



x. Transverse section of a dicotyledonous stem.

y. An embryo with two cotyledons.

w. An embryo with four cotyledons.

z. An embryo with many cotyledons.

z. Stem and leaves of a dicotyledonous plant.

1651. The distinctions of the two great classes of *phanogamous*, or *flowering*, plants, it thus appears, are obvious at a glance; and so far is it from there being any necessity for dissecting a seed in order to ascertain its structure, that this point is one of the most easy determination, and about which there cannot be in one case in five hundred the slightest cause of doubt or difficulty. It is almost impossible to see even a morsel of a plant without instantly being in possession of the knowledge of the structure of its seed, with respect to the cotyledons. Even in a general view, the difference is conspicuous, as may be seen by comparing the monocotyledonous group (*fig. 284.*) with the dicotyledonous



group (*fig. 285.*) Thus far have we advanced without a single obstacle to impede us. In all farther investigation, no greater degree of knowledge or application is requisite than what ought to be possessed by every one who would be able to ascertain the genus of a plant. Many of the orders do not depend upon the minute characters of the seed so much as is believed; the structure of the ovarium and position of the ovula are aids which frequently make amends for the absence of fruit: and the nature of the foliage and inflorescence is a guide which, though sometimes treacherous, is often as faithful as the fructification itself. But as it is not intended to give the characters of the orders in this place, neither is it necessary to advance further in an explanation of the manner of determining them; upon that point each order would require a particular note. It may, however, be confidently believed, that there are no greater impediments in the road to an acquaintance with the natural relations of plants than those that have been already removed; and that although neither the science of botany, nor any other science, is to be taken by storm, yet that the fortress is sure to be reduced by silent and patient approach. An abridged popular description of all the natural orders of which there are plants in Britain, will be found in our *Hortus Britannicus*, drawn up, like the preceding Introduction, chiefly by Mr. Lindley.

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CHAP. IV.

Of forming and preserving Herbariums, and of Methods of Study.

1652. *Dried plants far surpass either drawings or descriptions* in giving complete ideas of their appearance. When plants are well dried, the original forms and positions of even their minutest parts, though not their colours, may at any time be restored by immersion in hot water. By this means the productions of the most distant and various countries, such as no garden could possibly supply, are brought together at once under our eyes, at any season of the year.

1653. *The mode or state in which plants are preserved*, is generally desiccation, accompanied by pressing. Some persons, Sir J. E. Smith observes, recommend the preservation of specimens in weak spirits of wine, and this mode is by far the most eligible for such as are very juicy; but it sometimes destroys their colours, and renders their parts less fit for examination than by the process of drying. It is, besides, inconvenient for frequent study, and a very expensive and bulky way of making a herbarium.

1654. *The greater part of plants dry with facility between the leaves of books or other paper*, the smoother the better. If there be plenty of paper, they often dry best without shifting; but if the specimens are crowded, they must be taken out frequently, and the paper dried before they are replaced. The great point to be attended to is, that the process should meet with no check. Several vegetables are so tenacious of their vital principle, that they will grow between papers; the consequence of which is, a destruction of their proper habit and colours. It is necessary to destroy the life of such, either by immersion in boiling water, or by the application of a hot iron, such as is used for linen, after which they are easily dried. The practice of applying such an iron, as some persons do, with great labour and perseverance, till the plants are quite dry, and all their parts incorporated into a smooth flat mass is not approved of. This renders them unfit for subsequent examination, and destroys their natural habit, the most important thing to be preserved. Even in spreading plants between papers, we should refrain from that precise and artificial disposition of their branches, leaves, and other parts, which takes away from their natural aspect, except for the purpose of displaying the internal parts of some one or two of their flowers, for ready observation. In *Coniferae*, *Ericae*, and some other orders, the leaves are apt to fall off, after drying; but this may be prevented by plunging the specimen, when newly gathered, for a minute in boiling water. The most approved method of pressing is by a box or frame, with a bottom of cloth or leather, like a square sieve. In this, coarse sand or small shot may be placed, in any quantity. Very little pressing is required in drying specimens; what is found necessary should be applied equally to every part of the bundle under the operation, and this can only be done by the use of an equalising press of granulated matter, of compressed air, or of a bag of water. Mr. Lindley suggests putting the specimens between cushions in a press resembling a napkin-press, and putting it in the sun, or before a hot fire.

1655. *Dried specimens are kept in herbariums in various ways*: sometimes loose between leaves of paper; at other times wholly gummed or glued to paper; but most generally attached by one or more transverse slips of paper, glued on one end and pinned at the other, so that such specimens can readily be taken out, examined, and replaced. On

account of the aptitude of the leaves and other parts of dried plants to drop off, may glue them entirely; and such seems to be the method adopted by Linnaeus, and recommended by Sir. J. E. Smith. "Dried specimens," the latter observes, "are best preserved by being fastened, with weak carpenter's glue, to paper, so that they may be turned over without damage. Thick and heavy stalks require the additional support of a few transverse strips of paper, to bind them more firmly down. A half sheet, of a convenient folio size, should be allotted to each species, and all the species of a genus may be placed in one or more whole sheets or folios. On the outside of the latter should be written the name of the genus, while the name of every species, with its place of growth, time of gathering, the finder's name, or any other concise piece of information, may be inscribed on its appropriate paper. This is the plan of the Linnæan herbarium." A very handsome gardener's herbarium has been formed by Mr. Toward, of Bagshot Park. It is in four thick folio volumes; the leaves are of cartridge-paper, and each has a leaf of brown blotting-paper pasted to its back. Round the margin of the cartridge-paper side of the leaf are pasted strips of the same paper about half an inch broad. These strips rather more than compensate for the thickness of the dried specimens; so that when the leaves are bound up, their edges cut, and the book shut close, the external air is excluded, and the appearance is as neat as that of any printed volume. (*Gard. Mag.* vol. iv. p. 436.)

1656. *In arranging dried specimens*, the most simple and obvious guide is that of the order of their flowering, or that in which they are gathered, and this may be adopted during the summer season; but afterwards they ought to be put into some scientific method, either natural or artificial. They may be kept in a cabinet, consisting of a collection of drawers for each order; and the relative as well as absolute size of these drawers will depend on the proposed extent of the collection, as whether of British plants only, of hardy plants only, or of all plants introduced to this country, &c.

1657. *The fungi cannot in general be dried* so as to retain the habit and character of the vegetating plant; but this defect is supplied by models, of which excellent collections are prepared for sale by the Sowerby family, well known for their botanical works.

1658. *The perfect preservation of a herbarium* is much impeded from the attacks of insects. A little beetle, called *Ptinus* fur, is more especially the pest of collectors, laying its eggs in the germens or receptacles of flowers, as well as on the more solid parts, which are speedily devoured by the maggots when hatched; and by their devastations, paper and plants are alike involved in ruin. The most bitter and acrid tribes, as *Euphorbia*, *Gentiana*, *Prunus*, the syngenesious class, and especially willows, are preferred by these vermin. A specimen of the last-mentioned family can scarcely be thoroughly dried before it is devoured. Ferns are scarcely ever attacked, and grasses but seldom. To remedy this inconvenience, a solution of corrosive sublimate of mercury in rectified spirits of wine, about two drams to a pint, with a little camphor, will be found perfectly efficacious. It is easily applied with a camel-hair pencil when the specimens are perfectly dry, not before; and if they are not too tender, it is best done before they are pasted, as the spirit extracts a yellow dye from many plants, and stains the paper. A few drops of this solution should be mixed with the glue used for pasting. This application not only destroys or keeps off all vermin, but it greatly revives the colours of most plants. After several years' experience, no inconvenience has been found from it whatever, nor can any dried plants be long preserved without it. (Smith.) Professor Lindley has found that suspending little open paper bags, filled with camphor, in the inside of the doors of his cabinets, is a very effectual mode of protection from insects. It will not destroy the larvæ already there, or that may be carried in by fresh specimens; but when such larvæ become perfect insects, they quit the cases without leaving any eggs. (Lindley's *Introd.* p. 468.)

1659. *The herbarium is best kept in a dry room without a constant fire.* Linnaeus had a stone building for his museum, remote from his dwelling-house, into which neither fire nor candle was ever admitted, yet no collection could be more free than his from the injuries of dampness, or other causes of decay. (Smith's *Introduction*, ch. 24.)

1660. *There are two methods of acquiring botanical knowledge, analogous to those by which languages are acquired.* The first is the natural method, by which plants are classed according to the natural affinities which they bear to each other, a knowledge of which is obtained by a consideration of the whole of their structure. This knowledge is the highest of which systematic botany is capable. The second is the artificial method, by which plants are classed according to their similarity in some few particular points of structure, without reference to their natural resemblances. This method, as being the most simple, and requiring the least study, or previous knowledge, is the best suited to persons whose object does not go beyond the acquiring a knowledge of the names of plants, and obtaining the means of referring to writers who have treated upon them. An easy and expeditious mode for gardeners to know plants and study the vegetable kingdom is as follows:—

1661. *Begin by acquiring the names of a great number of individuals.* Supposing the

plants growing in a named collection, or that you have any person to tell you their names: then take any old book, and begin at any point (in preference the beginning) of the collection, border, or field, and taking a leaf from the plant whose name you wish to know, put it between the two first leaves of the book, writing the name with a pencil, if you are gathering from a named collection, or if not, merely write a number, and get the name inserted by your instructor afterwards. Gather, say a dozen the first day; carry the book in your pocket, and fix these names in your memory, associated with the form and colour of the leaves, by repeatedly turning to them during the moments of leisure of one day. Then, the second day, proceed to the plants, and endeavour to apply the names to the entire plant. To assist you, take them in the order in which you gathered them, and refer to the book when your memory fails. To aid in recollecting the botanic names, endeavour, after you have gathered the leaves, either by books or your instructor, to learn the etymology of the name, and something of the history of the plant, &c. Attach the leaves by two transverse cuts in the paper, or by any simple process, so as the first set may not fall out when you are collecting a second. Having fixed the first fasciculus in your memory, form a second, which you may increase according to your capacity of remembering. Proceed as before during the second day; and the beginning of the third day, begin at your first station, and recall to memory the names acquired during both the first and second day. In this way go on till you have acquired the names of the great majority of the plants in the garden or neighbourhood where you are situated. Nothing is more easily remembered than a word when it is associated with some visible object, such as a leaf or a plant; and the more names of plants we know, the more easy does it become to add to our stock of them. A person who knows only ten plants will require a greater effort of memory to recollect two more, than one who knows a thousand will to remember an additional two hundred. That gardener must have little desire to learn who cannot, in two or three weeks, acquire the names of a thousand plants, if already arranged. If to be collected in the fields, it is not easy getting a thousand leaves or specimens together; but, in general, every gardener requires to charge his memory with the names, and ideas or images, of between five hundred and one thousand plants; as being those in general cultivation as agricultural plants, forest-trees, and field-shrubs, horticultural plants, plants of ornament, and those requiring eradication as weeds.

1662. *To acquire the glossology*, cut a leaf or other part from the plants indicated in any elementary work on botany which you may possess, as affording examples of each term. You will not be able to get at all the examples; but if you get at one tenth of them, it will prepare you for the next step, which is—

1663. *To acquire a knowledge of the classes and orders*. This is easily done by selecting the blossoms of plants, whose class, &c. is designated in a catalogue. Begin with class 1, order 1. On looking at any proper catalogue, such as our *Hortus Britannicus*, you will find that there are but few plants in this class, and only one British example which flowers in May. Unless you take that month, therefore, or enjoy the advantages of inspecting hot-house plants, you can do nothing with this class. Proceed to the next order, and so on, examining as many flowers as possible in each class and order, in connection with the descriptions, as given in your elementary guide, in order that you may be perfectly familiarised with all the classes, and the whole or the greater number of the orders.

1664. *Study the descriptions of plants, with the plants before you*. For this purpose, procure any good Species Plantarum or Flora, in Latin, if you know a little of that language, as the *Hortus Kewensis*, Smith's *Flora Britannica*; or in English, as Lindley's *Synopsis of the British Flora*, Hooker's *Scottish Flora*, Don's *Miller's Dictionary*, or Withering's *Arrangement of British Plants*. Persevere in this practice, collecting an herbarium, and writing the complete description of each specimen under it, till all the parts of plants are familiar to you. When that is the case, you will be able, on a plant's being presented to you which you never saw before, to discover (that is, if it be in flower), first, its class and order, and next, by the aid of proper books, its generic and specific name; and this, as far as respects the names of plants, is to attain the object in view.

1665. *But to know the name of an object is not to know its nature*; therefore having stored up a great many names in your memory, and become familiarised with the plants by which you are surrounded, and with the art of discovering the names of such as may be brought to you, by the Linnæan method; the next thing is to study plants according to their natural affinities, by referring them to their natural orders, and observing the properties common to each order. Then proceed to study their anatomy, chemistry, and physiology; and lastly, their history and application. For these purposes Lindley's *Introduction to Botany*, Keith's *Vegetable Physiology*, and De Candolle's *Organographie Végétale*, may be reckoned standard works. Books of figures, such as Smith's *Exotic and English Botany*, or Curtis's *Magazine*, are eminently useful for the first department, but they can only come into the hands of a few. Those who understand French will

and elementary works of De Candolle, Mirbel, and Richard, of a superior description. The *Elements* of De Candolle and Sprengel, lately translated, is also a valuable work.

CHAP. V.

Organology, or the Anatomical Structure of Plants.

1666. *The elementary organs of plants* are either simple or compound. The former constituting their ultimate principles, and the latter their component parts. This part of the science of botany is so extensive, that, in an outline like the present, it cannot be treated with much advantage to the student; we must, therefore, confine ourselves to giving the young gardener an idea of how much he has to learn on the subject. We shall adopt Mr. Lindley's Arrangement of Simple Organs, Compound Organs in Flowering Plants, and Compound Organs in Flowerless Plants.

SECT. I. *Simple Organs.*

1667. *The organic basis* of all plants whatever consists of what is called vegetable tissue, or matter composed of fibre and membrane. Some physiologists consider that membrane and fibre are the same thing; but others, with Mr. Lindley, that they are different. The forms produced from these elementary materials are cellular tissue, woody fibre, and vascular tissue.

SECT. II. *Compound Organs of Flowering Plants.*

1668. *The compound parts of plants* are recognisable by every observer, being the roots, stems, branches, leaves, and other larger parts of plants; and also the cuticle, hairs, scales, glands, prickles, and other smaller parts, which are found on the larger. All the different parts of the flower and fruit are of course included in the compound organs; and, in short, every combination of vegetable tissue, which assumes a uniform appearance in a plant, and is, at the same time, a distinct part of it as a form, and not as a mere mass of tissue.

1669. *The axis of a plant* is a term that ought to be understood by the young gardener. In a seedling just begun to grow, an elongation takes place at both extremities: the root, which strikes downwards in the direction of the earth's centre, is called the descending axis; and the stem, which shoots upwards in a contrary direction, is the ascending axis. The point between the two is called the neck, or vital knot, and has been thought by some to be the seat of vegetable vitality; and though this is an erroneous idea, yet, in many plants, the principle of life appears to act with more vigour at that point than any where else.

1670. *Buds* are usually placed in the axilla of leaves; but there are others, termed latent, or adventitious, which are found in almost every part of plants; the roots, the internodia (the space between the joints), the petiole, and the leaf itself, both on its surface and margin, have all been observed to produce them. The cause of the formation of buds is unknown to botanists. Mr. Knight is, or once was, of opinion, that the sap itself can at any time generate buds, without any previously formed rudiment; but we know of no other vegetable physiologist whose opinion on this subject is not directly the reverse.

1671. *The internal structure of the stems of flowering plants* is subject to the two modifications characterised in p. 446., as exogenous and endogenous; and this important division of vegetables ought to be constantly borne in mind by every botanical student, and more especially by the gardener. In the exogenous structure, or that of the Dicotyledonous plants, there are many anomalies; so much so, that Mr. Lindley observes "that it is neither medullary rays, nor concentric zones in the wood, that are the certain indications of exogenous growth; both the one and the other being sometimes absent; but that the presence of a central pith, and a greater degree of hardness in the centre than in the circumference, are the signs from which alone any absolute evidence can be derived. (*Introd.* p. 72.) The endogenous structure of plants is much less familiar to botanists than that of the exogenous, from the plants themselves being chiefly natives of tropical climates. The diameter of an endogenous stem, as before observed (§ 1683.), is increased by the constant addition of fibrous bunches to the centre; which, in consequence, is always the softest part of the trunk. "It does not, however, appear that each successive bundle of fibres passes exactly down the centre, or that there is even much regularity in the manner in which they are arranged in that part: it is only certain, that it is about the centre that they descend; and that on the outside no new formation takes place." Very little increase can be observed in the diameter of the stem of endogenous plants, from the time of its first formation till its arrival at its greatest age. This is more particularly the case with the palms, but not so much so with the bamboo and the dragon-trees.

Sacr. III. *Compound Organs of flowerless Plants.*

1672. *The leaves of flowerless plants*, such as ferns, are generally called fronds; and the wood of such as have arborescent trunks, such as the tree ferns, is formed by the cohesion of the bases of the footstalks of the leaves, or fronds, round a cellular axis. In the structure of mosses, neither vessels nor woody fibre are employed; their stems consist entirely of elongated cellular tissue. *Algae* and *Fungi* form the lowest orders of flowerless plants, and their structure consists almost entirely of cellular tissue.

CHAP. VI.

Vegetable Physiology, or the Action of Plants.

1673. *The nature of the laws of vegetable life* ought to be familiar to every gardener. He will find these laws beautifully developed in the second book of Mr. Lindley's *Introduction*, from which we shall here give an abridgment of such parts as are calculated to be most useful to the cultivator, and such as we hope will induce him to pursue the subject farther by himself. We shall first give a summary of the principal phenomena of vegetation; and next, some remarks relative to the actions of the different parts of plants.

Sacr. I. *The principal Phenomena of Vegetation as exemplified in a single Plant.*

1674. *The circle of vegetable life* commences with the germination of a seed in the soil, and ends with the decay of the plant which is produced by that seed. The following correct and beautiful picture of the progress of a plant from infancy to maturity, is given in Mr. Lindley's own words, and with his permission. "If we place a seed,—that of an apple, for instance,—in earth at the temperature of 32° Fahr., it will remain inactive till it finally decays. But if it is placed in moist earth above the temperature of 32°, and screened from the action of light, its integument gradually imbibes moisture and swells, oxygen is absorbed, carbonic acid expelled, and the vital action of the embryo commences. It elongates downwards by the radicle, and upwards by the cotyledons; the former penetrating the soil, the latter elevating themselves above it, acquiring a green colour by the deposition of carbon absorbed from the atmosphere in the light, and unfolding in the form of two opposite roundish leaves. This is the first stage of vegetation: the young plant consists of little more than cellular tissue: only an imperfect development of vascular and fibrous tissue being discoverable, in the form of a sort of cylinder of bundles, lying just in the centre. The part within the cylinder, at its upper end, is now the medulla, without it the bark; while the cylinder itself is the preparation for the medullary sheath, and consists of vertical fibres passing through cellular tissue, which separates them horizontally in every direction.

1675. *The young root* is now absorbing from the earth its nutriment, which passes up to the summit of the plant by the cellular substance of the medulla, and is thence impelled into the cotyledons, where it is aërated and evaporated: such of it as is not fixed in the cotyledons passes down through the bark into the root.

1676. *The plumula*, forced onwards by the current of sap, which is continually impelled upwards from the root, next ascends in the form of a little twig, at the same time sending roots in the form of fibres downwards in the centre of the radicle, which become the earliest portion of wood that is deposited: these fibres, by their action, now compel the root to emit little ramifications. Previously to the elongation of the plumula its apex has acquired the rudimentary state of a leaf: this continues to develop as the plumula elongates, until, when the first internodium of the latter ceases to lengthen, the leaf has actually arrived at its complete formation. When fully grown it repeats in a much more perfect manner the functions previously performed by the cotyledons: it aërates the sap that it receives, and returns the superfluous portion of it downwards through the bark to the root; it also sends fibres down between the medullary sheath and the bark, thus forming the first stratum of wood in the new stem. During these operations, while the plumula is ascending, its leaf forming and acting, and the woody matter created by it descending, the cellular tissue of the stem is forming, and expanding horizontally to make room for the new matter forced into it; so that development is going on simultaneously both in a horizontal and perpendicular direction. This process may not inaptly be compared to that of weaving, the warp being the perpendicular, and the weft the horizontal, formation. In order to enable the leaf to perform its functions of aëration completely, it is traversed by veins originating in the medulla, and has delicate evaporating pores (*stomata*), which communicate with a highly complex pneumatic system that extends to almost every part of the plant.

1677. *The plumula having produced its first leaf*, others are successively produced around the axis at its elongating point, all constructed alike, connected with the stem or

axis in the same manner, and performing precisely the same functions as have been just described. At last the axis ceases to elongate; the old leaves gradually fall off; the new leaves, instead of expanding after their formation, retain their rudimentary condition, harden, and fold over one another, so as to be a protection to the delicate point of elongation; or, in other words, become the scales of a bud. We have now a shoot with a woody axis, and a distinct pith and bark; and of a more or less conical figure. At the axilla of every leaf a bud had been generated during the growth of the axis; so that the shoot, when deprived of its leaves, is covered from end to end with little, symmetrically arranged, projecting points, which are the buds. The cause of the figure of the perfect shoot being conical is, that, as the wood originates from the base of the leaves, the lower end of the shoot, which has the greatest number of strata, because it has the greatest number of leaves above it, will be the thickest; and the upper end, which has had the fewest leaves to distend it by their deposit, will have the least diameter. Thus that part of the stem which has two leaves above it will have wood formed by two successive deposits; that which has nine leaves above it will have wood formed by nine successive deposits; and so on: while the extreme vital point, as it can have no deposit of matter from above, will have no wood, the extremity being merely covered by the rudiments of leaves hereafter to be developed. If at this time a cross section be examined, it will be found that the interior is no longer imperfectly divided into two portions, namely, medulla and skin, as it was when first examined in the same way, but that it has distinctly two, internal, perfect, concentric lines, the outer indicating a separation of the bark from wood; and the inner, a separation of the wood from the medulla: the latter too, which in the first observation was fleshy, and saturated with humidity, is become distinctly cellular, and altogether or nearly dry.

1678. *Vegetation recommences* with the spring of the second year and the return of warm weather. The uppermost, and perhaps some other, buds which were formed the previous year gradually unfold, and pump up sap from the stock remaining in store about them; the place of the sap so removed is instantly supplied by that which is next it; an impulse is thus given to the fluids from the summit to the roots; new sap is absorbed from the earth, and sent upwards through the wood of last year; and the phenomenon called the flow of the sap is fully completed, to continue with greater or less velocity till the return of winter. The axis of the buds elongates upwards, forming leaves and buds in the same way as the parent shoot: in like manner also each bud sends down its roots, in the form of fibres within the bark and above the wood of the shoot from which it sprang; thus forming on the one hand a new layer of wood, and on the other a fresh deposit of bark. In order to facilitate this last operation, the old bark and wood are separated in the spring by the exudation from both of them of the glutinous, slimy substance called cambium; which appears to be expressly intended, in the first instance, to facilitate the descent of the subcortical fibres of the growing buds; and, in the second place, to generate the cellular tissue by which the horizontal dilatation of the axis is caused, and which maintains a communication between the bark and the centre of the axis. These lines of communication have, by the second year, become sufficiently developed to be readily discovered, and are in fact the medullary rays of physiologists. It will be remembered that there was a time when that which is now bark constituted a homogeneous body with the medulla; and that it was after the leaves began to come into action that the separation which now exists between the bark and medulla took place. At the time when they were indissolubly united they both consisted of cellular tissue, with a few spiral vessels upon the line indicative of future separation. When a deposit of wood was formed from above between them they were not wholly divided the one from the other, but the deposit was effected in such a way as to leave a communication by means of cellular tissue between the bark and the medulla; and, as this formation is at all times coætantaneous with that of the wood, the communication so effected between the medulla and bark is quite as perfect at the end of the third year as it is at the beginning of the first; and so it will continue to be to the end of the growth of the plant. The sap which has been sucked into circulation by the unfolding leaves is exposed, as in the previous year, to the effect of air and light; is then returned through the petiole to the stem, and sent downwards through the bark, to be from it either conveyed to the root, or distributed horizontally by the medullary rays to the centre of the stem. At the end of the year the same phenomena occur as took place the first season: wood is gradually deposited by slower degrees, whence the last portion is denser than the first, and gives rise to the appearance called the annual zones: the new shoot or shoots are prepared for winter, and are again elongated cones, as was the first; and this latter has acquired an increase in diameter proportioned to the quantity of new shoots which it produced, new shoots being to it now what young leaves were to it before.

1679. *The third year* all that took place the year before is repeated: sap is absorbed by the unfolding leaves; and its loss is made good by new fluids introduced by the roots

and transmitted through the alburnum or wood of the year before; new wood and liber are deposited by matter sent downwards by the buds; cambium is exuded; the horizontal development of cellular tissue is repeated, but more extensively; wood towards the end of the year is formed more slowly, and has a more compact character; and another ring appears indicative of this year's increase. In precisely the same manner as in the second and third years of its existence will the plant continue to vegetate, till the period of its decay, each successive year being a repetition of the phenomena of that which preceded it.

1680. *The age of puberty.* After a certain number of years the tree arrives at the age of puberty: the period at which this occurs is very uncertain, depending in some measure upon adventitious circumstances, but more upon the idiosyncrasy, or peculiar constitution of the individual. About the time when this alteration of habit is induced, by the influence of which the sap or blood of the plant is to be partially directed from its former courses into channels in which its force is to be applied to the production of new individuals rather than to the extension of itself;—about this time it will be remarked that certain of the young branches do not elongate, as had been heretofore the wont of others, but assume a short stunted appearance, probably not growing two inches in the time which had been previously sufficient to produce twenty inches of increase. Of these little stunted branches, called *spurs*, the terminal bud acquires a swollen appearance, and at length, instead of giving birth to new leaves, produces from its bosom a cluster of flower-buds, or *alabastra*, which had been enwrapped and protected from injury during the previous winter by several layers of imperfect leaves, now brought forth as bractæ. Sap is impelled into the calyx through the pedicel by gentle degrees, is taken up by it, and exposed by the surface of its tube and segments to air and light; but having very imperfect means of returning, all that cannot be consumed by the calyx is forced onwards into the circulation of the petals, stamens, and pistillum. The petals unfold themselves of a dazzling white tinged with pink, and expose the stamens; at the same the disk changes into a saccharine substance, which nourishes the stamens and pistillum, and gives them energy to perform their functions.

1681. *Propagation.* At a fitting time, the stigmatic surface of the pistillum being ready to receive the pollen, this is injected upon it from the anthers, which have remained in approximation to it for that particular purpose. When the pollen touches the stigma, the grains adhere firmly to it by means of its viscid surface, then emit a delicate membranous tube, which pierces into the stigmatic tissue, lengthens there, and conveys the vivifying matter contained in the pollen towards the ovula, which it finally enters by means of their foramen. This has no sooner occurred than the petals and stamens fade and fall away, their ephemeral but important functions being accomplished. All the sap which is afterwards impelled through the peduncle can only be disposed of to the calyx and ovarium, where it lodges: both these swell and form a young fruit, which continues to grow as long as any new matter of growth is supplied from the parent plant. After a certain period the juices of the fruit cease to be increased by the addition of new matter, its surface performs the functions of leaves in exposing the juice to light and air; finally the surface loses its green colour, assumes the rich ruddy glow of maturity; the juices cease to be influenced by light; the peduncle is no longer a passage for fluids, but dries up and becomes unequal to supporting the fruit, which at last falls to the earth. Here, if not destroyed by animals, it lies and decays: in the succeeding spring its seeds are stimulated into life, strike root in the mass of decayed matter that surrounds them, and spring forth as new plants to undergo all the vicissitudes of their parent.

1682. *Conclusion.* Such are the progressive phenomena in the vegetation, not only of the apple, but of all trees that are natives of northern climates, and of a large part of the herbage of the same countries,—modified, of course, by peculiarities of constitution, as in annual and herbaceous plants, and in those the leaves of which are opposite and not alternate; but all the more essential circumstances of their growth are the same as those of the apple tree. If we reflect upon these phenomena, our minds can scarcely fail to be deeply impressed with admiration at the perfect simplicity and, at the same time, faultless skill with which all the machinery is contrived upon which vegetable life depends. A few forms of tissue, interwoven horizontally and perpendicularly, constitute a stem; the development, by the first shoot that the seed produces, of buds which grow upon the same plan as the first shoot itself, and a constant succession of the same phenomenon, causes an increase in the length and breadth of the plant; an expansion of the bark into a leaf, within which ramify veins proceeding from the seat of nutritive matter in the new shoot, the provision of air-passages in its substance, and of evaporating pores on its surface, enables the crude fluid sent from the roots to be elaborated and digested until it becomes the peculiar secretion of the species; the contraction of a branch and its leaves forms a flower; the disintegration of the internal tissue of a petal forms an anther; the folding inwards of a leaf is sufficient to constitute a pistillum;

and, finally, the gorging of the pistillum with fluid which it cannot part with causes the production of a fruit.

1683. *Endogenous, or monocotyledonous plants.* In hot latitudes there exists another race of trees, of which palms are the representatives, and in the north there are many herbs, in which growth, by addition to the outside, is wholly departed from, the reverse taking place; that is to say, their diameter increasing by addition to the inside. As the seeds of such plants are formed with only one cotyledon, they are called monocotyledonous; and their growth being from the inside, they are also named endogenous. In these plants the functions of the leaves, flowers, and fruit are in nowise different from those of dicotyledons; their peculiarity consisting only in the mode of forming their stems. When a monocotyledonous seed has vegetated, it usually does not disentangle its cotyledon from the testa, but simply protrudes the radicle; the cotyledon swelling, and remaining firmly encased in the seminal integuments. The radicle shoots downwards to become root; and afterwards a leaf is emitted from the side of the collum, which elongated at the same time as the radicle. This first leaf is succeeded by another facing it, and arising from its axilla; the second produces a third facing it, and arising also from its axilla; and, in this manner, the production of leaves continues, until the plant, if caulescent, is ready to produce its stem. Up to this period no stem having been formed, it has necessarily happened that the bases of the leaves, hitherto produced, have been all upon the same plane; and as each has been produced from the bosom of the other without any such intervening space, as occurs in dicotyledonous plants, it would have been impossible for the matter of wood, if any had been formed, to be sent downwards around the circumference of the plant: it would, on the contrary, have been necessarily deposited in the centre. In point of fact, however, no deposit of wood like that of dicotyledons takes place, either now or hereafter. The union of the bases of the leaves has formed a fleshy stock, cormus, or *plate*, which, if examined, will be found to consist of a mass of cellular tissue, traversed by perpendicular bundles of vascular tissue and woody fibre, taking their origin in the veins of the leaves, of which they are manifest prolongations downwards; and there is no trace of bark, medullary rays, or central pith: the whole body being a mass of pith, woody fibre, and vascular tissue mixed together. To understand this formation yet more clearly, consider for a moment the internal structure of the petiole of a dicotyledon: it is composed of a bundle or bundles of vascular tissue encased in woody fibre, surrounded on all sides with pith, or, which is the same thing, parenchyma. Now suppose a number of these petioles to be separated from their laminae, and to be tied in a bunch parallel with each other, and, by lateral pressure, to be squeezed so closely together that their surfaces touch each other accurately, except at the circumference of the bunch. If a transverse section of these be made, it will exhibit the same mixture of bundles of woody fibre and parenchyma, and the same absence of distinction between medulla, wood, and bark, which has been noticed in the cormus, or plate, of monocotyledons.

1684. *Formation of the stems of exogenous plants.* As soon as the plate has arrived at the necessary diameter it begins to elongate upwards, leaving at its base those leaves that were before at its circumference, and carrying upwards with it such as occupied its centre; at the same time, new leaves continue to be generated at the centre, or, as it must now be called, at the apex of the shoot. As fresh leaves are developed, they thrust aside to the circumference those which preceded them, and a stem is by degrees produced. Since it has not been formed by additions made to its circumference by each successive leaf, it is not conical, as in dicotyledons; but, on the contrary, as its increase has been at the centre, which has no power to extend its limits, being strictly confined by the circumference which, when once formed, does not afterwards materially alter in dimensions, it is, of necessity, cylindrical: and this is one of the marks by which a monocotyledon is often to be known in the absence of other evidence. The centre being but little acted upon by lateral pressure, it remains loose in texture, and, until it becomes very old, does not vary much from the density acquired by it shortly after its formation; but the tissue of the circumference being continually jammed together by the pressure outwards of the new matter formed in the centre, in course of time becomes a solid mass of woody matter, the cellular tissue once intermingled with it being almost obliterated, and appearing among the bundles it formerly surrounded, like the interstices around the minute pebbles of a mosaic gem.

1685. *Anomalous cases.* Such is the mode of growth of palms, and of a great proportion of arborescent monocotyledons. But there are others in which this is in some measure departed from. In the common asparagus the shoots produce a number of lateral buds, which all develop and influence its form, as the buds of dicotyledons; so that the cylindrical figure of monocotyledons is exchanged for the conical; its internal structure is strictly endogenous. In grasses a similar conical figure prevails, and for the same reason; but they have this additional peculiarity, that their stem, in consequence of the great rapidity of its growth, is fistular, with transverse partitions at its knots. It is

not certain whether the subsequent internal growth of the stem is ever sufficient to fill up the central cavity; but, from a specimen of a bamboo in my possession, I incline to think that the lower part of grass stems does sometimes become filled up with solid matter.

1686. *Flowerless plants.* Upon one or other of the two plans now explained are all flowering plants developed; but in flowerless plants it is different. In arborescent ferns the stem consists of a cylinder of hard sinuous plates connected by parenchyma, and surrounding a hollow axis, which sometimes becomes filled up with solid matter. It would seem, in these plants, as if the stem consisted of a mere adhesion of the petioles of the leaves in a single row; but we are, at present, too little acquainted with them in a living state to form any fixed opinion upon the subject. In mosses and some Hepaticæ the stem seems to consist of nothing but an axis formed of the united bases of the leaves; and their growth may be considered analogous to that of an annual shoot of a dicotyledon without its wood. The remainder of flowerless plants are principally mere horizontal expansions of cellular tissue, analogous to nothing that is known in other parts of the vegetable kingdom."

SECT. II. *The Functions of the various Parts of Plants.*

1687. *The cellular tissue*, the most important elementary organs of plants, transmits fluids in all directions. In the case of wounds, or of the development of new parts; for example, when a cutting is embedded in the earth, or transplantation performed, cellular tissue is first generated. It may be considered as the flesh of vegetable bodies. Fecundation is effected exclusively through its agency, and in it alone starchy or sugary secretions are deposited.

1688. *The woody fibre of plants* seems intended for the conveyance of fluid, either upwards or downwards. It gives firmness and elasticity to every part of a plant, and surrounds and protects the ramifications of the vascular system.

1689. *The vascular system*, which includes the spiral vessels of plants, seems to be intended for the absorption and admission of air, and perhaps other fluids. It is certain, however, that many plants are without spiral vessels.

1690. *The roots* of plants take up the greater part of their food, not by the whole surface of the root, but by the spongioles, or points of their most minute fibres. Roots increase only in length by their extremities; occasionally they act as reservoirs of nutriment, as in the case of fleshy roots. According to Mr. Knight, the energies of a variety, artificially produced, exist longer in the system of the root than in that of the stem; so that it is more advisable to propagate old varieties of fruit trees from cuttings of the root than from those of the stem. The roots not only absorb fluid from the soil, but they return a portion of their peculiar secretions back again into it; as has been found by Brugmans, who ascertained that some plants exude an acid fluid from their spongioles; and also by Mr. Macaire, who has proved that to excrete superabundant matter from the roots is a general property of the vegetable kingdom. This, taken together with the fact that plants cannot digest their own secretions, explains why soil is deteriorated by one species having long grown in it, that it will not support other individuals of the same species, until the fecal matter deposited in it shall have been decomposed. This is the solution of the necessity of the rotation of crops.

1691. *The sap* may be considered as the blood of plants. When first absorbed by the root, it is called true sap, and when changed by elaboration in the leaves, proper juice. Sap, in its most simple state, consists of water, mucilage, and sugar; whence it follows, that fluids as soon as they are taken up by the roots of plants, undergo some chemical decomposition. Sap, is also in some cases absorbed from the atmosphere by the leaves. The food of plants, it is ascertained, must be composed of oxygen, hydrogen, carbon, and azote. Water, which consists of oxygen and hydrogen, has been proved insufficient, and it is also found, that plants will neither grow nor live without carbonic acid. "That some plants have the power of secreting one kind of accessory principle, and others another kind from the same food, is clear from the fact, that, if wheat and peas be sown in the same water, earth, or other medium, the former will uniformly deposit silex in their cuticle, and the latter, never." (*Lind. Introd.* p. 233.) The sap, in its ascent through the plant, is diffused laterally in all directions, round the principal channels of its upward and downward route; and it has been clearly ascertained, that the main route of the ascent of the sap, is through the alburnum, or soft wood.

1692. *The accumulations of sap* in plants appears to be attended with very beneficial consequences, and to be deserving of the especial attention of gardeners. It is well known how weak and imperfect is the inflorescence of the turnip tribe, when forced to flower before their fleshy root stock is formed; and how vigorous it is after that reservoir of accumulated sap is completed. Mr. Knight, in a valuable paper upon this subject, remarks that the fruit of melons, which sets upon the plant when very young, uniformly falls off; while, on the contrary, if not allowed to set until the stem is well formed, and

much sap accumulated for its support, it swells rapidly, and ripens without experiencing any deficiency of food in the course of its growth. In like manner, if a fruit tree is by any circumstance prevented bearing its crop one year, the sap that would have been expended accumulates, and powerfully contributes to the abundance and perfection of the fruit of the succeeding year. And again, the plan recommended by Mr. Knight, of always planting large tubers of the potatoe, is another proof of the importance of plenty of accumulated sap to the vigorous growth of plants. (*Lind. Introd.*, p. 236.)

1693. *The cause of the motion of the sap* has given rise to a great variety of opinions. That of Du Petit Thouars, which seems to be adopted by Mr. Lindley, is as follows:—"In the spring, as soon as vegetation commences, the extremities of the branches and the buds begin to swell. The instant this happens, a certain quantity of sap is attracted out of the circumjacent tissue for the supply of those buds: the tissue, which is thus emptied of its sap, is filled instantly by that beneath or about it; this is, in its turn, replenished by the next; and thus the whole mass of fluid is set in motion, from the extremities of the branches down to the roots." Du Petit Thouars is therefore of opinion, "that the expansion of leaves is not the effect of the motion of the sap; but, on the contrary, is the cause of it; and that the sap begins to move at the extremities of the branches before it stirs at the roots. That this is really the fact, is well known to foresters and all persons accustomed to the felling or examination of timber in the spring." (*Ibid.*, p. 237.)

1694. *The pith* "seems to serve, in the infancy of a plant, for the reception of the sap, from which the tender vessels that surround it are to derive their nourishment at their first formation. The medullary sheath, which encloses the pith, is an essential organ in the early age of a shoot; for, though "the pith and the bark, and even the young wood, may be destroyed without the life of a young shoot being much affected; yet, if the medullary sheath be cut through, the pith, bark, or wood, being left, the part above the wound will perish." (*Ibid.* p. 240.)

1695. *The bark* is the medium in which the proper juices of the plant, in their descent from the leaves, are finally elaborated and brought to the state which is peculiar to the species. From the bark these juices are communicated to the medullary rays, to be by them deposited in the tissue of the wood. The character of timber, therefore, depends chiefly upon the influence of the bark; and hence it is that the wood formed above a graft never partakes, in the slightest degree, of the nature of the wood below it. The bark, when young and green, like the leaves, is supposed, like them, to elaborate the sap, and hence may be considered as the universal leaf of a plant.

1696. *The medullary rays* maintain a communication between the bark and the timber. This is proved by the fact, that in endogenous plants, where such a communication would be useless, medullary rays are wanting.

1697. *The wood* is produced from matter elaborated in the leaves, and sent downwards, either through the vessels of the inner bark, or those of the liber or alburnum. M. Du Petit Thouars is of opinion that wood and liber, or inner bark, are both formed by the downward descent of bud-roots. A plant, according to this author, is formed of multitudes of buds or fixed embryos, each of which has an independent life and action:—by its elongation upwards, forming new branches; and by its elongation downwards, forming wood, bark, and roots. This theory, Mr. Lindley observes, seems the only one that is adapted to the explanation of the real cause of the many anomalous forms of exogenous stems; and, at the same time, accounts equally for the exogenous and endogenous modes of growth.

1698. *Leaves* are the most important of all vegetable organs, serving at once for respiration, digestion, and nutrition; "they elaborate the crude sap impelled into them from the stem, parting with its water, adding to its carbon, and exposing the whole to the action of the air; and, while they supply the necessary food to the young fibres that pass downwards from them, and from the buds in the form of alburnum and liber, they also furnish nutriment to all the parts immediately above and beneath them." (*Ibid.* p. 247.) If a plant is deprived of its leaves before the fruit has commenced ripening, the fruit will fall off without arriving at maturity. A branch, deprived of its leaves for a whole summer, will either die or not increase in size. If the cotyledons or seed-leaves of a plant are cut off, the seed will either not vegetate at all, or do so slowly, or with great difficulty: and if they are injured, a languor of habit is produced, by which excessive luxuriance is checked, and fruit formed, rather than leaves or branches: hence it is that gardeners prefer old melon and cucumber seeds to new ones.

1699. *The cause of the fall of the leaf* has been explained in various ways, and by Du Petit Thouars on the following principle.—"In the first instance, the base of every leaf reposes upon the medulla of the branch, to the sheath of which it is attached. But, as the branch increases in diameter by the acquisition of new wood, the space between the base of the leaf and the medulla becomes sensibly augmented. It has, therefore, been necessary that the fibres by which the leaf is connected with the medulla should

lengthen, in order to admit the deposition of wood between the bark and the medulla. Now, how does this elongation take place? As the bundles of fibres, which run from the medulla into the leaf-stalk, are at first composed only of spiral vessels, it is easy to conceive that they may be susceptible of elongation by unrolling. And in this seems to lie the mystery of the fall of the leaf; for the moment will come, when the spiral vessels are entirely unrolled and incapable of any further elongation; they will, therefore, by the force of vegetation, be stretched until they snap, when the necessary communication between the branch and the leaf is destroyed, and the latter falls off. It is highly probable that this interruption of the necessary communication between the leaves and their support is the principal cause of the fall of the leaf in all cases; and it seems to be strongly supported by the following phenomena:—first, the early fall of the lower leaves of plants during the period of vegetation; second, the fall of the leaves of evergreen trees, and of those whose foliage withers and perishes during winter, at the period when new wood is formed by the operation of new shoots in the spring; third, the ultimate fall of those leaves which are subject to no fixed periods of defoliation; and fourth, the persistence of the leaves of stunted trees which have not formed wood enough during a single season to cause a rupture of the conducting vessels of the petioles, as the beech and hornbeam. The well-known indication by which gardeners judge of the probable success in transplanting a tree or other plant in leaf, may also be considered a further proof of the justness of Du Petit Thouars's theory. On such occasions, if the leaves wither and hang upon the branches, the omen is unfavourable; but if they are cast off, it is a certain indication of success. Here the action of the spiral vessels may be understood to be impaired by the interruption of the regular transmission of oxygenated air through them, caused by the act of transplantation. As soon as the energies of the plant are renewed, a sudden increase of diameter supervenes, the communication is cut off between the leaves and the stem by the too rapid extension of the spiral vessels, and the leaves fall off." (*Lind. Introd.* p. 251.)

1700. *The expansion of the flowers of plants* requires the same conditions as those requisite for the germination of the seed. Flowers will not open at a temperature less than 32° of Farenh.; but at from 50° to 86° they acquire a considerable supply of ascending sap, without which they cannot open; and even aquatic plants will not develop their flowers without the presence of oxygen. Flowers, like germinating seeds, while expanding, rob the air of oxygen, and give out an equal column of carbonic acid.

1701. *The fruit*, next to the wood, is the most important part of a plant; not only on account of its use to man and other animals, but on account of its seeds for the continuation of the species. "The fruit, during its growth, is supported at the expense of the sap generally; but most especially of that which had been previously accumulated for its maintenance. This is less apparent in perennial or ligneous plants than in annual ones, but is capable of demonstration in both. Mr. Knight has well observed, § 1692., that in annual fruit-bearing plants, such as the melon, if a fruit is allowed to form at a very early period of the life of the plant, as for instance, in the axilla of the third leaf, it rarely sets, or arrives at maturity, but falls off soon after beginning to swell, from want of an accumulation of food for its support; while, if the same plant is not allowed to bear fruit until it has provided a considerable supply of food, as will be the case after the leaves are fully formed, and have been some little time in action, the fruit which may then set swells rapidly, and speedily arrives at the highest degree of perfection of which it may be susceptible. And in woody trees, also, a similar phenomenon occurs: it is well known to gardeners, that if a season occurs in which trees in a state of maturity are prevented bearing their usual crops, the succeeding year their fruit is unusually fine and abundant, owing to their having a whole year's extra stock of accumulated sap to feed upon." (*Ibid.*, p. 267.)

1702. *Prolongation of fruits.* When fruits nearly, but not quite ripe, are placed in an atmosphere free from oxygen, the process of ripening is suspended; but it may be re-established within certain limits of time, by replacing them in the common atmosphere. Hence by placing at the bottom of a bottle a paste formed of lime, sulphate of iron, and water, which may deprive the atmospheric air enclosed of its oxygen, and suspending fruit gathered a few days before it is ripe in such a bottle, and afterwards hermetically sealing it by a cork covered with cement, the fruits may be preserved for a longer or shorter time, according to their nature. "Peaches, plums, and apricots, may be preserved from twenty days to a month; pears and apples for three months: if they are withdrawn after this time, and exposed to the air, they ripen extremely well; but, if the times mentioned are much exceeded, they undergo a particular alteration, and will not ripen well." (*Ibid.* p. 268.) It appears that atmospheric air is necessary to the rotting or decay of fruits; because, without the presence of oxygen, a different change takes place.

1703. *Seeds* will not germinate in the light, because light decomposes the carbonic acid gas, expels the oxygen, and fixes the carbon; thus hardening all the parts of the

seed, and preventing vegetation. Seeds sown as soon as they are gathered, generally vegetate, at the latest, in the ensuing spring; but when they are first dried they will frequently lie a whole year in the soil without vegetating. Many seeds, when buried beyond a certain depth, lose their vegetative powers; others, as clover, retain them, and when brought up to the surface, will germinate, after having been buried for many years. The conditions which are necessary for the germination of seeds, are heat, moisture, and darkness; and the reverse of these are the most favourable for conveying seeds to a distance. After much experience it has been found, that seeds packed loosely in coarse canvass bags, and hung to the ceiling of the cabin of a ship, where they are exposed to light and air, and protected from damp, will retain their vegetative powers much better than when enveloped in wax or tallow, or mixed with sugar or charcoal. No material will preserve seeds so long as coarse brown paper, made from old tarred rope, in which a large quantity of tar is incorporated. Cartridge paper offers seeds no protection whatever. Surrounding seeds with moist earth rammed very hard, will also prevent germination, and at the same time retain the vital principle. In general, the most difficult seeds to preserve are those which contain much oil; but there are many exceptions in the case of the seeds of the *Brassica* family, and of mustard, and other cruciferous plants.

1704. *Colour* is acquired by plants from the loss of oxygen, and the acquisition of carbon. The ordinary membranes of plants are destitute of colour; all the pure acids of plants are white; but azote possesses the power of discolouration. Young roots are white, and young stems are green, like leaves; but both, as they grow older, become brown. Light, and every other agent which extracts oxygen from plants, will produce a green colour; but an unusual quantity of oxygen, in consequence either of intense light or a sickly state of the plant, will change green into yellow or red.

1705. *The odours of plants* depend upon volatile oils, which are continually flying off, but in different degrees. Some odours are not perceptible till the parts of the plant are rubbed; some are most apparent in a recent state, and others in a dried state; in the latter case, the oil has been combined with too much water. In some of the cruciferae, and other orders, the oil is so rapidly dispersed in the day-time, as to render its odour imperceptible, while during night it is eminently odoriferous; as in the case of the night-smelling stock, the rocket, and several other plants. In general, plants in hot countries are more fragrant than those in cold countries; but their fragrance is so much dispersed by the heat, as to be imperceptible in the day-time.

1706. *The tastes of plants* arise from sugar; from different acids; from volatile oils, which alone produce an acrid taste; from tannin, which produces astringency; and from a mixture of mucilage with a little tannin, which produces what is called a herbaceous taste.

1707. *The vital principle of plants* seems to depend upon a degree of irritability which exists in them; of a character analogous to that of animals, though far inferior in degree. This is considered to be proved by the action of mineral and vegetable poisons on plants. M. Marcelet, of Geneva, has found that metallic poisons act upon vegetables nearly as they do upon animals; and that vegetable poisons also cause the death of plants. From this it is inferred, that plants have a system of organs analogous to the nerves of animals.

SECT. III. Diseases of Plants.

1708. *Plants are subject to numerous diseases*, the origin of the greater part of which is almost wholly unknown. Some, it is probable, arise from a derangement of the circulation of the fluids; and others, from an undue absorption of water.

1709. *Tubes, or Gangrene*, is a term applied to a general languor of the system, under which the plant withers away, or becomes rotten. In succulent plants, this or a similar disease is denominated *Anasarca*, or *Dropsy*.

1710. *Scorching, or Insulation*, is produced by too high a temperature; or, by excessive evaporation. A variety of this disease is termed *Marcor*, or *Welting*.

1711. *Chlorosis, or Etiolation*, is a kind of constitutional debility, supposed to depend on the too great accumulation of oxygen, from the absence of light, and from other causes. It is often produced from the action of insects on the roots.

1712. *Canker, or Caries*, exhibits itself in small, brown dead spots, which extend on all sides of a branch, until they surround and kill it. The disease is continued by grafting, and no cure for it is yet known.

1713. *Carcinoma* is a term given to the appearance of an unusual deposit of the cambium or returning sap, between the wood and the bark; in this case, the cambium becomes putrid, and oozing out through the bark, the latter separates from the alburnum, and the intervening space forms a nidus for insects, which soon destroy the tree.

1714. *Extravasation, or Gummy*, is one of the most common diseases of trees, and is known to most gardeners. Galls are tumid excrescences, caused by the punctures of insects. *Alburnitus* is a term applied to the appearance of a layer of soft wood, between layers of a wood of a harder texture, and is supposed to arise from a wet season.

1715. *Albugo*, *Ferrugo*, and *Uredo*, that is, mildew, rust, smut, brand, and blight, &c., are caused by the presence of innumerable minute funguses, which are to plants what intestinal worms are to animals.

1716. *Ergot*, or *Clerus*, is a brown or black excrescence from the seeds of grasses, not depending on a parasitical fungus. The ergot of rye is used in medicine.

1717. *Spotting*, or *Necrosis*, consists of small black spots on the leaves and soft parts of plants, most probably arising from wet and cold; since it is most common among exotics in cold seasons.

1718. *Melligo* and *Saleugo* are natural exudations of the juices of certain plants; the former produces the manna of the ash; and the latter, a saline secretion of the same kind.

1719. The names of a number of other diseases might be given; such as suffocatio, or choking up; icterus, or jaundice; pernio, or chilblain wounds caused by frosts; exostosis, or clubbing of the roots; *crispatura*, or curling, &c.; but, as no cure can be offered for them, and as, like all the preceding diseases, they are only to be prevented by regimen, their enumeration here would be of little service to the young gardener.

SECT. IV. Hybrid Plants.

1720. The power of hybridising "appears to be far more common in plants than in animals; for while only a few animal mules are known, there is scarcely a genus of domesticated plants in which this effect cannot be produced by the assistance of man, in placing the pollen of one species upon the stigma of another. It is, however, in general, only between nearly allied species that this intercourse can take place; those which are widely different in structure and constitution not being capable of any artificial union. Thus, the different species of strawberry, of certain tribes of *Pelargonium*, and of *Cucurbitaceæ*, intermix with the greatest facility, there being a great accordance between them in general structure and constitution; but no one has ever succeeded in compelling the pear to fertilise the apple, nor the gooseberry the currant. And as species that are very dissimilar appear to have some natural impediment, which prevents their reciprocal fertilisation, so does this obstacle, of whatever nature it may be, present an insuperable bar to the intercourse of different genera. All the stories that are current as to the intermixture of oranges and pomegranates, of roses and black currants, and the like, may, therefore, be set down to pure invention." (*Lind. Introd.*, p. 302.)

1721. Many experiments on the subject of hybridism were made by Köhnerster, of Carlsruhe, towards the end of the last century; from which, and from others of more recent date, it appears that hybrid plants are uniformly incapable of procreation, with some exceptions, in which this power is possessed by hybrids to the third or fourth generation, after which they revert to one or other of their parents, or become absolutely barren.

1722. The cause of the sterility of mule plants, Mr. Lindley observes, "is at present entirely unknown. Sometimes, indeed, a deficiency of pollen may be assigned; but in many cases there is no perceptible difference in the healthiness of structure of the fertilising organs of a male plant, and of its parents. I know of no person who has attempted to prove this by comparative anatomical observations, except Professor Henslow of Cambridge; who, in an excellent paper upon a hybrid *Digitalis*, investigated anatomically the conditions of the stamens and pistillum, both of his hybrid and its two parents, with great care and skill. The result of his enquiry was, that no appreciable difference could be detected. Although the power of creating mule plants, that are fertile for two or three generations, incontestably exists, yet in wild nature hybrid varieties are far from common; or, at least, there are few well attested instances of the fact. Among the most remarkable cases are, the *Cistus Lædon* constantly produced between *C. monspessulanus* and *aurifolius* and *Cistus longifolius* between *C. monspessulanus* and *populifolius*, in the wood of Fontfroide, near Narbonne, mentioned by Mr. Bentham. Again, the same acute botanist ascertained that *Saxifraga luteopurpurea* of Lapeyrouse, and *S. ambigua* of De Candolle, are only wild accidental hybrids between *S. aretioides* and *calyciflora*: they are only found when the two parents grow together; but there they form a suite of intermediate states between the two. Gentians, having a similar origin, have also been remarked upon the mountains of Europe. It is difficult not to believe that a great number of the reputed species of *Salix*, *Rosa*, *Rubus*, and other intricate genera, have also had a hybrid origin; but I am not aware that there is at present any positive proof of this." (*Ibid.* p. 304.)

1723. The power of obtaining mule varieties by art, Mr. Lindley continues, "is, in a practical point of view, I am inclined to believe, one of the most important means that man possesses of modifying the works of nature, and of rendering them better adapted to his purposes. In our gardens some of the most beautiful flowers have such an origin; as, for instance, the roses obtained between *R. indica* and *moschata*, the different rule *Potentillæ* and *Cécéæ*, the splendid azaleas raised between *A. pontica* and *A. nudiflora* *coccinea*, and the magnificent American-East-Indian rhododendrons. By crossing varieties

of the same species, the races of fruits and of culinary vegetables have been brought to a state as nearly approaching perfection as we can suppose possible. And if similar improvements have not taken place in a more important department, namely, the trees that afford us timber, our experience as fully warrants our entertaining the belief, that if proper means were adopted, improved varieties of as much consequence might be introduced into our forests, as have already been created for our gardens. In conducting experiments of this kind, it is well to know that, in general, the characters of the female parent predominate in the flowers and parts of fructification; while the foliage and general constitution are generally those of the male parent. Thus, in the celebrated *Rhododendron alta-clerense*, gained by Lord Carnarvon by fertilising *R. arboreum* with *R. catawbiense*, the male variety had the flowers and colour of *R. arboreum*, but more the leaves and hardness of constitution of *R. catawbiense*." (*Lind. Intro.*, p. 304.)

SECT. V. *Of the Metamorphoses of Plants.*

1724. *Morphology*, or the gradual transmutation of leaves into the various organs of a plant, is a subject which has lately engaged the attention of botanists. The first ideas of this metamorphosis appear to have originated with Linnæus; and the first attempt to reduce it to a system with the poet Goëthe, in the year 1790. According to this doctrine, the bractææ are leaves affected by the vicinity of the fructification; the calyx and the corolla are formed by the adhesion and verticillation of leaves, the filament is a form of a petiole, the anthers of laminae, and the ovarium itself a convolute leaf. The elementary organs used by nature in the construction of plants being essentially the same, and the plan upon which they are combined being every where uniform, it follows that the functions of plants are equally regular, and that every thing which takes place in the vegetable world is governed by a few simple laws. Whatever can be demonstrated of one branch of a tree, is not only true of all other branches of the same tree, but also of the branches of all other trees. Whatever can be shown to govern the structure of one individual will also govern that of all other individuals.

1725. *Stipule* and *bractææ* are not uncommonly found transformed into leaves, in the rose family more especially; hence these organs are considered as rudimentary leaves. Instances in which the calyx and even the corolla have been transformed into leaves, as in the daisy, the tulip, the rose, &c., are familiar to every gardener; and hence it is concluded that these organs also are but modified leaves. In double flowers, every one knows that the stamens are changed into petals; but petals having been proved to be leaves, it follows also that stamens are leaves, which is occasionally seen to be the case in monstrous flowers. From these, and similar facts and arguments, Mr. Lindley concludes, that "there can be no difficulty in admitting the following propositions as the basis of morphology."

1726. *Every flower with its pedicule and bracteole*, being the developement of a flower bud, and flower buds being altogether analogous to leaf buds, it follows, as a corollary, that every flower, with its pedicule and bracteole, is a metamorphosed branch.

1727. *The flowers being abortive branches*, whatever the laws are of the arrangement of branches with respect to each other, the same will be the laws of the arrangement of flowers with respect to each other.

1728. *In consequence of a flower and its peduncle being a branch* in a particular state, the rudimentary or metamorphosed leaves which constitute bractææ, floral envelopes, and sexes, are subject to exactly the same laws of arrangement as regularly formed leaves. (*Outlines of the First Principles of Botany*, 2d edit.)

1729. *All plants are alike subject to metamorphosis*. The extent of the changes which they are capable of undergoing may depend on their constitutional peculiarities, and also on their situation with respect to soil and climate. The developement of a plant in its native habitation will, in general, remain unchanged; but the same plant, in a state of culture, may undergo a considerable alteration in its external characters. This is the cause of the numerous varieties into which most garden plants are continually sporting, and is called by botanists, irregular metamorphosis.

1730. *The changes undergone by the roots of plants* are so numerous, that we have only to remind the gardener of the carrot, the celery, the turnip, &c. in their wild state, and in their state of cultivation. The tubers of some potatoes are red throughout; and the beet and the turnip are also of different colours.

1731. *The stem changes less than the root*; but in different varieties of the same species the height is varied by culture as well as the thickness and tenderness or rigidity of texture. The köhl rabi, the cockscomb, the finocchio, and other plants readily occur to every gardener.

1732. *The metamorphoses of leaves and flowers* are too numerous to be mentioned, not only in respect to form, but also in regard to colour. Some of the laws by which the change of colour is effected are thus given by Mr. Lindley.

1733. *Metamorphoses of colours*. "A blue flower will change to white or red, but not

to bright yellow; a bright yellow flower will become white or red, but never blue. Thus the hyacinth, of which the primitive colour is blue, produces abundance of white and red varieties, but nothing that can be compared to bright yellow; the yellow hyacinths, as they are called, being a sort of pale yellow ochre colour verging to green. Again, the ranunculus, which is originally of an intense yellow, sports into scarlet, red, purple, and almost any colour but blue. White flowers, which have a tendency to produce red, will never sport to blue, although they will to yellow; the rose, for example, and chrysanthemums. It is also probable that white flowers, with a tendency to produce blue, will not vary to yellow; but of this I have no instance at hand." (*Lind. Introd.* p. 525.)

1734. *Smell* is changed in degree, but not in nature. In general, cultivation diminishes the intensity of all smells; though distinct varieties may exist under the same degree of cultivation, and yet with different degrees of intensity of smell. Some cultivated apples are destitute of smell, and others are scented like the pine-apple or the rose.

1735. *Metamorphoses of fruit* are common both as to colour, flavour, size, smell, and structure; and this is not only the case with fruits, popularly so called, but with seeds and seed pods. In the garden pea, the parchment-like lining of the pod occasionally disappears and the entire substance becomes a lax, cellular substance.

1736. *Permanency of metamorphoses*. "It is a general law of nature, that seeds will perpetuate a species but not a variety; and this is no doubt true, if rightly considered, and yet it may be urged, if this be so, how have the varieties, well known to gardeners and agriculturists, for many years been unceasingly carried on from generation to generation without change? The long red, and round white radishes of the markets, for instance, have been known from time immemorial in the same state in which they now exist. The answer is this. A species will perpetuate itself from seed for ever under any circumstances, and left to the simple aid of nature: but accidental varieties cannot be so perpetuated; if suffered to become wild, they very soon revert to the form from which they originally sprung. It is necessary that they should be cultivated with the utmost care; that seed should be saved from those individuals only in which the marks of the variety are most distinctly traced; and all plants that indicate any disposition to cast off their peculiar characteristics should be rejected. If this is carefully done, the existence of any variety of annual or perennial plant may undoubtedly be prolonged through many generations; but in woody plants this scarcely happens, it being a rare occurrence to find any variety of tree or shrub producing its like when increased by seed." (*Ibid.* p. 526.)

CHAP. VII.

Vegetable Geography and History, or the Distribution of Vegetables relatively to the Earth and to Man.

1737. *The science of the distribution of plants*, Humboldt observes, (*Essai sur la Géographie des Plantes*, &c. 1807), considers vegetables in relation to their local associations in different climates. It points out the grand features of the immense extent which plants occupy, from the regions of perpetual snow to the bottom of the ocean, and to the interior of the globe, where, in obscure grottoes, cryptogamous plants vegetate, as unknown as the insects which they nourish. The superior limits of vegetation are known, but not the inferior; for every where in the bowels of the earth are germs which develop themselves when they find a space and nourishment suitable for vegetation. On taking a general view of the disposition of vegetables on the surface of the globe, independently of the influence of man, that disposition appears to be determined by two sorts of causes, *geographical* and *physical*. The influence of man, or of cultivation, has introduced a third cause, which may be called *civil*; and the different aspects of plants in different regions have given rise to what may be called their *characteristic* or *picturesque distribution*.

SECT. I. *Geographical Distribution of Vegetables.*

1738. *The territorial limits to vegetation* are determined in general by three different causes: — 1. By sandy deserts, which seeds cannot pass over either by means of winds or birds, as that of Sahara, in Africa; 2. By seas too vast for the seeds of plants to be drifted from one shore to the other, as in the ocean; while the Mediterranean sea, on the contrary, exhibits the same vegetation on both shores; and, 3. By long and lofty chains of mountains. To these causes are to be attributed the fact, that similar climates and soils do not always produce similar plants. Thus in certain parts of North America,

which altogether resemble Europe in respect to soil, climate, and elevation, not a single European plant is to be found. The same remark will apply to New Holland, the Cape of Good Hope, Senegal, and other countries, as compared with countries in similar physical circumstances, but geographically different. The separation of Africa and South America, Humboldt considers, must have taken place before the development of organised beings, since scarcely a single plant of the one country is to be found in a wild state in the other.

SECT. II. *Physical Distribution of Vegetables.*

1739. *The natural circumstances* affecting the distribution of plants, may be considered in respect to temperature, elevation, moisture, soil, and light.

1740. *Temperature* has the most obvious influence on vegetation. Every one knows that the plants of hot countries cannot in general live in such as are cold, and the contrary. The wheat and barley of Europe will not grow within the tropics; the same remark applies to plants of still higher latitudes, such as those within the polar circles, which cannot be made to vegetate in more southern latitudes; nor can the plants of more southern latitudes be made to vegetate there. In this respect, not only the medium temperature of a country ought to be studied, but the temperature of different seasons, and especially of winter. Countries where it never freezes; those where it never freezes so strongly as to stagnate the sap in the stems of plants; and those where it freezes sufficiently strongly to penetrate into the cellular tissue; form three classes of regions in which vegetation ought to differ. But this difference is somewhat modified by the effect of vegetable structure, which resists, in different degrees, the action of frost; thus, in general, trees which lose their leaves during winter resist the cold better than such as retain them; resinous trees more easily than such as are not so; herbs of which the shoots are annual and the root perennial, better than those where the stems and leaves are persisting; annuals which flower early, and whose seeds drop and germinate before winter, resist cold less easily than such as flower late, and whose seeds lie dormant in the soil till spring. Monocotyledonous trees, which have generally persisting leaves and a trunk without bark, as in palms, are less adapted to resist cold than dicotyledonous trees, which are more favourably organised for this purpose, not only by the nature of their proper juice, but by the disposition of the cortical and alburnous layers, and the habitual carbonisation of the outer bark. Plants of a dry nature resist cold better than such as are watery; all plants resist cold better in dry winters than in moist winters; and an attack of frost always does most injury in a moist country, in a humid season, or when the plant is too copiously supplied with water.

1741. Some plants of firm texture, but natives of warm climates, will endure a frost of a few hours' continuance, as the orange at Genoa (*Humboldt, De Distributione Plantarum*); and the same thing is said of the palm and pine-apple, facts most important for the gardener. Plants of delicate texture, and natives of warm climates, are destroyed by the slightest attack of frost, as the *Phaseolus*, *Tropæolum*, *Georgina*, &c.

1742. *The temperature of spring* has a material influence on the life of vegetables; the injurious effects of late frosts are known to every cultivator. In general, vegetation is favoured in cold countries by exposing plants to the direct influence of the sun; but this excitement is injurious in a country subject to frosts late in the season: in such cases, it is better to retard than to accelerate vegetation.

1743. *The temperature of summer*, as it varies only by the intensity of heat, is not productive of so many injurious accidents as that of spring. Very hot dry summers, however, destroy many delicate plants, and especially those of cold climates. A very early summer is injurious to the germination and progress of seeds; a short summer to their ripening, and a prolonged one the contrary.

1744. *Autumn* is an important season for vegetation, as it respects the ripening of seeds; hence, where that season is cold and humid, annual plants, which naturally flower late, are never abundant, as in the polar regions; the effect is less injurious to perennial plants, which generally flower earlier. Frosts early in autumn are as injurious as those which happen late in spring. The conclusion, from these considerations, obviously is, that temperate climates are more favourable to vegetation than such as are either extremely cold or extremely hot. But the warmer climates, as Keith observes, are more favourable upon the whole to vegetation than the colder, and that nearly in proportion to their distance from the equator. The same plants, however, will grow in the same degree of latitude, throughout all degrees of longitude, and also in correspondent latitudes on different sides of the equator; the same species of plants, as some of the palms and others, being found in Japan, India, Arabia, the West Indies, and part of South America, which are all in nearly the same latitudes; and the same species being also found in Kamtschatka, Germany, Great Britain, and the coast of Labrador, which are all also in nearly the same latitudes. (*Willdenow, p. 374.*)

1745. *The most remarkable circumstances respecting the temperature in the three zones, is exhibited in the following Table by Humboldt. The temperature is taken according to the centigrade thermometer. The fathom is 6 French feet, or 6.39453 English feet.*

	Torrid zone.		Temperate zone.			Frigid zone.
	Andes of Quito, Lat. 0°.	Mountains of Mexico, Lat. 20°.	Caucasus, Lat. 42½°.	Pyrenees, Lat. 42½°.	Alps, Lat. 45½° to 46°.	Lapland, Lat. 67° to 70°.
Inferior limit of perpetual snow - - }	2460 fa.	2350 fa.	1650 fa.	1400 fa.	1370 fa.	550 fa.
Mean annual heat at that height - - }	1½°	—	—	3½°	4°	6°
Mean heat of winter, do.	1½°	—	—	—	10°	20½°.
Mean heat of Aug. do.	14°	—	—	—	6°	9½°
Distance between trees and snow - - }	600 fa.	350 fa.	650 fa.	230 fa.	450 fa.	300 fa.
Upper limit of trees -	1800 fa.	2000 fa.	1000 fa.	1170 fa.	920 fa.	250 fa.
Last species of trees towards the snow - }	Escallonia Alstonia.	Pinus occident.	Bétula álba.	Pin. rubra P. uncin.	Abies excelsa.	Bétula álba.
Distance between the snow and corn - - }	800 fa.	—	630 fa.	—	700 fa.	450 fa.

1746. *Elevation, or the height of the soil above the level of the sea, affects climate much in the same manner as latitude; while, at the same time, it occasions a material difference in atmospheric pressure. This diminished pressure is thought by Professor Dobereiner, and some other botanists, to be the chief cause of the diminutive size of plants grown in elevated situations. Experiments have been made to prove this, by causing seeds of barley to germinate in soil placed in vessels under different degrees of atmospheric pressure; and the result has been, that where the pressure was greatest, the vigour of the plant was greatest also. With respect to the influence of elevation on temperature, as the altitude increases, the temperature lessens in regular gradation, in the same manner as it does in receding from the equator; and 600 feet of elevation, De Candolle states, are deemed equal to one degree of latitude, and occasion a diminution of temperature equal to 23° Fahr.; 300 feet being nearly equal to half a degree. Mountains 1000 fathoms in height, at 46° of latitude, have the mean temperature of Lapland.*

1747. *Hence it is that plants of high latitudes live on the mountains of such as are much lower, and thus the plants of Greenland and Lapland are found on the Alps and Pyrenees. At the foot of Mount Ararat, Tournefort met with plants peculiar to Armenia; above these he met with plants which are found also in France; at a still greater height he found himself surrounded with such as grow in Sweden; and at the summit, with such as vegetate in the polar regions. This accounts for the great variety of plants which are often found in a Flora of no great extent; and it may be laid down as a botanical axiom, that the more diversified the surface of the country, the richer will its flora be, at least in the same latitudes. It accounts also, in some cases, for the want of correspondence between plants of different countries, though placed in the same latitudes; because the mountains, or ridges of mountains, which may be found in the one and not in the other, will produce the greatest possible difference in the character of their Floras. And to this cause may generally be ascribed the diversity that often actually exists between plants growing in the same latitudes, as between those of the north-west and north-east coasts of North America; as also of the south-west and south-east coasts; the former being more mountainous, the latter more flat. Sometimes the same sort of difference takes place between the plants of an island and those of the neighbouring continent; that is, if the one is mountainous and the other flat; but if they are alike in their geographical delineation, then they are generally alike in their vegetable productions.*

1748. *Cold and lofty situations are the favourite habitations of most cryptogamic plants*

of the terrestrial class, especially the Fungi, Algae, and Mosses; as also of plants of the class Tetradynamia, and of the Umbellatæ and Syngenesian tribes: whereas, trees and shrubs, ferns, parasitic plants, lilies, and aromatic plants, are most abundant in warm climates: only this is not to be understood merely of geographical climates, because, as we have seen, the physical climate depends upon altitude. In consequence of which, combined with the ridges and directions of the mountains, America and Asia are much colder in the same degrees of northern latitude than Europe. American plants, vegetating at forty-two degrees of northern latitude, will vegetate very well at fifty-two degrees in Europe: the same, or nearly so, may be said of Asia; which, in the former case, is perhaps owing to the immense tracts of woods and marshes covering the surface; and in the latter, to the more elevated and mountainous situation of the country affecting the degree of temperature. So also Africa is much hotter under the tropics than America; because, in the latter, the temperature is lowered by immense chains of mountains traversing the equatorial regions; while in the former it is increased by means of the hot and burning sands that cover the greater part of its surface.

1749. *Elevation influences the habits of plants in various ways*; — by exposing them to the wind; to be watered by a very fresh and pure water from the melting of adjoining snow; and to be covered in winter by a thick layer of snow, which protects them from severe frosts. Hence many alpine plants become frozen during winter in the plains, and in gardens which are naturally warmer than their native situations. In great elevations, the diminution of the density of the air may also have some influence on vegetation. The rarity of the atmosphere admits a more free passage for the rays of light, which, being in consequence more active, ought to produce a more active vegetation. Experience seems to prove this in high mountains; and the same effect is produced in high latitudes by the length of the day. On the other hand, vegetables require to absorb a certain quantity of oxygen gas from the air during the night; and as they find less of that in the rarified air of the mountains, they ought to be proportionably feeble and languishing. According to experiments made by Theodore de Saussure, plants which grow best in the high Alps are those which require to absorb least oxygen during the night; and, in this point of view, the shortness of the nights near the poles correspond. These causes, however, are obviously very weak, compared to the powerful action of temperature.

1750. *Great anomalies* are found in the comparative height in which the same plant will grow in different circumstances. In countries situated under the equator, the two sides of the mountain are of the same temperature, which is solely determined by elevation; but in countries distant from it, the warmest side is that towards the south; and the zones of plants, instead of forming lines parallel to the horizon, incline towards the north. The reason, in both cases, is sufficiently obvious. In the temperate zone we find the same plants frequently on low and elevated situations; but this is never the case between the tropics.

1751. *The habits of aquatics are various, in regard to the depth of water*: thus, some aquatics float always on the surface of the water, as Læmna; while others are either partially or wholly immersed. Such aquatics as grow in the depths of the sea are not influenced by climate; but such as are near the surface are influenced by climate, and have their habitations affected by it.

1752. *The moisture, or mode of watering*, natural to vegetables, is a circumstance which has a powerful influence on the facility with which plants grow in any given soil. The quantity of water absolutely necessary for the nourishment of plants, varies according to their tissue; some are immersed, others float on its surface; some grow on the margin of waters, with their roots always moistened or soaked in it; others, again, live in soil slightly humid or almost dry. Vegetables which resist extreme drought most easily are, 1. Trees and herbs with deep roots, because they penetrate to, and derive sufficient moisture from, some distance below the surface; 2. Plants which, being furnished with few pores on the epidermis, evaporate but little moisture from their surface, as the succulent tribe.

1753. *The qualities of water*, or the nature of the substances dissolved in it, must necessarily influence powerfully the possibility of certain plants growing in certain places. But the difference in this respect is much less than would be imagined, because the food of one species of plant differs very little from that of another. The most remarkable case is that of salt-marshes, in which a great many vegetables will not live, whilst a number of others thrive there better than any where else. Plants which grow in marine marshes, and those which grow in similar grounds situated in the interior of a country, are the same. Other substances naturally dissolved in water appear to have much less influence on vegetation, though the causes of the habitations of some plants, such as those which grow best on walls, as Peltaria, and in lime-rubbish, as Thlaspi, and other Crucifere, may doubtless be traced to some salt (nitrate of lime, &c.) or other substance peculiar to such situations.

1754. *The nature of the earth's surface* affects the habitations of vegetables in different

points of view : 1. As consisting of primitive earths, or the *débris* of rocks or mineral bodies : and, 2. As consisting of a mixture of mineral, animal, and vegetable matter.

1755. *Primitive surfaces* affect vegetables mechanically, according to their different degrees of moveability or tenacity. In coarse sandy surfaces plants spring up easily, but many of them, which have large leaves or tall stems, are as easily blown about and destroyed. In fine, dry, sandy surfaces, plants with very delicate roots, as *Protéea* and *Erica*, prosper : a similar earth, but moist in the growing season, is suited to bulbs. On clayey surfaces plants are more difficult to establish ; but when established are more permanent : they are generally coarse, vigorous, and perennial in their duration.

1756. With respect to the *relative proportions of the primitive earths* in these surfaces, it does not appear that their influence on the distribution of plants is so great as might at first sight be imagined. Doubtless, different earths are endowed with different degrees of absorbing, retaining, and parting with moisture and heat ; and these circumstances have a material effect in a state of culture, where they are comminuted and exposed to the air ; but not much in a wild or natural state, where they remain hard, firm, and covered with vegetation. The difference, with a few exceptions, is never so great but that the seeds of a plant which have been found to prosper well in one description of earth, will germinate and thrive as well in another composed of totally different earths, provided they are in a nearly similar state of mechanical division and moisture. Thus, De Candolle observes, though the box is very common on calcareous surfaces, it is found in as great quantities in such as are schistous or granitic. The chestnut grows equally well in granitic and clayey earths, in volcanic ashes, and in sand. The plants of Jura, a mountain entirely calcareous, grow equally well on the Voeges or the granitic Alps. But, though the kind or mixture of earths seems of no great consequence, yet the presence of metallic oxides and salts, as sulphates of iron or copper, or sulphur alone, or alum, or other similar substances, in a state to be soluble in water, are found to be injurious to all vegetation, of which some parts of Derbyshire and the maremmes of Tuscany (*Chateauxvieux*, let. 8.) are striking proofs. But, excepting in these rare cases, plants grow nearly indifferently on all primitive surfaces, in the sense in which we here take these terms ; the result of which is, that earths strictly or chemically so termed have much less influence on the distribution of plants, than temperature, elevation, and moisture. Another result is, as De Candolle has well remarked, that it is often a very bad method of culture to imitate so exactly the nature of the earth in which a plant grows in its wild state.

1757. *Mixed or secondary soils* include not only primitive earths, or the *débris* of rocks, but vegetable matters — not only the medium through which perfect plants obtain their food, but that food itself. In this view of the subject the term soil is used in a very extensive acceptation, as signifying, not only the various sorts of earths which constitute the surface of the globe, but every substance whatever on which plants are found to vegetate, or from which they derive their nourishment. The obvious division of soils in this acceptation of the term is that of aquatic, terrestrial, and vegetable soils ; corresponding to the division of aquatic, terrestrial, and parasitical plants.

1758. *Aquatic soils* are such as are either wholly or partially inundated with water, and are fitted to produce such plants only as are denominated aquatics. Of aquatics there are several subdivisions according to the particular situations they affect, or the degree of immersion they require. One of the principal subdivisions of aquatics is that of *marine plants*, such as the *Fûci* and many of the *Algæ*, which are very plentiful in the seas that wash the coasts of Great Britain, and are generally attached to stones and rocks near the shore. Some of them are always immersed ; and others, which are situated above low water mark, are immersed and exposed to the action of the atmosphere alternately. But none of them can be made to vegetate except in the waters of the sea. Another subdivision of aquatics is that of *river plants*, such as *Châra*, *Potamogeton*, and *Nymphæa*, which occupy the bed of fresh water rivers, and vegetate in the midst of the running stream ; being for the most part wholly immersed, as well as found only in such situations. A third subdivision of aquatics is that of *paludal or fen plants*, being such as are peculiar to lakes, marshes, and stagnant or nearly stagnant waters, but of which the bottom is often tolerably clear. In such situations you find the *Isoëtes lacustris*, flowering rush, water ranunculus, water violet, and a variety of others which uniformly affect such situations ; some of them being wholly immersed, and others immersed only in part.

1759. *Earthy soils* are such as emerge above the water and constitute the surface of the habitable globe, that is every where covered with vegetable productions. Plants affecting such soils, which comprise by far the greater part of the vegetable kingdom, are denominated terrestrial, being such as vegetate upon the surface of the earth, without having any portion immersed in water, or requiring any further moisture for their support beyond that which they derive from the earth and atmosphere. This division is, like the aquatics, distributed into several subdivisions, according to the peculiar situations which

different tribes affect. Some of them are *maritime*, that is, growing only on the sea-coast, or at no great distance from it, such as *Státice*, *Glaúx*, *Sámolus*, samphire, sea-pea. Some are *fluvialic*, that is, affecting the banks of rivers, such as *Lýthrum*, *Lycòpus*, *Eupatórium*. Some are *champaign*, that is, affecting chiefly the plains, meadows, and cultivated fields, such as *Cardámíne*, *Tragopògon*, *Agrostémma*. Some are *dumose*, that is, growing in hedges and thickets, such as the bramble. Some are *ruderal*, that is, growing on rubbish, such as *Senécio viscéus*. Some are *sybotic*, that is, growing in woods or forests, such as *Stáchys sylvática*, *Angélica sylvéstris*. And, finally, some are *alpine*, that is, growing on the summits of mountains, such as *Pòa alpina*, *Epilóbium alpinum*, and many of the mosses and lichens.

1760. *Vegetable soils* are such as are formed of vegetating or decayed plants themselves, to some of which the seeds of certain other plants are found to adhere, as being the only soil fitted to their germination and developement. The plants springing from them are denominated *parasitical*, as being plants that will vegetate neither in the water nor earth, but on certain other plants, to which they attach themselves by means of roots that penetrate the bark, and from the juices of which they do often, though not always, derive their support. This last circumstance constitutes the ground of a subdivision of parasitical plants, into such as adhere to the dead or inert parts of other plants, these are termed *epiphytes*; and such as adhere to living plants, and feed on their juices.

1761. *Parasitical mosses, lichens, and fungi*, may be placed in the first subdivision. They are found as often, and in as great perfection on the stumps of rotten trees, and on rotten pales and stakes, as on trees that are yet vegetating; whence it is also plain that they do not derive their nourishment from the juices of the plants on which they grow, but from their decayed parts, and the atmosphere by which they are surrounded; the plant to which they cling serving as a basis of support.

1762. *Plants strictly parasitical* may be placed in the second subdivision. By these are meant all such as do actually abstract from the juices of the plant to which they cling, the nourishment necessary to the developement of their parts; and of which the most common, at least as being indigenous to Britain, are the mistletoe, dodder, broom-rape, and a sort of tuber that grows on the root of saffron, and destroys it if allowed to spread.

1763. *The Mistletoe* (*Viscum álbum*) is found for the most part on the apple-tree, the lime, the hawthorn, the poplar and some other trees. If its berry is made to adhere to the trunk or branch of either of the foregoing trees, which from its glutinous nature it may readily be made to do, it germinates by sending out a small globular body attached to a pedicle, which after it acquires a certain length bends towards the bark, into which it insinuates itself by means of a number of small fibres which it now protrudes, and by which it abstracts from the plant the nourishment necessary to its future development. When the root has thus fixed itself in the bark of the supporting tree, the stem of the parasite begins to ascend, at first smooth and tapering, and of a pale green colour, but finally protruding a multiplicity of branches and leaves. It seems to have been thought by some botanists that the roots of the mistletoe penetrate even into the wood, as well as through the bark. But the observations of Du Hamel show that this opinion is not well founded. The roots are indeed often found within the wood, which they thus seem to have penetrated by their own vegetating power. But the fact is, that they are merely covered by the additional layers of wood that have been formed since the fibres first insinuated themselves into the bark.

1764. *The Cúscuta europæa*, or Dodder (*fig. 286.*), though it is to be accounted a truly parasitical plant in the issue, is yet not originally so. For the seed of this plant when it has fallen to the ground takes root originally by sending down its radicle into the soil and elevating its stem into the air. It is not yet, therefore, a parasitical plant. But the stem which is now elevated above the surface lays hold of the first plant it meets with, though it is particularly partial to hops and nettles, and twines itself around it, attaching itself by means of little parasitical roots at the points of contact, and finally detaching itself from the soil altogether by the decay of the original root, and becoming a truly parasitical plant. Withering describes the plant in his arrangement as being originally parasitical; but this is certainly not the fact.

1765. *The Orobánche*, or Broom-rape, which attaches itself by the root to the roots of other



plants, is also to be regarded as being truly parasitical, though it sometimes sends out fibres which seem to draw nourishment from the earth. It is found most frequently on the roots of common broom.

1766. *The structure and physiology of true parasites* will be found lucidly explained by Dr. Brown, in his elaborate paper in the *Lin. Trans.*, vol. xiii. p. 227, on that most wonderful of plants the *Rafflesia Arnóldi*; and by J. E. Bowman, Esq., in an equally elaborate paper (*Lin. Trans.*, vol. xvi. p. 399—420) on the *Lathræa Squamaria*. The majority of the tropical Orchideæ are true epiphytes.

1767. *Light* is a body which has very considerable influence on the structure of vegetables, and some also on their habitation. The Fungi do not require the usual interludes of day, in order to decompose carbonic acid gas, and can live and thrive with little or no light. In green plants, which require the action of light, the intensity required is very different in different species: some require shady places, and hence the vegetable inhabitants of caves, and the plants which grow in the shade of forests; others, and the greater number, require the direct action of the sun, and grow in exposed elevated sites. De Candolle considers that the great difficulty of cultivating Alpine plants in the gardens of plains, arises from the impossibility of giving them at once the fresh temperature and intense light which they find on high mountains.

SECT. III. *Civil Causes affecting the Distribution of Plants.*

1768. *By the art of man, plants may be insured to circumstances foreign to their usual habits.* Though plants in general are limited to certain habitations destined for them by nature, yet some are, and probably the greater number may be, insured to climates, soils, and situations, to which they are not indigenous. The means used are acclimatising and culture.

1769. *Acclimatising* seems to be most easily effected, in going from a hot to a cold climate, on herbaceous plants; because it often happens that the frosts of winter are accompanied with snow, which shelters the plant from the inclemency of the atmosphere till the return of spring. Trees and shrubs, on the contrary, are acclimatised with more difficulty, because they cannot be so easily sheltered from the cold, owing to the greater length of their stems and branches. The acclimatising or naturalisation of vegetables is to be attempted by two modes: by sowing the seeds of successive generations, and by the difference of temperature produced by different aspects. Experience, however, has proved, that very little change takes place in the constitutions of plants, by either of these modes of treatment. An individual plant may be rendered more hardy, or more delicate, by local or other changes; but the power of the species to resist cold or heat, drought or moisture, remains the same. Thus the kidneybean, the nasturtium, the potato, and other plants from the southern hemisphere, though raised through numerous generations by seed in Britain, are as easily affected by the autumnal frosts as they probably were when first planted in our gardens. This, we believe, was first noticed in the *Gardener's Magazine*, in consequence of some remarks made to its conductor by Mr. Milne of the Fulham nursery.

1770. *Domesticated plants.* "Some plants," Humboldt observes, "which constitute the objects of gardening and of agriculture, have time out of mind accompanied man from one end of the globe to the other. In Europe, the vine followed the Greeks; the wheat, the Romans; and the cotton, the Arabs. In America, the Tultiques carried with them the maize; the potato and the quinoa (*Chenopodium Quinoa*, of which the seeds are used,) are found wherever have emigrated the ancient Condinamarea. The migration of these plants is evident; but their first country is as little known as that of the different races of men, which have been found in all parts of the globe from the earliest traditions." (*Géographie des Plantes*, p. 25.)

1771. *The general effect of culture on plants* is that of enlarging all their parts; but it often also alters their qualities, forms, and colours: it never, however, alters their primitive structure. "The potato," as Humboldt observes, "cultivated in Chili, at nearly twelve thousand feet above the level of the sea, carries the same flower as in Siberia."

1772. *The culinary vegetables of our gardens*, compared with the same species in their wild state, afford striking proofs of the influence of culture on both the magnitude and qualities of plants. Nothing, in regard to magnitude, is more remarkable than in the case of the *Brássica* tribe; and nothing, in respect to quality, exceeds the change effected on the celery and carrot.

1773. *The influence of culture on fruits* is not less remarkable. The peach in its wild state, in Medina, is poisonous; but, cultivated in the plains of Ispahan and Egypt, it becomes one of the most delicious of fruits. The effect of culture on the apple, pear, cherry, plum, and other fruits, is nearly as remarkable; for not only the fruit and leaves, but the general habits of the tree, are altered in these and other species. The history of the migration of fruit-trees has been commenced by Sickler, in a work (*Geschichte, &c.*) which Humboldt has praised as equally curious and philosophical.

1774. *The influence of culture on plants of ornament is great in most species. The parts of all plants are enlarged; some are numerically increased, as in the case of double flowers: and what is most remarkable, even the colours are frequently changed, both in the leaf, flower, and fruit.*

1775. *The influence of civilisation and culture, in increasing the number of plants in a country, is very considerable, and operates directly, by introducing new species for culture in gardens, fields, or timber-plantations; and, indirectly, by the acclimatising and final naturalisation of many species, by the influence of winds and birds in scattering their seeds. The vine and the fig are not indigenous to France, but were brought there by birds. In like manner the orange was naturalised in the south of Italy, and many herbaceous plants of the Levant, both in France and Britain; some, as the cabbage, cherry, and apple, probably during the subjection of England to the Romans. The narrow-leaved elm was brought from the Holy Land during the crusades. *Phaseolus vulgaris* and *Balsamina hortensis* were originally from India; and *Datura Stramonium*, which is now naturalised in Europe, came originally from India or Abyssinia. Buckwheat, and most species of corn and peas, came also from the East; and along with them several plants found among corn only, such as *Centaurea Cyanus*, *Agrostemma Githago*, *Raphanus Raphanistrum*, and *Myagrum sativum*. The country whence the most valuable grasses migrated is not known. Bruce says he found the oat wild in Abyssinia; and wheat and millet have been found in a wild state in hilly situations in the East Indies. The Romans were unacquainted with either potatoes or rye; and the native country of the former, Humboldt declares to be totally unknown.*

1776. *The greatest refinement in culture consists in the successful formation of artificial climates for the culture of tropical plants in cold regions. Many vegetables, natives of the torrid zone, such as the pine-apple, the palm, &c., cannot be acclimatised in temperate countries. But, by means of hot-houses of different kinds, they are grown, even on the borders of the frozen zone, to the highest degree of perfection: and in Britain, some of the tropical fruits, as the pine and melon, are brought to a greater size and better flavour than in their native habitations. Casting our eyes on man, and the effects of his industry, we see him spread on the plains and sides of mountains, from the frozen ocean to the equator, and every where assembling around him whatever is useful and agreeable of his own or of other countries. The more difficulties he has to surmount, the more rapidly his moral faculties are developed; and thus the civilisation of a people is almost always in an inverse ratio with the fertility of the soil which they inhabit. What is the reason of this? Humboldt asks. We reply—Habit, and love of the native soil.*

SECT. IV. *Characteristic or picturesque Distribution of Vegetables.*

1777. *The social and antisocial habits of plants are among their most remarkable characteristics. Like animals, they live in two classes: the one class grows alone and scattered, as *Solanum Dulcamara*, *Lýchnis dioica*, *Polygonum Bistorta*, *Phalangium Liliago*, &c. The other class unites in society, like ants or bees, covers immense surfaces, and excludes other species, such as *Fragaria vesca*, *Vaccinium Myrtillus*, *Polygonum aviculare*, *Aira canescens*, *Pinus sylvestris*, &c. Barton states that the *Mitchella repens* is the plant most extensively spread in North America, occupying all the ground between the 28° and 69° of north latitude. The *Arbutus Uva-ursi* extends from New Jersey to the 72° of latitude. On the contrary, *Gordonia*, *Franklinia*, and *Dionea Muscipula*, are found isolated in small spots. Associated plants are more common in the temperate zones than in the tropics, where vegetation is less uniform and more picturesque. In the temperate zones, the frequency of social plants, and the culture of man, has rendered the aspect of the country comparatively monotonous. Under the tropics, on the contrary, all sorts of forms are united; thus cypresses and pines are found in the forests of the Andes of Quindiu, and of Mexico; and bananas, palms, and bamboos in the valleys. But green meadows and the season of spring are wanting in the south, for nature has reserved gifts for every region. "The valleys of the Andes," Humboldt observes, "are ornamented with bananas and palms; on the mountains are found oaks, firs, barberries, alders, brambles, and a crowd of genera believed to belong only to countries of the north. Thus the inhabitant of the equinoctial regions views all the vegetable forms which nature has bestowed around him on the globe; and earth develops to his eyes a spectacle as varied as the azure vault of heaven, which conceals none of its constellations." The people of Europe do not enjoy the same advantage. The languishing plants, which, from a love of science, or from luxury, are cultivated in our hot-houses, present only a shadow of the majesty of equinoctial vegetation; but by the richness of our language, we paint those countries to the imagination, and individual man feels a happiness peculiar to civilisation.*

1778. *The features of many plants are so obvious and characteristic as to strike every general observer. The Scitamineæ, tree-heaths, firs and pines, Mimosæ, climbers, Cactææ, grasses, lichens, mosses, palms, Equisetaceæ, arums, *Pothos*, *Dracontium*, *Mal-**

vaceæ, Orchidææ, Liliææ, &c., form remarkable groups, distinguishable at first sight. Of these groups, the most beautiful are the palms, Scitamineæ, and Liliææ, while the Gramineæ include the bamboos, and the Musææ the plantains, the most splendid of umbrageous plants.

1779. *The native countries of plants may often be discovered by their features, in the same manner as the national distinctions which are observable in the looks and colour of mankind, and which are effected chiefly by climate.* Asiatic plants are remarkable for their superior beauty; African plants for their thick and succulent leaves, as in the case of the Cacti; and American plants for the length and smoothness of their leaves, and for a sort of singularity in the shape of the flower and fruit. The flowers of European plants are but rarely beautiful, a great proportion of them being amentaceous. Plants indigenous to polar and mountainous regions are generally low, with small compressed leaves, but with flowers large in proportion. Plants indigenous to New Holland are distinguishable for small and dry leaves, that have often a shrivelled appearance. In Arabia they are low and dwarfish; in the Archipelago they are generally shrubby, and furnished with prickles; while in the Canary Islands, many plants, which in other countries are merely herbs, assume the port of shrubs and trees. The shrubby plants of the Cape of Good Hope and New Holland exhibit a striking similarity, as also the shrubs and trees of the northern parts of Asia and America, which may be exemplified in the *Plátanus orientális* of the former, and in *Plátanus occidentális* of the latter, as well as in *Fágus sylvática* and *Fágus ferrugínea*, or *Acer cappadóciūm* and *Acer saccharinum*; and yet the herbs and under shrubs of the two countries do not in the least correspond. "A tissue of fibres," Humboldt observes, "more or less loose—vegetable colours more or less vivid, according to the chemical mixture of their elements, and the force of the solar rays—are some of the causes which impress on the vegetables of each zone their characteristic features."

1780. *The influence of the general aspect of vegetation on the taste and imagination of a people*—the difference in this respect between the monotonous oak and pine forests of the temperate zones, and the picturesque assemblages of palms, mimosæ, plantains, and bamboos of the tropics—the influence of the nourishment, more or less stimulant, peculiar to different zones, on the character and energy of the passions;—these, Humboldt observes, unite the history of plants with the moral and political history of man.

CHAP. VIII.

Origin of Culture, as derived from the Study of Vegetables.

1781. *Agriculture and gardening* are the two arts which embrace the whole business of cultivating vegetables, for whatever purpose they are applied by civilised man, and in this respect their fundamental principles are the same; they are all indicated by nature, and explained by vegetable chemistry and physiology.

1782. *The object of vegetable culture* is to multiply plants; to increase their number and retain their native qualities; to increase their number and improve their qualities; to increase their magnitude; to increase their number, improve the quality, and increase the magnitude of particular parts of the vegetable; to form new varieties for the furtherance of all or any of the above purposes; to propagate and preserve from degenerating approved varieties of vegetables; and to preserve vegetables for future use. The first step for all these objects in common, is to procure the desired plant, either by removing it in an entire state from its native site, and planting it in an appropriate situation; or by gathering and sowing its seeds; or by propagating from a part of the plant. Hence the general origin both of agriculture and gardening, and of all the different modes of propagation, transplanting, and collecting seeds. The next step is to secure the plants to be cultivated from the depredations of animals or unsuitable weather, either by surrounding them with an adequate barrier where they are growing fortuitously, or by removing them to a spot already protected. Hence the origin of fences and enclosures, and plant habitations. A third step, common to all the above objects of culture, is to remove from the vicinity of the plant to be cultivated, or from the plant itself, all other plants, or animals, or objects likely to impede its progress. Hence the origin of weeding, thinning, destroying insects, and curing diseases.

1783. *To increase the number and retain the native qualities of vegetables*, it is necessary to imitate, as exactly as circumstances will admit, their native habitation, in respect to soil, climate, mode of watering, light, &c. If the habitation is in any way ameliorated, the qualities of the plant will be altered, and its parts enlarged, which is not desired. All that is necessary, therefore, for effecting this branch of culture, is to imitate the habitation, and to propagate. This is, or ought to be, the case, wherever plants are grown for medical or botanical purposes, as in herb and botanic gardens.

Nature is here imitated as exactly as possible; and the result is, productions resembling, as nearly as possible, those of nature.

1784. *To increase the number and improve the qualities of plants*, it is necessary to facilitate their mode of nutrition by removing all obstacles to the progress of the plant. These obstacles may either exist under or above the surface; and hence the origin of draining, clearing from surface-incumbrances, and the various operations, as digging, ploughing, &c., employed for pulverising the soil. Nature suggests this in accidental ruptures of the surface, broken banks, the alluvial depositions from overflowing rivers, and the earth thrown up by underground animals. Many of the vegetables within the influence of such accidents are destroyed, but such as remain are ameliorated in quality; and the reason is, their food is increased, because, their roots being enabled to take a more extensive range, more is brought within their reach.

1785. *It is necessary, or at least advantageous, to supply food artificially*; and hence the origin of manuring. All organised matters are capable of being converted into the food of plants; but the best manure for ameliorating the quality, and yet retaining the peculiar chemical properties of plants, must necessarily be decayed plants of their own species. It is true, that plants do not differ greatly in their primary principles, and that a supply of any description of putrescent manure will cause all plants to thrive; but some plants, such as wheat, contain peculiar substances (as gluten and phosphate of lime), and those manures (as that of animals, or that formed of decayed wheat), both of which contain the same substances, must necessarily be the best food or manure for such plants. Manuring is an obvious imitation of the operations of nature, every where observable by the decaying herbage of herbaceous plants, or the fallen leaves of trees, rotting into dust or vegetable mould about their roots: and by the effect of the dung left by pasturing or other animals.

1786. *The amelioration of climate* is advantageous, in improving the qualities of vegetables, by increasing or diminishing its temperature according to the nature of the plant; unless, indeed, it be situated in a climate which experience and observation show to be exactly suited to its nature. Hence the origin of shelter and shade, by means of walls, hedges, or strips of plantation; of sloping surfaces or banks, to receive more directly or indirectly the rays of the sun; of soils better calculated to absorb and retain heat; walls fully exposed to the south, or to the north; of training or spreading out the branches of trees on those walls; of hot-walls; of hot-beds; and, finally, of all the variety of hot-houses. Nature also suggests this part of culture, by presenting, in every country, different degrees of shelter, shade, and surface, and in every zone different climates.

1787. *The regulation of moisture* is the next point demanding attention; for when the soil is pulverised, it is more easily dried by the penetration of the air; when an increase of food is supplied, the medium through which that food is taken up by the plant should be increased; and when the temperature is increased, evaporation becomes greater. Hence the origin of watering by surface or subterraneous irrigation, manual supplies to the root, showering over the leaves, steaming the surrounding atmosphere, &c. This is only to imitate the dews and showers, streams and floods of nature; and it is to be regretted that the imitation is in most countries attended with so much labour, and requires so much nicety in the arrangement of the means, and judgment in the application of the water, that it is but very partially applied by man in every part of the world, excepting, perhaps, a small district of Italy. But moisture may be excessive; and from certain soils at certain seasons, and from certain productions at particular periods of their progress, it may be necessary to carry off a great part of the natural moisture, rather than to let it sink into the earth, or to draw it off where it has sunk in and injuriously accumulated, or to prevent its falling on the crop at all; and hence the origin of surface-drainage by ridges, and of under-draining by covered conduits, or gutters; and of awnings and other covers to keep off the rain or dews from ripe fruits, seeds, or rare flowers.

1788. *The regulation of light* is the remaining point. Light sometimes requires to be excluded, sometimes to be modified, and sometimes to be increased, in order to improve the qualities of vegetables; and hence the origin of thinning the leaves which overshadow fruits and flowers, the shading of cuttings, seeds, &c., and the practice of blanching. The latter practice is derived from accidents observable among vegetables in a wild state, and its influence on their quality is physiologically accounted for by the obstruction of perspiration, and the prevention of the chemical changes effected by light on the epidermis.

1789. *To increase the magnitude of vegetables*, without reference to their quality, it is necessary to afford them an increased supply of all the ingredients of food, distributed in such a body of well pulverised soil as the roots can reach to: and of heat and moisture: they should also be partially excluded from the direct rays of the sun, so as to moderate perspiration; and from the wind, so as to prevent sudden desiccation. But experience alone can determine what plants are best suited for this, and to what extent the practice can be carried. Nature gives the hint in the occasional luxuriance of plants acci-

dentally placed in favourable circumstances; man adopts it, and, improving upon it, produces cabbages and turnips of half a cwt.; apples of one pound and a half; and cabbage-roses of four inches in diameter; productions which may in some respects be considered as diseased, as it were plethorically.

1790. *To increase the number, improve the quality, and increase the magnitude of particular parts of vegetables,* it is necessary to remove such parts of the vegetable as are not wanted, such as the blooms or bulbous or tuberous rooted plants, when the bulbs are to be increased, and the contrary; the over-luxuriant wood-shoots and leaf-buds of fruit-trees; the flower-stems of tobacco; the male flowers and barren runners of the cucumber tribe, &c. Hence the important operations of pruning, ringing, cutting off large roots, and other practices for improving fruits, and throwing trees into a bearing state. At first sight these practices do not appear to be copied from nature; but, independently of accidents by fire, already mentioned, which both prune and manure, and of fruit-bearing trees, say thorns or oaks, which when partially torn up by the roots by high winds, or washed out of the soil by torrents, always bear better afterwards, why may not the necessity that man was under, in a primitive state of society, of cutting or breaking off the branches of trees, to form huts, fences, or fires, and the consequent vigorous shoots produced from the parts where the amputation took place, or the larger fruit on that part of the tree which remained, have given the first idea of pruning, cutting off roots, &c.? It may be said that this is not nature, but art; but man, though an improving animal, is still in a state of nature, and all his practices, in every stage of civilisation, are as natural to him as those of the other animals are to them. Cottages and palaces are as much natural objects as the nests of birds, or the burrows of quadrupeds; and all the laws and institutions by which social man is guided in his morals and politics, are no more artificial than the instinct which congregates sheep and cattle in flocks and herds, and guides them in their choice of pasturage and shelter.

1791. *To form new varieties of vegetables,* as well as of flowers and of useful plants of every description, it is necessary to take advantage of their sexual differences, and to operate in a manner analogous to crossing the breed in animals. Hence the origin of new sorts of fruits. Even this practice is but an imitation of what takes place in nature by the agency of bees and other insects, and the wind; all the difference is, that man operates with a particular end in view, and selects individuals possessing the particular properties which he wishes to perpetuate or improve. New varieties, or rather subvarieties, are formed by altering the habits of plants; by dwarfing through want of nourishment; variegating by arenaceous soils; and in giving, or rather continuing peculiar habits when formed by nature, as in propagating from monstrosities — fasciculi of shoots, weeping shoots, shoots with peculiar leaves, flowers, fruit, &c.

1792. *To propagate and preserve from degeneracy approved varieties of vegetables,* it is in general necessary to have recourse to the different modes of propagating by extension. Thus, choice apples and tree fruits are preserved and multiplied by grafting; others, as the pine-apple, by cuttings or suckers; choice carnations by layers, potatoes by cuttings of the tubers, &c. But approved varieties of annuals are in general multiplied and preserved by selecting seed from the finest specimens, and paying particular attention to supply suitable culture. This part of culture is the farthest removed from nature; yet there are, notwithstanding, examples of the fortuitous graft; of accidental layers; of leaves (as of the *Cardamine pratensis*), or detached portions, forming natural cuttings, dropping and taking root.

1793. *The preservation of vegetables for future use* is effected by destroying or rendering dormant the principle of life, and by warding off, as far as practicable, the progress of chemical decomposition. Hence the herbs, or roots, or fruits of some vegetables, are dried; others are placed beyond the reach of the active principles of vegetation, viz. heat and moisture, — as seeds, cuttings, scions, roots, and fruits; and some are, in addition, excluded from the air, or placed in very low temperatures. The origin of these practices are all obvious imitations of what actually takes place in nature, from the withered grassy tussock to the hedgehog's winter store; and hence the origin of herb, seed, fruit, and root rooms and cellars, and packing plants and seeds for sending them to a distance.

1794. *The whole of gardening, as an art of culture,* is but a varied developement of the above fundamental practices, all founded in nature, and for the most part rationally and satisfactorily explained on chemical and physiological principles. Hence the great necessity of the study of botany to the cultivator; not in the limited sense in which the term is often taken, as including mere nomenclature and classification, but in that extended signification of which we have endeavoured, in this chapter, to present a general outline. Those who would enter more minutely into the subject will have recourse to the excellent works of Lindley, and in particular to his *Outlines of the Principles of Horticulture*; to Sir J. E. Smith's *Introduction to Botany*; and to the elementary works of De Candolle and Richard.

BOOK II.

OF THE STUDY OF THE NATURAL AGENTS OF VEGETABLE GROWTH AND CULTURE.

1795. *The composition and nature of material bodies, and the laws of their changes, form the next step in the study of the science of gardening.* The earthy matters which compose the surface of the globe, the air and light of the atmosphere, the water precipitated from it, the heat and cold produced by the alternation of day and night, and by chemical composition and resolution, include all the elements concerned in vegetation. We shall consider in succession Earths and Soils, Manures, and the Atmosphere; drawing our resources for the first two chapters almost entirely from *Davy's Agricultural Chemistry*, and for the third from various works.

CHAP. I.

Of Earths and Soils.

1796. *Earths are the productions of the rocks which are exposed on the surface of the globe, and soils are earths mixed with more or less of the decomposed organised matter afforded by dead plants and animals.* Earths and soils, therefore, must be as various as the rocks which produce them; and hence to understand their nature and formation it is necessary to begin by considering the geological structure of the territorial surface, and the manner in which earths and soils are produced. We shall next consider in succession the Nomenclature, Quality, Use, and Improvement of Soils.

SECT. I. *Of the Geological Structure of the Globe, and the Formation of Earths and Soils.*

1797. *The crust of our earth, when examined, will be found to be composed of various stony bodies, differing in their structure and composition.* Some of these are arranged in *strata* of greater or less regularity, and more or less inclined to the horizon; others show no marks of stratification, but constitute large mountain masses, without any definite shape, or fill up fissures in other rocks, forming *veins*. Some rocks show an evident compound or aggregated structure; others appear, to the naked eye, of a uniform texture: some stony bodies contain undoubted remains of animals and vegetables, which chiefly belong to species of organised beings no longer known to exist in a living state; other rocks are always destitute of every trace of organised remains. These peculiarities have given rise to different classifications of rocks. One sect of geologists divide rocks into *simple* and *compound*; and again subdivide these classes according as the structure of the rock is *compact, granular, slaty, porphyritic, or amygdaloidal*. The greatest number of geologists, however, are not satisfied with this arrangement, but have ventured to speculate on the relative age or era of the formation of the different kinds of rock. The data on which they proceed are, chiefly, the presence or absence of organic remains, and the superposition of one kind of rocky bed on another. All geologists are agreed in considering stratified rocks as arranged and deposited by the agency of water, and therefore the relative age of such rocks may be generally inferred from their relative position; but philosophers differ both with regard to the origin and era of the unstratified rocks, and also of the minerals which occupy veins. It is not our business here to enter into this discussion, but we shall content ourselves by a slight sketch of the most generally received arrangement of rocks, which, though it involves theoretic considerations, is convenient to the student of mineralogy. The crust of our globe may be considered as composed of five series of rocks: primitive, transition, *floëtz*, alluvial, and volcanic.

1798. *Primitive rocks.* These, from the absence of organic remains, are conceived to have been deposited, in their present situation, before the creation of animals, and, from most usually lying below other rocks, are supposed to be the most ancient. Of these the chief species are *granite* (including *syenite*), *gneiss*, *mica slate* (including *talc slate*), *clay slate*, *primitive limestone*, *primitive trap*, *serpentine*, *quartz rock*, and some kinds of *porphyry*.

1799. *Rocks of transition.* In these a few organic remains occur, but neither frequently nor in large quantity. They are supposed to have obtained their present form during the transition of the surface of the earth from a chaotic to a habitable state. The principal members of this series are *greywacke*, one kind of *limestone*, and occasionally most of the rocks of the first series.

1800. *Floëtz rocks* are so named from their generally occurring in nearly horizontal strata. They were formerly termed *secondary*, in contradistinction to the primitive series, and they constitute the *terrain secondaire* of the French geologists. The principal

rocks of this class are *sandstone* or *freestone*, which appears to be of different ages, though comprehended still in the *floëts* series; *limestone* (including *alpine limestone*, *magnesian limestone*, *oolite*, *chalk*, *gypsum*, and the calcareous beds of the Paris basin), *coal*, and the accompanying rocks of our great coal-fields; *trap rocks*, including *basalt*, *wacke*, and the great body of kindred rocks, which often form the summits of considerable hills.

1801. *Alluvial deposits*, chiefly consisting of beds of clay, sand, gravel, and some cemented rocks. The first three formations appear to be universally distributed over the globe, and are supposed to owe their formation to causes acting before the land had yet appeared above the waves. The alluvial formations are conceived to be produced by the action of water on the rocks already mentioned.

1802. *Volcanic rocks*. Of this series different kinds of lava, scoria, puzzuolana, &c. are undoubted members; and most geologists now include in it certain varieties of *trap*, *trachyte*, *obsidian*, and *pumice*; while others are disposed to consider all trap rocks, and even granite, as the products of either recent or ancient volcanic fire, acting under the modifying circumstance of pressure. All the members of these formations are not every where to be found: sometimes one or more species of rock may be wanting in the series; but a skilful geologist can generally detect a wonderful degree of regularity in the superposition of strata, which, to an unpractised eye, present only a mass of confusion.

1803. *The relative situation of these rocks in Britain is as follows*:—The primitive rocks are usually observed constituting a portion of the most elevated parts of the surface of the earth; the rocks of transition usually form the less elevated ridges; the *floëts* rocks, with alluvial matter, generally constitute the bases of plains, or of an *undulated* country. The two latter formations constitute by far the greatest portion of England and the low parts of Scotland: the mountains of Cumberland and Wales are chiefly composed of rocks of transition, while Cornwall and the Highlands of Scotland have generally a basis of primitive rocks, over which some rocks of the transition series are occasionally *super-imposed*.

1804. *The surface earth*, or that which forms the outer coating of the dry parts of the globe, is formed by the detritus, or worn off parts of rocks and rocky substances. For in some places, as in chasms and vacuities between rocky layers or masses, earth occupies many feet in depth; and in others, as on the summits of chalk hills or granite mountains, it hardly covers the surface.

1805. *Earths are therefore variously composed*, according to the rocks or strata which have supplied their particles. Sometimes they are chiefly formed from slate-rocks, as in blue clays; at other times from sandstone, as in siliceous soils; and mostly of a mixture of clayey, alaty, and limestone rocks, blended in proportions as various as their situations. Such we may suppose to have been the state of the surface of the dry part of the globe immediately after the last disruption of its crust; but in process of time the decay of vegetables and animals forms additions to the outer surface of the earths, and constitute what are called *soils*; the difference between which and earths is, that the former always contain a portion of vegetable or animal matter.

1806. *The manner in which rocks are converted into soils*, Sir H. Davy observes (*Elem. of Agric. Chem.* 188.), may be easily conceived by referring to the instance of soft granite, or porcelain granite. This substance consists of three ingredients—quartz, feldspar, and mica. The quartz is almost pure siliceous earth in a crystalline form. The feldspar and mica are very compounded substances; both contain silica, alumina, and oxide of iron; in the feldspar there is usually lime and potassa; in the mica, lime and magnesia. When a granite rock of this kind has been long exposed to the influence of air and water, the lime and the potassa contained in its constituent parts are acted upon by water or carbonic acid; and the oxide of iron, which is almost always in its least oxidised state, tends to combine with more oxygen: the consequence is, that the feldspar decomposes, and likewise the mica; but the first the most rapidly. The feldspar, which is as it were the cement of the stone, forms a fine clay: the mica, partially decomposed, mixes with it as sand; and the undecomposed quartz appears as gravel, or sand of different degrees of fineness. As soon as the smallest layer of earth is formed on the surface of a rock, the seeds of lichens, mosses, and other imperfect vegetables which are constantly floating in the atmosphere, and which have made it their resting-place, begin to vegetate; their death, decomposition, and decay, afford a certain quantity of organisable matter, which mixes with the earthy materials of the rock; in this improved soil more perfect plants are capable of subsisting; these in their turn absorb nourishment from water and the atmosphere; and, after perishing, afford new materials to those already provided: the decomposition of the rock still continues; and at length, by such slow and gradual processes, a soil is formed in which even forest trees can fix their roots, and which is fitted to reward the labours of the cultivator.

1807. *The formation of peaty soils* is produced from very opposite causes, and it is interesting to contemplate how the same effect may be produced by different means, and

that the earth which supplies almost all our wants may become barren alike from the excessive application of art, or the utter neglect of it. Continual pulverisation and cropping, without manuring, will certainly produce a hungry barren soil; and the total neglect of fertile tracts will, from their accumulated vegetable products, produce peat soils and bogs. Where successive generations of vegetables have grown upon a soil, Sir H. Davy observes, unless part of their produce has been carried off by man, or consumed by animals, the vegetable matter increases in such a proportion, that the soil approaches to a peat in its nature: and if in a situation where it can receive water from a higher district, it becomes spongy and permeated with that fluid, and is generally rendered incapable of supporting the nobler classes of vegetables.

1808. *Spurious peaty soil.* Lakes and pools are sometimes filled up by the accumulation of the remains of aquatic plants; and in this case a sort of spurious peat is formed. The fermentation in these cases, however, seems to be of a different kind. Much more gaseous matter is evolved; and the neighbourhood of morasses, in which aquatic vegetables decompose, is usually aguish and unhealthy; whilst that of the true peat, or peat formed on soils originally dry, is always salubrious.

1809. *Soils may generally be distinguished from mere masses of earth by their friable texture and dark colour, and by the presence of some vegetable fibre or carbonaceous matter.* In uncultivated grounds, soils occupy only a few inches in depth on the surface, unless in crevices, where they have been washed in by rains; and in cultivated soils their depth is generally the same as that to which the implements used in cultivation have penetrated.

SECT. II. Classification and Nomenclature of Soils.

1810. *Systematic order and an agreed nomenclature* are as necessary in the study of soils as in that of plants or animals. The number of provincial terms for soils which have found their way into the books on cultivation is one reason why so little use can be made of their directions.

1811. *A correct classification of soils* may be founded on the presence or absence of organic and inorganic matter in their basis. This will form two grand classes, viz. *primitive soils*, or those composed entirely of inorganic matter, and *secondary soils*, or those composed of organic and inorganic matter in mixtures. These classes may be subdivided into orders founded on the presence or absence of saline, metallic, and carbonic matter. The orders may be subdivided into genera founded on the prevailing earths, salts, metals, or carbon; the genera into species founded on their different mixtures; the species into varieties founded on colour, or texture; and subvarieties founded on moisture, dryness, richness, lightness, &c.

1812. *In naming the genera of soils*, the first thing is to discover the prevailing earth or earths; either the simple earths, as clay, lime, sand; or the particular rocks from which the soil has been produced, as granite, basalt, &c. When one earth prevails, the generic name should be taken from that earth, as clayey soil, calcareous soil, &c.; when two prevail to all appearance equally, then their names must be conjoined in naming the genus, as clay and sand, lime and clay, basalt and sand, &c. The great thing is precision in applying the terms. Thus, as Sir H. Davy has observed, the term sandy soil should never be applied to any soil that does not contain at least seven eighths of sand; sandy soils which effervesce with acids should be distinguished by the name of calcareous sandy soil, to distinguish them from those that are siliceous. The term clayey soil should not be applied to any land which contains less than one sixth of impalpable earthy matter, not considerably effervescing with acids; the word loam should be limited to soils containing at least one third of impalpable earthy matter, copiously effervescing with acids. A soil, to be considered as peaty, ought to contain at least one half of vegetable matter. In cases where the earthy part of a soil evidently consists of the decomposed matter of one particular rock, a name derived from the rock may with propriety be applied to it. Thus, if a fine red earth be found immediately above decomposing basalt, it may be denominated basaltic soil. If fragments of quartz and mica be found abundant in the materials of the soil, which is often the case, it may be denominated granitic soil; and the same principles may be applied to other like instances. In general, the soils, the materials of which are the most various and heterogeneous, are those called alluvial, or which have been formed from the depositions of rivers; and these deposits may be designated as siliceous, calcareous, or argillaceous; and in some cases the term saline may be added as a specific distinction, applicable, for example, at the mouths of rivers, where their alluvial remains are overflowed by the sea.

1813. *In naming the species of soils*, greater nicety is required to determine distinctions than in naming the genera; and there is also some difficulty in applying or devising proper terms. The species are always determined by the mixture of matters, and never by the colour or texture of that mixture, which belongs to the nomenclature of varieties. Thus a clayey soil with sand is a sandy clay; this is the name of the species: if the mass

is yellow, and it is thought worth while to notice that circumstance, then it is a yellow sandy clay, which express at once the genus, species, and variety. A soil containing equal parts of clay, lime, and sand, would, as a generic term, be called clay, lime, and sand; if it contained no other mixture in considerable quantity, the term entire might be added as a specific distinction; and if notice was to be taken of its colour or degree of comminution, it might be termed a brown, a fine, a coarse, a stiff, or a free entire clay, lime, and sand.

SECT. III. *Of discovering the Qualities of Soils.*

1814. *The value of soils to the cultivator* is discoverable botanically, chemically, and mechanically; that is, by the plants that grow on them naturally; by chemical analysis; and by their sensible qualities of roughness, smoothness, taste, smell, and fracture.

SUBJECT. 1. *Of discovering the Qualities of Soils by means of the Plants which grow on them.*

1815. *Plants are the most certain indicators of the nature of a soil*; for while no practical cultivator would engage with land of which he knew only the results of a chemical analysis, or examined by the sight and touch a few bushels which were brought to him, yet every one, who knew the sort of plants it produced, would be at once able to decide as to its value for cultivation.

1816. *The leading soils for the cultivator* are the clayey, calcareous, sandy, ferrugineous, peaty, saline, moist or aquatic, and dry. The following are the plants by which such soils are distinguished in most parts of Europe:—

1817. *Argillaceous.* Common coltsfoot (*Tussilago Fáfara*); goose tansy (*Potentilla Anserina*), silvery (argentea), and creeping (réptans); yellow meadow rue (*Thalictrum flavum*); *Arex*, many species; *Juncus*, various species; tuberous bitter vetch (*Orobis tuberosus*); greater bird's-foot trefoil (*Lotus major*), and crow-footed (corniculatus); official soapwort (*Saponaria officinalis*): but the *Tussilago Fáfara* is a certain and universal sign of an argillaceous soil, and is the chief plant found on the alum grounds of Britain, France, and Italy.

1818. *Calcareous.* Spiked speedwell (*Verónica spicata*), little bedstraw (*Galium pusillum*), official growmwell (*Lithospermum officinale*) and purple-blue (purpureo-ceruleum), clustered bell-flower (*Campanula glomerata*), hybrid prismatocarpus (*Prismatocarpus hybridus*), round-headed rampion (*Phyteuma orbiculare*), lychnitis mullein (*Verbascum Lychnitis*), wayfaring tree (*Viburnum Lantana*), common berberry (*Berberis vulgaris*), common dwarf sun rose (*Helianthemum vulgare*), common pulsatilla anemone (*Anemone Pulsatilla*), white vine, virgin's bower, or traveller's joy (*Clematis Vitalba*), cultivated saintfoin (*Onobrychis sativa*).

1819. *Siliceous.* Three-leaved speedwell (*Verónica triphyllos*) and vernal (vérna), Italian viper's bugloss (*Echium italicum*), smooth rupture-wort (*Herniaria glabra*) and hairy (hirsuta), English catchfly (*Silene anglica*) and other species, red sandwort (*Arenaria rubra*), &c., corn-field spurrey (*Spergula arvensis*), hybrid poppy (*Papaver hybridum*), argemone, &c.

1820. *Ferrugineous.* Common sorrel (*Rumex Acetosa*) and sheep's sorrel (*Acetosella*).

1821. *Peaty.* Bilberry (*Vaccinium Myrtillus*), bleaberry (*uliginosum*), cranberry (*Oxycoccus palustris*), heath (*Erica*) 4 sp., awl-leaved spurrey (*Spergula subulata*), official septfoil (*Tormentilla officinalis*).

1822. *Saline.* Glasswort (*Salicornia*) 4 species, marine wrackgrass (*Zostera marina*), sea ruppia (*Ruppia maritima*), sea lung-wort (*Pulmonaria maritima*), soldanella bearbind (*Calystegia Soldanella*), whorled knotgrass (*Ilécebrum verticillatum*), sea goosefoot (*Chenopodium maritimum*) and shrubby (fruticosum), kali saltwort (*Salsola Kali*), whorl-leaved honeywort (*Sison verticillatum*), marine sandwort (*Arenaria marina*), &c., fringed orache (*Atriplex laciniata*).

1823. *Aquatic.* Marsh marigold (*Caltha palustris*), common mare's-tail (*Hippuris vulgaris*), common butterwort (*Pinguicula vulgaris*), European water-borehound (*Lycopus europæus*), diocious valerian (*Valeriana dioica*), water violet (*Hottônia palustris*), Valerandi's brookweed (*Samolus Valerandi*), marsh thyselinum (*Thyselinum palustre*), square-stalked epilobium (*Epilobium tetragdnum*), willow lythrum (*Lythrum Salicaria*), tongue-leaved crowfoot (*Ranunculus Lingua*) and spearwort (*Flammula*).

1824. *Very dry.* Red sandwort (*Arenaria rubra*), sheep's sorrel (*Rumex Acetosella*), wild thyme (*Thymus Serpyllum*), common acynos (*Acynos vulgaris*), field trefoil (*Trifolium arvense*).

1825. *These plants are not absolutely to be depended on*, however, even in Britain; and in other countries they are sometimes found in soils directly opposite. Still, the cultivated saintfoin (*Onobrychis sativa*) is almost always an indication of a calcareous soil; the common coltsfoot (*Tussilago Fáfara*), of blue clay; the red sandwort (*Arenaria*

rùbra), of poor sand; and the sheep's sorrel (*Rumex Acetosella*), of the presence of iron, or of peat. The common reed (*Phragmites communis*) and the amphibious polygonum (*Polygonum amphibium*) grow on alluvial soils, which yield excellent crops if properly drained; but where the corn horse-tail (*Equisetum arvense*) grows freely, it indicates a cold and retentive subsoil. The corn-field pimpernel (*Anagallis arvensis*), the corn-field madder (*Sherardia arvensis*), the corn-field gromwell (*Lithospermum arvense*), and the salad lamb's lettuce (*Valerianella olitoria*), grow on cultivated lands, where the soil is a strong black loam on a dry bottom; when such a soil is wet, the clown's all-heal (*Stachys palustris*) makes its appearance. A light sandy soil is known by the presence of the purple archangel (*Lamium purpureum*); the shepherd's purse (*Capsella bursa pastoris*). If the parakey piert (*Alchemilla Aphanes*) is found, the soil is rather unproductive; if the corn-field spurrey (*Spérgula arvensis*) grows very thick, the ground has likely been rendered too fine by the harrow; the common ragwort (*Senecio Jacobaeae*), and the cornfield cirsium (*Cirsium arvense*), grow indiscriminately on light and strong loams, but always indicate a fertile soil. The vernal draba (*Draba verna*) and the annual knawel (*Scleranthus annuus*) grow on soils that are dry, sandy, and poor in the extreme. The spiny rest-harrow (*Ononis spinosa*) is often found on dry pasture, and where the soil is incumbent on rotten rock. The aquatic, peaty, and saline soils are almost every where indicated by their appropriate plants; a proof, as we have before stated, that the climate and natural irrigation of plants have much more influence on their habits than mere soil. (*Galpine's Compendium*; *Flora Brit.*; *Loudon's Hortus Brit.*; *Kent's Hints*; *Farmer's Mag.* Feb. 1819; and the *Quarterly Journal of Agric.* for Aug. 1828.)

SUBSECT. 2. Of discovering the Qualities of Soils by Chemical Analysis.

1826. *Chemical analysis is much too nice an operation for general purposes.* It is not likely that many practical cultivators will ever be able to conduct the analytic process with sufficient accuracy, to enable them to depend on the result: but, still, such a knowledge of chemistry as shall enable the cultivator to understand the nature of the process and its results, when made and presented to him by others, is likely to be highly useful, and ought to be acquired by every man whose object is to join theoretical to practical knowledge. If it so happens that he can perform the operations of analysis himself, so much the better, as far as that point is concerned; but, on the whole, such knowledge and adroitness are not to be expected from men who have so many other points demanding their attention, and who will, therefore, effect their purpose much better by collecting proper specimens of the soils to be studied, and sending them for analysis to a respectable operative chemist.

1827. *In selecting specimens,* where the general nature of the soil is to be ascertained, portions of it should be taken from different places, two or three inches below the surface, and examined as to the similarity of their properties. It sometimes happens, that upon plains, the whole of the upper stratum of the land is of the same kind, and in this case, one analysis will be sufficient: but in valleys, and near the beds of rivers, there are very great differences, and it now and then occurs that one part of the surface is calcareous, and another part siliceous; and in this case, and in analogous cases, the portions different from each other should be separately submitted to experiment. Soils, when collected, if they cannot be immediately examined, should be preserved in phials quite filled with them, and closed with ground glass stoppers. The quantity of soil most convenient for a perfect analysis is from two to four hundred grains. It should be collected in dry weather, and exposed to the atmosphere till it becomes dry to the touch.

1828. *The soil best suited for culture,* according to the analysis of Bergman, contains four parts of clay, three of sand, two of calcareous earth, and one of magnesia; and, according to the analysis of Fourcroy and Hassenfratz, 9216 parts of fertile soil contained 305 parts of carbon, together with 279 parts of oil; of which, according to the calculations of Lavoisier, 220 parts may be regarded as carbon: so that the whole of the carbon contained in the soil in question may be estimated at about 525 parts, exclusive of the roots of vegetables, or to about one sixteenth of its weight. Young observed that equal weights of different soils, when dried and reduced to powder, yielded by distillation quantities of air somewhat corresponding to the ratio of their values. The air was a mixture of fixed and inflammable airs, probably derived from the decomposition of water, either by the chemical affinities of the ingredients of the soil, or by the process of vegetation, while the carbonic acid or fixed air may be absorbed from the atmosphere, or produced by living vegetables under certain circumstances. Kirwan has shown in his *Geological Essays*, that the fertility of a soil depends in a great measure upon its capacity for retaining water; and if so, soils containing the same ingredients must be also equally fertile, all other circumstances being the same, though it is plain that their actual fertility will depend ultimately upon the quantity of rain that falls, because the quantity suited to a wet soil cannot be the same that is suited to a dry soil; and hence it often happens

that the ingredients of the soil do not correspond to the character of the climate. Silica exists in the soil under the modification of sand, and alumine under the modification of clay; but the one or the other is often to be met with in excess or defect. Soils in which the sand preponderates retain the least moisture, and soils in which the clay preponderates retain the most; the former are dry soils, the latter are wet soils: but it may happen that neither of them is sufficiently favourable to culture; in which case, their peculiar defect or excess must be supplied or retrenched before they can be brought to a state of fertility.

1829. *Use of the result of analysis.* In the present state of chemical science, Dr. Ure observes, no certain system can be devised for the improvement of lands, independent of experiment; but there are few cases in which the labour of analytical trials will not be amply repaid by the certainty with which they denote the best methods of melioration; and this will particularly happen, when the defect of composition is found in the proportions of the primitive earths. In supplying organic matter, a temporary food only is provided for plants, which is in all cases exhausted by means of a certain number of crops; but when a soil is rendered of the best possible constitution and texture, with regard to its earthy parts, its fertility may be considered as permanently established. It becomes capable of attracting a very large portion of vegetable nourishment from the atmosphere, and of producing its crops with comparatively little labour and expensæ. (*Dict. of Chem., art. Soil.*)

SUMMARY. 3. *Of discovering the Qualities of a Soil mechanically and empirically.*

1830. *The physical properties of soils, and some of their most important constituents relatively to the cultivator, may be ascertained to a certain extent by various and very simple means.*

1831. *The specific gravity of a soil, or the relation of its weight to that of water, may be ascertained by introducing into a phial, which will contain a known quantity of water, equal volumes of water and of soil, and this may be easily done by pouring in water till it is half full, and then adding the soil till the fluid rises to the mouth; the difference between the weight of the soil and that of the water will give the result. Thus, if the bottle contains four hundred grains of water, and gains two hundred grains when half filled with water and half with soil, the specific gravity of the soil will be 2, that is, it will be twice as heavy as water, and if it gained one hundred and sixty-five grains, its specific gravity would be 1825, water being 1000.*

1832. *The presence of clay and sand in any soil is known, the first by its tenacity, the other by its roughness to the touch, and by scratching glass when rubbed on it.*

1833. *The presence of calcareous matter in soil may be ascertained by simply pouring any acid on it, and observing if it effervesces freely. Muriatic acid is the best for this purpose. Calcareous soils, magnesian soils, and clays, are, for the most part, softer to the touch than arenaceous soils. To ascertain the quantity of calcareous earth present, dry soil thoroughly, and weigh 100 grains of it, which gradually add to one drachm of muriatic acid diluted with two drachms of water in a phial poised in a balance: the loss of weight will indicate the escape of carbonic acid, which will be 44 per cent. of the quantity of calcareous earth in the soil.*

1834. *The presence of organised matter in any soil may be ascertained very satisfactorily by weighing it after it is thoroughly dried; then subjecting it to a red heat and weighing it again, the weight so found will be the proportion of organic matter and carbonic acid gas, if there should have been any. The same object may also be attained by ascertaining the specific gravity of the soil, but with less accuracy.*

1835. *The presence of metallic oxides in a soil may generally be known by their colour. Ferruginous soils are red or yellow; cupreous soils, interspersed with greenish streaks, &c. Cupreous impregnations of soils are rare; and the usual green matter in such soils as the green sand of English geologists, appears to be coloured by iron, which is almost the only metallic impregnation in considerable quantity in any soil.*

1836. *The presence of salt, sulphur, coal, &c., may be known by the absence or peculiarity of vegetation, as well as by colour, and the appearance of the water of such soils. Saline soils may be distinguished by the taste; sulphureous soils by their smell when thrown on a hot iron; and the presence of coal by its fragments, which will be left after the soluble matters are removed by water and muriatic acid.*

1837. *The capacity of a soil for retaining water may be thus ascertained. An equal portion of two soils, perfectly dry, may be introduced into two tall glass cylindrical vessels, in the middle of each of which a glass tube has been previously placed. The soils should be put into each in the same manner, not compressed very hard, but so as to receive a solidity approaching to that which they possessed when first obtained for trial. If, after this preparation, a quantity of water be poured into the glass tubes, it will subside; and the capillary attraction of the soils will conduct it up the cylinders towards the tops of the vessels. That which conducts it most rapidly, provided it does not rise*

from the weight of the incumbent column of water in the tube, may be pronounced to be the better soil. (*Grisenthwaite.*)

SECT. IV. *Of the Uses of the Soil to Vegetables.*

1838. *Soils afford to plants a fixed abode and medium of nourishment.* Earths, exclusively of organised matter and water, are allowed by most physiologists to be of no other use to plants than that of supporting them, or furnishing a medium by which they may fix themselves to the globe. But earths and organic matter, that is, soils, afford at once support and food.

1839. *The pure earths merely act as mechanical and indirect chemical agents in the soil.* The earths all appear to be metallic bases united to oxygen: these oxides have not been completely decomposed; but there is no reason to suppose that their earthy bases are convertible into the elements of organised compounds, that is, into carbon, hydrogen, and azote. Plants have been made to grow in given quantities of earth. They consume very small portions only; and what is lost may be accounted for by the quantities found in their ashes; that is to say, it has not been converted into any new products. The carbonic acid united to lime or magnesia, if any stronger acid happens to be formed in the soil during the fermentation of vegetable matter, which will disengage it from the earths, may be decomposed; but the earths themselves cannot be supposed convertible into other substances, by any process taking place in the soil. In all cases the ashes of plants contain some of the earths of the soil in which they grow; but these earths, as has been ascertained from the ashes afforded by different plants, never equal more than one fiftieth of the weight of the plant consumed. If they be considered as necessary to the vegetable, it is as giving hardness and firmness to its organisation.

1840. *The true nourishment of plants is water and decomposing organic matter:* both these exist only in soils, not in pure earths; but the earthy parts of the soils are useful in retaining water, so as to supply it, in the proper proportions, to the roots of the vegetables; and they are likewise efficacious in producing the proper distribution of the animal or vegetable matter. When equally mixed with it, they prevent it from decomposing too rapidly; and by their means the soluble parts are supplied in proper proportions.

1841. *The soil is necessary to the existence of plants,* both as affording them nourishment, and enabling them to fix themselves in such a manner as to obey those laws by which their radicles are kept below the surface, and their leaves exposed to the free atmosphere. As the systems of roots, branches, and leaves, are very different in different vegetables, so they flourish most in different soils. Plants which have bulbous roots require a looser and a lighter soil than such as have fibrous roots. Plants possessing only short fibrous radicles demand a firmer soil than such as have tap-roots or extensive lateral roots.

1842. *The constituent parts of the soil, which give tenacity and coherence, are the finely divided matters;* and they possess the power of giving those qualities in the highest degree when they contain much alumina. A great proportion of sand, however, always produces sterility. The soil of Bagshot Heath, which is almost devoid of vegetable covering, contains less than one twentieth of finely divided matter: 400 parts of it, which had been heated red, afforded 380 parts of coarse siliceous sand; nine parts of fine siliceous sand, and eleven parts of impalpable matter, which was a mixture of ferruginous clay with carbonate of lime. Vegetable or animal matters, when finely divided, not only give coherence, but likewise softness and penetrability; but neither they nor any other part of the soil must be in too great proportion: and a soil is unproductive if it consists entirely of impalpable matters. Pure alumina or silica, pure carbonate of lime or carbonate of magnesia, are incapable of supporting healthy vegetation; and no soil is fertile that contains as much as nineteen parts out of twenty of any of these constituents.

1843. *A certain degree of friability or looseness of texture* is also required in soils, in order that the operations of culture may be easily conducted; that moisture may have free access to the fibres of the roots, that heat may be readily conveyed to them, and that evaporation may proceed without obstruction. These are commonly attained by the presence of sand. As alumina possesses all the properties of adhesiveness in an eminent degree, and siliceous those of friability, it is obvious that a mixture of these two earths, in suitable proportions, would furnish every thing wanted to form the most perfect soil, as to water and the operations of culture. In a soil so compounded, water will be presented to the roots by capillary attraction. It will be suspended in it, in the same manner as it is suspended in a sponge, not in a state of aggregation, but of minute division, so that every part may be said to be moist, but not wet. (*Grisenthwaite.*)

1844. *The water chemically combined amongst the elements of soils,* unless in the case of the decomposition of animal or vegetable substances, cannot be absorbed by the roots of plants; but that adhering to the parts of the soil is in constant use in vegetation. Indeed, there are few mixtures of the earths found in soils which contain any chemically combined

water: water is expelled from the earth by most substances which combine with them. Thus, if a combination of lime and water be exposed to carbonic acid, the carbonic acid takes the place of water: and compounds of alumina and silica, or other compounds of the earths, do not chemically unite with water: and soils, as it has been stated, are formed either by earthy carbonates, or compounds of the pure earths and metallic oxides. When saline substances exist in soils, they may be united with water, both chemically and mechanically; but they are always in too small a quantity to influence materially the relations of the soil to water.

1845. *The power of the soil to absorb water by capillary attraction* depends in great measure upon the state of division of its parts: the more divided they are, the greater is their absorbent power. The different constituent parts of soils likewise appear to act, even by cohesive attraction, with different degrees of energy. Thus, vegetable substances seem to be more absorbent than animal substances; animal substances more so than compounds of alumina and silica; and compounds of alumina and silica more absorbent than carbonates of lime and magnesia: these differences may, however, possibly depend upon the differences in their state of division, and upon the surface exposed.

1846. *The power of soil to absorb water from air* is much connected with fertility. When this power is great, the plant is supplied with moisture in dry seasons; and the effect of evaporation in the day is counteracted by the absorption of aqueous vapour from the atmosphere, by the interior parts of the soil during the day, and by both the exterior and interior during the night. The stiff clays, approaching to pipe-clays in their nature, which take up the greatest quantity of water when it is poured upon them in a fluid form, are not the soils which absorb most moisture from the atmosphere in dry weather. They cake, and present only a small surface to the air; and the vegetation on them is generally burnt up almost as readily as on sands. The soils most efficient in supplying the plant with water by atmospheric absorption, are those in which there is a due mixture of sand, finely-divided clay, and carbonate of lime, with some animal or vegetable matter, and which are so loose and light as to be freely permeable by the atmosphere. With respect to this quality, carbonate of lime, and animal and vegetable matter, are of great use in soils; they give absorbent power to the soil, without giving it likewise tenacity. Sand, which also destroys tenacity, on the contrary, gives little absorbent power. The absorbent power of soils, with respect to atmospheric moisture, is always greatest in the most fertile; so that it affords one method of judging of the productiveness of land.

1847. *The absorbent powers of soils ought to vary with the climate* in which they are situated. The absorption of moisture ought to be much greater in warm or dry countries, than in cold and moist ones; and the quantity of clay, or vegetable or animal matter, in soils, greater. Soils, also, on declivities, ought to be more absorbent than in plains or in the bottoms of valleys. Their productiveness, likewise, is influenced by the nature of the sub-soil, or the stratum on which they rest. When soils are immediately situated upon a bed of rock or stone, they are much sooner rendered dry by evaporation than where the sub-soil is of clay or marl: and a prime cause of the great fertility of the land in the moist climate of Ireland, is the proximity of the rocky strata to the soil. A clayey sub-soil will sometimes be of material advantage to a sandy soil; and in this case it will retain moisture in such a manner as to be capable of supplying that lost by the earth above, in consequence of evaporation, or the consumption of it by plants. A sandy or gravelly sub-soil often corrects the imperfections of too great a degree of absorbent power in the true soil. In calcareous countries, where the surface is a species of marl, the soil is often found only a few inches above the limestone; and its fertility is not impaired by the proximity of the rock; though, in a less absorbent soil, this situation would occasion barrenness; and the sandstone and limestone hills in Derbyshire and North Wales may be easily distinguished at a distance, in summer, by the different tints of the vegetation. The grass on the sandstone hills usually appears brown and burnt up; that on the limestone hills flourishing and green. There is a considerable difference between the sandy soils of the east and west coasts of Scotland. All along the west coast, from the Solway Frith to the Clyde, such soils are more productive than soils of a similar quality on the east coast, under the same circumstances of management. The extensive culture of potatoes, for instance, and the succession of corn crops in Dumfriesshire and Galloway, would soon reduce to a state of sterility much of the best sandy soils of Roxburghshire and the Lothians.

1848. *In a moist climate*, where the quantity of rain which falls annually, equals from forty to sixty inches, as in Lancashire, Cornwall, and some parts of Ireland, a siliceous sandy soil is much more productive than in dry districts. Even the exhausting powers of crops will be influenced by like circumstances. In cases where plants cannot absorb sufficient moisture, they must take up more manure: and in Ireland, Cornwall, and the western Highlands of Scotland, crops will exhaust less than in dry inland situations.

1849. *Many soils are popularly distinguished as cold or hot*; and the distinction, though at first view it may appear to be founded on prejudice, is really just. Some soils are

much more heated by the rays of the sun (all other circumstances being equal) than others: and soils brought to the same degree of heat, cool in different times; i. e. some cool much faster than others. This property has been very little attended to in a philosophical point of view; yet it is of the highest importance in culture. In general, soils which consist principally of a stiff white clay, are with difficulty heated; and, being usually very moist, they retain their heat but for a short time. Chalks are similar in one respect,—the difficulty with which they are heated; but, being drier, they retain their heat longer; less being consumed in causing the evaporation of their moisture. A black soil, containing much soft vegetable matter, is most heated by the sun and air; and the coloured soils, and the soils containing much carbonaceous or ferruginous matter, exposed under equal circumstances to the sun, acquire a much higher temperature than pale soils.

1850. *When soils are perfectly dry, those which most readily become heated by the solar rays likewise cool most rapidly*; but the darkest-coloured dry soil (that which contains abundance of animal or vegetable matter, substances which most facilitate the diminution of temperature), when heated to the same degree, provided it be within the common limits of the effect of solar heat, will cool more slowly than a wet pale soil entirely composed of earthy matter. Sir H. Davy "found that a rich black mould, which contained nearly one fourth of vegetable matter, had its temperature increased in an hour from 65° to 88° by exposure to sunshine; whilst a chalk soil was heated only to 69° under the same circumstances: but the mould removed into the shade, where the temperature was 69°, lost, in half an hour, 15°; whereas the chalk, under the same circumstances, had lost only 4°. We may also refer to the influence of black earth in melting snow, as practised empirically on the Alps, and tried philosophically by Franklin and Saussure. The latter placed on the top of the high Alpine mountain Cramont a box lined with black cloth, with the side next the sun closed by three panes of glass at a little distance apart the one from the other, and found the thermometer rise thirty degrees in two hours, from the concentration of the sun's rays. (*La Chymie appliquée*, &c., tom. i. 82.) A brown fertile soil and a cold barren clay were each artificially heated to 88°, having been previously dried, they were then exposed in a temperature of 57°; in half an hour the dark soil was found to have lost 9° of heat, the clay had lost only 6°. An equal portion of the clay containing moisture, after being heated to 88°, was exposed in a temperature of 55°; in less than a quarter of an hour it was found to have cooled to the temperature of the room. The soils in all these experiments were placed in small tin-plate trays, two inches square, and half an inch in depth; and the temperature was ascertained by a delicate thermometer. Thus the temperature of the surface, when bare and exposed to the rays of the sun, affords at least one indication of the degree of its fertility; and the thermometer may be sometimes a useful instrument to the purchaser or improver of lands."

1851. *The moisture in the soil and sub-soil materially affects their temperature*, and prevents, as in the case of constantly saturated aquatic soils, their ever attaining to any great degree either of heat or cold. The same observation will apply to moist peaty soils, or peat-bogs.

1852. *Chemical agency of soils*. Besides these uses of soils, which may be considered mechanical, there is, Sir H. Davy observes, another agency between soils and organisable matters, which may be regarded as chemical in its nature. The earths, and even the earthy carbonates, have a certain degree of chemical attraction for many of the principles of vegetable and animal substances. This is easily exemplified in the instance of alumina and oil; if an acid solution of alumina be mixed with a solution of soap, which consists of oily matter and potassa, the oil and the alumina will unite and form a white powder, which will sink to the bottom of the fluid. The extract from decomposing vegetable matter, when boiled with pipe-clay or chalk, forms a combination by which the vegetable matter is rendered more difficult of decomposition and of solution. Pure silica and siliceous sands have little action of this kind; and the soils which contain the most alumina and carbonate of lime are those which act with the greatest chemical energy in preserving manures. Such soils merit the appellation which is commonly given to them, of rich soils; for the vegetable nourishment is long preserved in them, unless taken up by the organs of plants. Siliceous sands, on the contrary, deserve the term hungry, which is commonly applied to them; for the vegetable and animal matters they contain, not being attracted by the earthy constituent parts of the soil, are more liable to be decomposed by the action of the atmosphere, or carried off from them by water. In most of the black and brown rich vegetable moulds, the earths seem to be in combination with a peculiar extractive matter, afforded during the decomposition of vegetables; this is slowly taken up or attracted from the earths by water, and appears to constitute a prime cause of the fertility of the soil.

1853. *Thus all soils are useful to plants*, as affording them a fixed abode and a range for their roots to spread in search of food; but some are much more so than others, as

better adapted by their constituent parts, climate, inclination of surface, and sub-soil, for attracting and supplying food.

Sect. V. *Of the Improvement of Soils.*

1854. *Soils may be rendered more fit for answering the purposes of vegetation by pulverisation, by consolidation, by exposure to the atmosphere, by an alteration of their constituent parts, by changing their condition in respect to water, by changing their position in respect to atmospherical influence, and by a change in the kinds of plants cultivated. All these improvements are independent of the application of manures.*

SUBJECT. 1. *Pulverisation.*

1855. *The mechanical division of the parts of soils is a very obvious improvement, and applicable to all in proportion to their adhesive texture. Even a free siliceous soil will, if left untouched, become too compact for the proper admission of air, rain, and heat, and for the free growth of the fibres; and strong upland clays, not submitted to the plough or the spade, will, in a few years, be found in the possession of fibrous-rooted perennial grasses, which will form a clothing on their surface, or strong tap-rooted trees, as the oak, which have forced their way through the interior of the mass. Annuals and ramose-rooted herbaceous plants cannot penetrate into such soils.*

1856. *The first object of pulverisation is to give scope to the roots of vegetables, for with-out abundance of roots no plant will become vigorous, whatever may be the richness of the soil in which it is placed. The fibres of the roots take up the extract of the soil by intro-susception; the quantity taken up, therefore, will not depend alone on the quantity in the soil, but on the number of absorbing fibres. The more the soil is pulverised, the more these fibres are increased, the more extract is absorbed, and the more vigorous does the plant become. Pulverisation, therefore, is not only advantageous previously to planting or sowing, but also during the progress of vegetation, when applied in the spaces between the plants. In the latter case it operates also in the way of pruning, and by cutting off or shortening the extending fibres, causes them to branch out into numerous others, by which the mouths or pores of the plants are greatly increased, and such food as is in the soil has the better chance of being sought after, and taken up by them. Tull and Du Hamel relate various experiments which decidedly prove that, *ceteris paribus*, the multiplication of the fibres is as the inter-pulverisation; but the strength of the vegetable, in consequence of this multiplication of fibres, must depend a good deal on the quantity of food or extract within their reach. The root of a willow tree has the fibres prodigiously increased by coming in contact with the water in a river, and so have various other aquatic plants, as alder, mint, *Lysimachia thyrisiflora*, *Caltha palustris*, *Onánthe fistulosa*, &c.; but their herbage is not proportionally increased unless the water be impregnated with organised remains.*

1857. *Pulverisation increases the capillary attraction, or sponge-like property, of soils, by which their humidity is rendered more uniform. It is evident this capillary attraction must be greatest where the particles of the earth are finely divided; for gravels and sands hardly retain water at all, while clays, not opened by pulverisation or other means, either do not absorb water, or when, by long action, it is absorbed, they retain too much. Water is not only necessary as such to the growth of plants, but it is essential to the production of extract from the vegetable matters which they contain; and unless the soil, by pulverisation or otherwise, is so constituted as to retain the quantity of water requisite to produce this extract, the addition of manures will be in vain. Manure is useless to vegetation till it becomes soluble in water, and it would remain useless in a state of solution, if it so abounded as wholly to exclude air, for then the fibres or mouths, unable to perform their functions, would soon decay and rot off. Pulverisation, in a warm season, is of great advantage in admitting the nightly dews to the roots of plants.*

1858. *The temperature of a soil is increased by pulverisation. Earths, Grisenthwaite observes, are among the worst conductors of heat with which we are acquainted, and consequently it would be a considerable time before the gradually increasing temperature of spring could communicate its genial warmth to the roots of vegetables, if the lower parts of soils were not heated by some other means. It is therefore necessary to have the surface of the soil open, that there may be a free ingress of the warm air, and tepid rain of spring.*

1859. *Pulverisation contributes to the increase of vegetable food. Water is known to be a condenser and solvent of carbonic acid gas, which, when the land is open, can be immediately carried to the roots of vegetables, and contribute to their growth; but if the land be close, and the water lie on or near its surface, then the carbonic acid gas, which always exists in the atmosphere and is carried down by rains, will soon be dissipated. An open soil is also most suitable for effecting those changes in the manure itself, which are equally necessary to the preparation of such food. Animal and vegetable substances, exposed to the alternate action of heat, moisture, light, and air, undergo spontaneous decompositions, which would not otherwise take place.*

1860. *By means of pulverisation a portion of atmospheric air is buried in the soil.* This air, so confined, is decomposed by the moisture retained in the earthy matters. Ammonia is formed by the union of the hydrogen of the water with the nitrogen of the atmosphere; and nitre, by the union of oxygen and nitrogen; the oxygen may also unite with the carbon contained in the soil, and form carbonic acid gas, and carburetted hydrogen. Heat is given out during these processes, and "hence," as Dr. Darwin remarks (*Phytologia*, sect. xii. 1.), "the great propriety of cropping lands immediately after they have been comminuted and turned over; and this the more especially, if manure has been added at the same time, as the process of fermentation will go on faster when the soil is loose, and the interstices filled with air, than afterwards, when it becomes compressed with its own gravity, the relaxing influence of rains, and the repletion of the partial vacuums formed by the decomposition of the enclosed air. The advantage of the heat thus obtained in exciting vegetation, whether in a seed or root, especially in spring, when the soil is cold, must be very considerable."

1861. *The great advantages of pulverisation deceived Tull*, who fancied that no other assistance was required in the well-management of the business of husbandry. A knowledge of chemistry, in its present improved state, would have enabled him to discover that the pulverisation of the soil was of no other benefit to the plants that grow in it than as it "increased the number of fibrous roots or mouths by which they imbibe their food, facilitated the more speedy and perfect preparation of this food, and conducted the food so prepared more regularly to their roots." Of this food it produced no part.

1862. *The depth of pulverisation*, Sir H. Davy observes, "must depend upon the nature of the soil and of the subsoil. In rich clayey soils it can scarcely be too deep; and even in sands, unless the subsoil contains some principles noxious to vegetables, deep comminution should be practised. When the roots are deep, they are less liable to be injured either by excessive rain or drought."

1863. *Pulverisation should, in all cases, be accompanied by the mixture of the parts of soils* by turning them over. It is difficult, indeed, to pulverise without effecting this end, at least by the implements in common use; but, if it could be effected, it would be injurious, because the difference of gravity between the organised matters and the earths which compose soils has a constant tendency to separate them; and stirring a soil only with forks or pronged implements, would, in a short time, leave its surface too light and spongy, and the lower part too compact and earthy.

1864. *Pulverisation of the surface of soils* serves to retain moisture in the substratum, and to prevent it from being penetrated by heat from a warmer, as well as from radiating its heat to colder, atmosphere than itself. The effect is produced by the porosity of the pulverised stratum, which may be compared to a mulching of dry loose sand. The operation is of great importance in horticulture. (*Gard. Mag.*, vol. x.)

SUBSECT. 2. *Of the Improvement of Soils by Compression.*

1865. *Mechanical consolidation* will improve some soils, such as spongy peats and light dusty sands. It is but a limited source of improvement, but still it deserves to be noticed. The proper degree of adhesiveness is best given to loose soils by the addition of earthy matters; but mere rolling and treading are not to be altogether rejected. To be benefited by rolling, a soil must be dry, and the operation must not be carried too far. A peat-bog drained and rolled will sooner become covered with grasses than one equally well drained and left to itself. Drifting sands may be well rolled when wet, and by repeating the process after rains they will, in time, acquire a surface of grass or herbage. Every cultivator knows the advantages of rolling light soils after sowing. Gardeners tread in seeds on certain soils, and roll grass lawns to improve the quality of the turf.

SUBSECT. 3. *Of the Improvement of Soils by Aeration or Fallowing.*

1866. *Soils are benefited by the free admission of the weather to their interior parts.* The precise advantages of the exposure of soil to the air, independently of the concurrent influence of water, heat, and the other effects mentioned as attendant on pulverisation, do not seem at present to be correctly ascertained. It is allowed that carbonic acid gas may be absorbed by calcareous earths, and Dr. Thomson thinks that the earths alone may thus probably administer food to plants; but Sir H. Davy seems to consider mere exposure to the atmosphere of no benefit to soils whatever. "It has been supposed by some writers," he says, "that certain principles necessary to fertility are derived from the atmosphere, which are exhausted by a succession of crops, and that these are again supplied during the repose of the land, and the exposure of the pulverised soil to the influence of the air; but this in truth is not the case. The earths commonly found in soils cannot be combined with more oxygen; none of them unite to azote; and such of them as are capable of attracting carbonic acid, are always saturated with it in those soils on which the practice of fallowing is adopted."

1867. *Aeration and repose of soils.* "The vague ancient opinion of the use of nitre, and of nitrous salts in vegetation," Sir H. Davy says, "seems to have been one of the principal speculative reasons for the defence of summer fallows. Nitrous salts are produced during the exposure of soils containing vegetable and animal remains, and in greatest abundance in hot weather; but it is probably by the combination of the azote from these remains with oxygen in the atmosphere that the acid is formed; and at the expense of an element which otherwise would have formed ammonia; the compounds of which are much more efficacious than the nitrous compounds in assisting vegetation." One obvious advantage of aeration in summer is, that the soil may thus be heated by the sun to a degree which it never could be if partially covered with the foliage of even widely scattered crops. For this purpose, if the soil is laid up in large lumps, it is evident it will receive more heat by exposing a greater surface to the atmosphere, and it will retain this heat for a period of unexpected duration, from the circumstance of the lumps reflecting back the rays of heat radiated by each other. A clayey soil, in this way, it is said (*Farmer's Magazine*, 1815) may be heated to 120°, which may in some degree alter its absorbent powers as to water, and contribute materially to the destruction of vegetable fibres, insects, and their eggs. By the aeration of lands in winter, minute mechanical division is obtained by the freezing of the water in the soil; for, as water in the solid state occupies more space than when fluid, the particles of earthy matters and of decomposing stones are thus rent asunder, and crumble down in a fine mould. Rough stony soils will thus receive an accession to their finer soil every winter. Soils which have been soured, addened, or baked by any means, during wet weather, are more speedily sweetened, as the expression is, by exposure to the sun during the hottest weather of summer, than by exposure to the frost of winter; but in summer, it is contended, that the drying influence of the sun and air exhausts the soil of its vegetable matter to such an extent as to counteract the good effects of extreme heating by the sun. Those who maintain this doctrine contend that the only use of aeration is to admit of freeing the soil of root-weeds.

SUBJECT. 4. *Alteration of the constituent Parts of Soils.*

1868. *Soils may be altered by the addition or subtraction of ingredients* in which they are deficient or superabundant, and by the chemical change of some of their constituent part or parts by the action of fire.

1869. *In ascertaining the composition of faulty soils, with a view to their improvement by adding to their constituent parts*, any particular ingredient which is the cause of their unproductiveness should be particularly attended to; if possible, they should be compared with fertile soils in the same neighbourhood, and in similar situations, as the difference of the composition may, in many cases, indicate the most proper methods of improvement. If, on washing a sterile soil, it is found to contain the salts of iron, or any acid matter, it may be ameliorated by the application of quicklime. A soil of good apparent texture, containing sulphate of iron, will be sterile; but the obvious remedy is a top-dressing with lime, which converts the sulphate into manure. If there be an excess of calcareous matter in the soil, it may be improved by the application of sand or clay. Soils too abundant in sand are benefited by the use of clay, or marl, or vegetable matter. Light sands are often benefited by a dressing of peat, and peats by a dressing of sand; though the former is in its nature but a temporary improvement. When peats are acid, or contain ferruginous salts, calcareous matter is absolutely necessary to bring them into cultivation. The best natural soils are those of which the materials have been derived from different strata, which have been minutely divided by air and water, and are intimately blended together; and in improving soils artificially, the cultivator cannot do better than imitate the processes of nature. The materials necessary for the purpose are seldom far distant; coarse sand is often found immediately on chalk, and beds of sand and gravel are common below clay. The labour of improving the texture or constitution of the soil is repaid by great permanent advantages; less manure is required, its fertility is ensured; and capital laid out in this way secures for ever the productiveness, and consequently the value, of the land.

1870. *Incineration.* The chemical changes which can be effected in soils by incineration are considerable. This practice was known to the Romans, is more or less in use in most parts of Europe, is mentioned as an approved practice by our oldest agricultural writers, and has lately excited some degree of attention from the successful experiments of different cultivators. (*Farmer's Magazine*, 1810 to 1815; and *Farmer's Journal*, 1814 to 1821.)

1871. *The theory of burning soils* is thus given by Sir H. Davy. It rests, he says, entirely on chemical doctrines. The bases of all common soils are mixtures of the primitive earths and oxide of iron; and these earths have a certain degree of attraction for each other. To regard this attraction in its proper point of view, it is only necessary to consider the composition of any common siliceous stone. Feldspar, for instance, contains

siliceous, aluminous, and calcareous earths, fixed alkali, and oxide of iron, which exist in one compound, in consequence of their chemical attractions for each other. Let this stone be ground into impalpable powder, it then becomes a substance like clay; if the powder is heated very strongly, it fuses, and on cooling forms a coherent mass similar to the original stone; the parts separated by mechanical division adhere again in consequence of chemical attraction. If the powder be heated less strongly, the particles only superficially combine with each other, and form a gritty mass, which, when broken into pieces, has the characters of sand. If the power of the powdered felspar to absorb water from the atmosphere before and after the application of the heat is estimated, it is found much less in the latter case. The same effect takes place when the powder of other siliceous or aluminous stones is made the subject of experiment; and two equal portions of basalt ground into impalpable powder, of which one half had been strongly ignited, and the other exposed only to a temperature equal to that of boiling water, gained very different weights in the same time when exposed to air. In four hours the one had gained only two grains, whilst the other had gained seven grains. When clay or tenacious soils are burnt, the effect is of the same kind; they are brought nearer to a state analogous to that of sands. In the manufacture of bricks the general principle is well illustrated; if a piece of dried brick earth be applied to the tongue, it will adhere to it very strongly, in consequence of its power to absorb water; but after it has been burnt there will be scarcely a sensible adhesion.

1872. *The advantages of burning are*, that it renders the soil less compact, less tenacious, and less retentive of moisture; and, when properly applied, may convert a matter which was stiff, damp, and, in consequence, cold; into one, powdery, dry, and warm, and much more proper as a bed for vegetable life.

1873. *The great objection made by speculative chemists to paring and burning is*, that it destroys vegetable and animal matter, or the manure in soil; but in cases in which the texture of its earthy ingredients is permanently improved, there is more than a compensation for this temporary disadvantage; and in some soils where there is an excess of inert vegetable matter, the destruction of it must be beneficial; and the carbonaceous matter remaining in the ashes may be more useful to the crop than the vegetable fibre from which it was produced.

1874. *Causes of the effects of burning soil.* Many obscure causes have been referred to for the purpose of explaining the effects of paring and burning; but they may be referred entirely to the diminution of the coherence and tenacity of clays, and to the destruction of inert and useless vegetable matter, and its conversion into a manure.

1875. *The soils improved by burning are* all such as contain too much dead vegetable fibre, and which consequently lose from one third to one half their weight by incineration; and all such as contain their earthy constituents in an impalpable state of division, i. e. the stiff clays and marls, are improved by burning; but in coarse sands, or rich soils containing a just mixture of the earths, and in all cases in which the texture is sufficiently loose, or the organisable matter sufficiently soluble, the process of torrefaction cannot be useful.

SUBJECT. 5. *Changing the Condition of Lands in respect to Water.*

1876. *The water of the soil where superabundant may be withdrawn, and when deficient supplied*: these operations with water are independent of its supply as a manure, or as affording the stimulus of heat or cold.

1877. *Stagnant water* may be considered as injurious to all land plants, by obstructing perspiration, and thus diseasing their roots and submerged parts. Where the surface-soil is properly constituted, and rests on a subsoil moderately porous, both will hold water by capillary attraction; and, what is not so retained, will sink into the interior strata by its gravity; but where the subsoil is retentive, it will resist, or not admit with sufficient rapidity, the percolation of water to the strata below, which accumulating in the surface-soil till its proportion becomes excessive as a component part, not only carries off the extractive matter, but diseases the plants. Hence the origin of surface-draining, that is, laying land in ridges or beds, or intersecting it with small open gutters.

1878. *Springs.* Where the upper stratum is porous in some places, and retentive in others, and on a retentive base, the water, in its progress along the porous bed or layer, will be interrupted by the retentive places in a great variety of ways, and there accumulating will burst through the upper surface in the form of springs, which are more injurious than surface-water, as being colder, and generally permanent in their operation. Hence the origin of under-draining in all its varieties of collecting, extracting, and conveying water.

1879. *The water of rivers* may become injurious to lands on their banks, by too frequently overflowing their surface. In this case, the stream may be included by mounds of earth or other materials impervious to water; and thus aquatic soils rendered dry and fit for useful herbage and aration. The same may be said of lands occasionally

overflowed by the sea. Hence the origin of embanking, an art carried to a great extent in Holland and Italy. (See *Smeaton's Posthumous Works*; *Sigismondi Agr. Tosc.*; *Raccolta dei Autori che trattano dell' Acque*; and our article *Embankment*, in *Supp. Encey. Brit.* 1819.)

1880. *Irrigation.* Plants cannot live without water, any more than they can prosper in soils where it is superabundant; and it is, therefore, supplied by art on a large scale, either by surface or subterraneous irrigation. In both practices the important points are to imitate nature in producing motion, and in applying the water in the mornings or evenings, or under a clouded sky, and also at moderate intervals. The effects of water constantly employed would, in most cases, be such as attend stagnated water, aquatic soils, or land-springs; and employed in hot sunshine, or after violent heats, it may check evaporation and destroy life, exactly as it happens to those who may have bathed in cold spring water after long and violent exercise in a hot day. (*Phytologia*, xv. 3. 5.)

1881. *The rationale of irrigation* is thus given by Sir H. Davy:—"In general, in nature, the operation of water is to bring earthy substances into an extreme state of division: but in the artificial watering of meadows, the beneficial effects depend upon many different causes, some chemical, some mechanical. Water is absolutely essential to vegetation; and when land has been covered by water in the winter, or in the beginning of spring, the moisture which has penetrated deep into the soil, and even the subsoil, becomes a source of nourishment to the roots of the plants in the summer, and prevents those bad effects which often happen in lands in their natural state, from a long continuance of dry weather. When the water used in irrigation has flowed over a calcareous country, it is generally found impregnated with carbonate of lime; and in this state it tends, in many instances, to ameliorate the soil. Common river water also generally contains a certain portion of organizable matter, which is much greater after rains than at other times; or which exists in the largest quantity when the stream rises in a cultivated country. Even in cases where the water used for flooding is pure, and free from animal or vegetable substances, it acts by causing a more equable diffusion of nutritive matter existing in the land; and in very cold seasons it preserves the tender roots and leaves of the grass from being affected by frost. Water is of greater specific gravity at 42° Fahrenheit, than at 32°, the freezing point; and hence, in a meadow irrigated in winter, the water immediately in contact with the grass is rarely below 40°, a degree of temperature not at all prejudicial to the living organs of plants." Water may also operate usefully in warm seasons by moderating temperature, and thus retarding the over-rapid progress of vegetation. The consequence of this retardation will be greater magnitude and improved texture of the grower parts of plants, a more perfect and ample development of their finer parts, and, above all, an increase in the size of their fruits and seeds. We apprehend this to be one of the principal uses of flooding rice-grounds in the East; for it is ascertained that the rice-plant will perfect its seeds in Europe, and even in this country, without any water beyond what is furnished by the weather, and the natural moisture of a well-constituted soil.

SUBSECT. 6. *Changing the Condition of Lands in respect to Atmospheric Influence.*

1882. *The influence of the weather on soils* may be affected by changing the position of their surface, and by sheltering or shading.

1883. *Changing the condition of lands, as to solar influence*, is but a limited means of improvement; but is capable of being turned to some account in gardening. It is effected by altering the position of their surface, so as that surface may be more or less at a right angle to the plane of the sun's rays, according as heat or cold is to be increased or diminished. The influence of the sun's rays upon any plane are demonstrated to be as their number and perpendicularity to that plane, the effects of the atmosphere being excepted. Hence one advantage of ridging lands, provided the ridges run north and south; for on such surfaces the rays of the morning sun will take effect sooner on the east side, and those of the afternoon will remain longer in operation on the west side; whilst at mid-day his elevation will compensate, in some degree, for the obliquity of his rays to both sides of the ridge. In culture, on a small scale, ridges or sloping beds for winter crops may be made south-east and north-west, with their slope to the south, at an angle of forty degrees, and as steep on the north side as the mass can be got to stand; and on the south slope of such ridge, *ceteris paribus*, it is evident much earlier crops may be produced than on level ground. The north side, however, will be lost during this early cropping; but as early crops are soon gathered, the whole can be laid level in time for a main crop. Hence all the advantage of grounds sloping to the south, south-east, or south-west, in point of precocity, and of those sloping to the north for lateness and diminished evaporation. Another advantage of such surfaces is, that they dry sooner after rains, whether by the operation of natural or artificial drainage; or, in the case of sloping to the south, by evaporation.

1884. *Shelter*, whether by walls, hedges, strips of plantation, or trees scattered over

the surface, may be considered, generally, as increasing or preserving heat, and lessening evaporation from the soil. But if the current of air should be of a higher temperature than the earth, screens against wind will prevent the earth from being so soon heated; and from the increased evaporation arising from so great a multiplication of vegetable surface by the trees, more cold will be produced after rains, and the atmosphere kept in a more moist state, than in grounds perfectly naked. When the temperature of a current of air is lower than that of the earth, screens will prevent its carrying off so much heat; but more especially scattered trees, the tops of which will be chiefly cooled whilst the under surfaces of their lower branches reflect back the rays of heat as they radiate from the surface of the soil. Heat, in its transmission from one body to another, follows the same laws as light; and, therefore, the temperature of the surface in a forest will, in winter, be considerably higher than that of a similarly constituted soil exposed to the full influence of the weather. The early flowering of plants, in woods and hedges, is a proof of this: but as such soils cannot be so easily heated in summer, and are cooled like others after the sinking in of rains, or the melting of snows, the effect of the reflection as to the whole year is nearly neutralised, and the average temperature of the year of such soils and situations will probably be found not greater than that of open lands.

1885. *Shading the ground, whether by umbrageous trees, spreading plants, or covering it with tiles, slates, moss, litter, or other materials, has a tendency to exclude atmospheric heat and retain moisture. Shading dry loose soils, by covering them with litter, slates, or tiles, laid round the roots of plants, is found very beneficial.*

SUBJECT. 7. *Rotation of Crops.*

1886. *Growing different crops in succession is a practice which every cultivator knows to be highly advantageous, though its beneficial influence has not yet been fully accounted for by chemists. The most general theory is, that though all plants will live on the same food, as the chemical constituents of their roots and leaves are nearly the same, yet that many species require particular substances to bring their seeds or fruits to perfection, as the analysis of these seeds or fruits often afford substances different from those which constitute the body of the plant. A more recent theory is that the roots throw off secretions, which by accumulation poison the soil for that family of plants. (See § 1690.)*

1887. *Brugmans stated, that a portion of the juices which are absorbed by the roots of plants are, after the salutiferous portions have been extracted by the vessels of the plant, again thrown out by exudation from the roots, and deposited in the soil. This idea has been more fully pursued by De Candolle, who sees in it the true theory of the rotation of crops. He thinks it probable that it is the existence of this exuded matter, which may be regarded in some measure as the excrement of the preceding crop of vegetables, that proves injurious to a succeeding vegetation. He has compared it to an attempt to feed animals upon their excrements. The particles which have been deleterious to one tribe of plants, cannot but prove injurious to plants of the same kind, and probably to those of some other species, while they furnish nutriment to another order of vegetables. Hence why one kind of corn crop is injured by immediately succeeding another of the same kind; hence why different kinds of crop may with advantage succeed one another; hence, in short, the propriety of a rotation of crops.*

1888. *M. Macaire, to subject these theoretic views to the test of experience, has made many experiments to prove that vegetables exude matter from the roots, and which are related by him in a memoir inserted in the Transactions of the Société de Physique et d'Histoire Naturelle of Geneva. (See Edin. New Phil. Jour., No. xxviii. p. 215.) After various attempts to raise plants in pure siliceous sand, pounded glass, washed sponge, white linen, he decided upon pure rain-water. After cleansing and washing the roots thoroughly, he placed them in vials with a certain quantity of pure water. After they had put forth leaves, expanded their flowers, and flourished for some time, he ascertained, by the evaporation of the water, and the use of chemical reagents, that the water contained matter which had exuded from the roots. He satisfied himself that this is the fact with respect to nearly all those plants which display their flowers. Several plants of *Chondrilla muralis*, perfectly clean, were placed with their roots in pure water. At the end of a week, the water was yellowish, and emitted an odour like opium, and had a bitter taste. Subacetate and acetate of lead produced a brownish flocculent precipitate, and a solution of gelatine disturbed its transparency. As a proof that this matter was an exudation from the roots, it was found that neither pieces of the root nor of the stem, when macerated in the water during the same time, occasioned either taste, smell, or precipitate. To prove that plants employ the excretory power of their roots, in order to get rid of hurtful substances which they may have imbibed, the following experiments were made:—Some plants of the *Mercurialis annua* were washed in distilled water, and placed so that one portion of their roots dipped into a weak solution of acetate of lead, and another branch of the same root into pure water. Having vegetated in this manner very well for several days, the water was tested by hydrosulphuret of ammonia, which proved, by the black precipitate which it formed, that a notable portion of the lead had been absorbed, and deposited by the branch which dipped into the water. Groundsel, cabbage, and other plants, gave the same results. Some plants grew very well for two days in acetate of lead. They were then withdrawn, their roots well washed with distilled water, which being afterwards tested, was found to contain no lead, and then placed to vegetate in rain water. In the course of two days this water was found to contain a small quantity of acetate of lead. The same experiments were made with lime-water, which, being less injurious to plants, is preferable to lead. The roots being partly placed in lime-water, and partly in pure water, the plants lived well, and the pure water soon showed the presence of lime by the oxalate of ammonia; and the plants which had grown in lime, and then been transferred with every precaution to pure water, soon disgorged into it a portion of lime. Similar trials were made with a weak solution of marine salt, and with a like result. There can be no doubt, then, that plants have the power of rejecting, by their roots, soluble salts, which are injurious to vegetation. Experiments also proved that the roots exuded a greater excess of matter under night, than in the day. As it is well known that the light of day causes the roots to absorb their juices, it is natural to suppose that, during the night, absorption ceases, and excretion takes place.*

1889. *The inferences which M. Macaire would deduce from his experiments, are, that the greater number of vegetables exude by their roots substances unfit for their vegetation; that the nature of these substances varies according to the families of plants which produce them; and that some, being acrid and*

malicious, may be injurious; and others, being mild and gummy, may assist in the nourishment of other plants. (*Quart. Jour. Agr.*, vol. II. p. 330; *Gard. Mag.*, vol. x. p. 12.)

1890. *Influence of rotations in destroying insects.* Olivier, member of the Institute of France, has described all the insects, chiefly *Tipulæ* and *Mûsces*, which live upon the collar or crown of the roots of the cereal grasses, and he has shown that they multiply themselves without end, when the same soil presents the same crop for several years in succession, or even crops of analogous species. But when a crop intervenes on which these insects cannot live, the whole race perish for want of proper nourishment for their larvæ. (*Mém. de la Société Royale et Centrale d'Agr. de Paris*, vol. vii.)

CHAP. II.

Of Manures.

1891. *Every species of matter capable of promoting the growth of vegetables* may be considered as manure. On examining the constituents of vegetables, we shall find that they are composed of oxygen, hydrogen, carbon, and nitrogen, or azote, with a small proportion of saline bodies. It is evident, therefore, that the substances employed as manure should also be composed of these elements, for, unless they are, there will be a deficiency in some of the elements in the vegetable itself; and it is probable that such deficiency may prevent the formation of those substances within it, for which its peculiar organisation is contrived, and upon which its healthy existence depends. The elementary bodies above enumerated are all contained in animal, and the first three in vegetable, matters. Sometimes, though very seldom, vegetables contain a small quantity of nitrogen. As certain salts are also constantly found to be present in healthy living vegetables, manures or vegetable food may, consequently, be distinguished into animal, vegetable, and saline. Kirwan, Dundonald, Darwin, and Davy, who produced the first chemical treatises on soils, were also the first to treat chemically of manures. Of these, the latest in the order of time is Sir H. Davy, from whose highly satisfactory work we shall extract the greater part of this chapter.

SECT. I. Of Manures of Animal and Vegetable Origin.

1892. *Decaying animal and vegetable substances* constitute by far the most important class of manures, or vegetable food, and may be considered as to the theory of their operation, their specific kinds, and their preservation and application in practice.

SUMMARY. 1. *The Theory of the Operation of Manures of Animal and Vegetable Origin.*

1893. *The rationale of organic manures* is very satisfactorily given by Sir H. Davy, who, after having proved that no solid substances can enter in that state into the plant, explains the manner in which nourishment is derived from vegetable and animal substances.

1894. *Vegetable and animal substances deposited in the soil*, as it is shown by universal experience, are consumed during the process of vegetation; and they can only nourish the plant by affording solid matters capable of being dissolved by water, or gaseous substances capable of being absorbed by the fluids in the leaves of vegetables; but such parts of them as are rendered gaseous, and pass into the atmosphere, must produce a comparatively small effect, for gases soon become diffused through the mass of the surrounding air. The great object, therefore, in the application of manure should be to make it afford as much soluble matter as possible to the roots of the plant; and that in a slow and gradual manner, so that it may be entirely consumed in forming its sap and organised parts.

1895. *Mucilaginous, gelatinous, saccharine, oily, and extractive fluids, carbonic acid, and water*, are substances that in their unchanged states contain almost all the principles necessary for the life of plants; but there are few cases in which they can be applied as manures in their pure forms; and vegetable manures, in general, contain a great excess of fibrous and insoluble matter, which must undergo chemical change, before it can become the food of plants.

1896. *The nature of the changes on these substances*; of the causes which occasion them, and which accelerate or retard them; and of the products they afford, have been scientifically stated and explained by our great agricultural chemist. If any fresh vegetable matter which contains sugar, mucilage, starch, or other of the vegetable compounds soluble in water, be moistened, and exposed to air, at a temperature from 55° to 80°, oxygen will soon be absorbed, and carbonic acid formed; heat will be produced, and elastic fluids, principally carbonic acid, gaseous oxide of carbon, and hydro-carbonate will be evolved; a dark-coloured liquid, of a slightly sour or bitter taste, will likewise be formed; and if the process be suffered to continue for a time sufficiently long,

nothing solid will remain, except earthy and saline matter, coloured black by charcoal. The dark-coloured fluid formed in the fermentation always contains acetic acid; and when albumen or gluten exists in the vegetable substance, it likewise contains volatile alkali. In proportion as there is more gluten, albumen, or matters soluble in water, in the vegetable substances exposed to fermentation, so in proportion, all other circumstances being equal, will the process be more rapid. Pure woody fibre alone undergoes a change very slowly; but its texture is broken down, and it is easily resolved into new aliments, when mixed with substances more liable to change, containing more oxygen and hydrogen. Volatile and fixed oils, resins, and wax, are more susceptible of change than woody fibre, when exposed to air and water; but much less liable than the other vegetable compounds; and even the most inflammable substances, by the absorption of oxygen, become gradually soluble in water. Animal matters in general are more liable to decompose than vegetable substances; oxygen is absorbed and carbonic acid and ammonia formed in the process of their putrefaction. They produce fetid, compound, elastic fluids, and likewise azote: they afford dark-coloured acid and oily fluids, and leave a residuum of salts and earths mixed with carbonaceous matter.

1897. *The principal substances which constitute the different parts of animals, or which are found in their blood, their secretions, or their excrements, are gelatine, fibrine, mucus, fatty or oily matter, albumen, urea, uric acid, and other acid, saline, and earthy matters.*

1898. *General treatment of organic manures.* Whenever manures consist principally of matter soluble in water, it is evident that their fermentation or putrefaction should be prevented as much as possible; and the only cases in which these processes can be useful, are when the manure consists principally of vegetable or animal fibre. The circumstances necessary for the putrefaction of animal substances are similar to those required for the fermentation of vegetable substances; a temperature above the freezing point, the presence of water, and the presence of oxygen, at least in the first stage of the process. To prevent manures from decomposing, they should be preserved dry, defended from the contact of air, and kept as cool as possible. Salt and alcohol appear to owe their powers of preserving animal and vegetable substances to their attraction for water, by which they prevent its decomposing action, and likewise to their excluding air.

SUMMARY. 2. *Of the different Species of Manures of Animal and Vegetable Origin.*

1899. *The properties and nature of the manures in common use should be known to every cultivator: for as different manures contain different proportions of the elements necessary to vegetation, so they require a different treatment to enable them to produce their full effects in culture.*

1900. *All green succulent plants contain saccharine or mucilaginous matter, with woody fibre, and readily ferment.* They cannot, therefore, if intended for manure, be used too soon after their death. Hence the advantage of digging in green crops, whether natural or sown on purpose; they must not, however, be turned in too deep, otherwise, as Mrs. Ibbotson has shown (*Philos. Mag.* 1816), fermentation will be prevented by compression and exclusion of air. Green crops should be dug in, if it be possible, when in flower or at the time the flower is beginning to appear; for it is at this period that they contain the largest quantity of easily soluble matter, and that their leaves are most active in forming nutritive matter. Green crops, pond-weeds, or the parings of hedges or ditches, require no preparation to fit them for manure, nor does any kind of fresh vegetable matter. The decomposition slowly proceeds beneath the soil; the soluble matters are gradually dissolved; and the slight fermentation which goes on, checked by the want of a free communication of air, tends to render the woody fibre soluble without occasioning the rapid dissipation of elastic matter. When old pastures are broken up and turned into garden ground, not only has the soil been enriched by the death and slow decay of the plants which have left soluble matters in the soil, but the leaves and roots of the grasses living at the time, and occupying so large a part of the surface, afford saccharine, mucilaginous, and extractive matters, which become immediately the food of the crop, and, from their gradual decomposition, afford a supply for successive years.

1901. *Rape-cake*, which is used with great success as manure, contains a large quantity of mucilage, some albuminous matter, and a small quantity of oil. This manure should be used recent, and kept as dry as possible before it is applied.

1902. *Malt dust* consists chiefly of the infant radicle separated from the grain during the process of turning and drying the malt on the kiln, from which it falls down through the holes in the floor to the space below, called the dunge (see *Encyc. of Cottage, Farm, and Villa Architect.*, § 798.). Sir H. Davy never made any experiment upon this manure; but had great reason to suppose that it must contain saccharine matter, and this substance will account for its powerful effects. Like rape-cake, it should be used as dry as possible, and its fermentation prevented.

1903. *Linseed-cake* is too valuable as a food for cattle to be much employed as a manure. The water in which flax and hemp are steeped, for the purpose of obtaining the pure vegetable fibre, has considerable fertilising powers. It appears to contain a substance analogous to albumen, and likewise much vegetable extractive matter. It putrefies very readily. By the watering process, a certain degree of fermentation is absolutely necessary to obtain the flax and hemp in a proper state; the water to which they have been exposed should therefore be used as a manure as soon as the vegetable fibre is removed from it: but as flax is generally watered in deep ponds, and sometimes even in streams, it is but seldom that the water is sufficiently impregnated with extractive matter to be worth applying to agricultural purposes.

1904. *Sea-weeds*, consisting of different species of *Fùci*, *Algæ*, and *Confervæ*, are much used as a manure on the sea-coasts of Britain and Ireland. In the Orkney Islands the *Fùcus digitatus* is preferred, on account of its greater substance. When driven on shore by the winter storms or the gales of spring, it is collected and laid on the land, into which it is then ploughed. In summer it is burnt, with other *Fùci*, into *kelp*. It is a powerful fertiliser, but its benefits do not extend beyond one or at most two seasons. By digesting the common *Fùcus*, which is the sea-weed usually most abundant on the coast, in boiling water, one eighth of a gelatinous substance will be obtained, with characters similar to mucilage. A quantity distilled gave nearly four fifths of its weight of water, but no ammonia; the water had an empyreumatic and slightly sour taste; the ashes contained sea salt, carbonate of soda, and carbonaceous matter. The gaseous matter afforded was small in quantity, principally carbonic acid, and gaseous oxide of carbon, with a little hydro-carbonate. This manure is transient in its effects, and does not last for more than a single crop; which is easily accounted for from the large quantity of water, or the elements of water, which it contains. It decays without producing heat when exposed to the atmosphere, and seems, as it were, to melt down and dissolve away. A large heap has been entirely destroyed in less than two years, nothing remaining but a little black fibrous matter. Some of the firmest part of a *Fùcus* was suffered to remain in a close jar, containing atmospheric air, for a fortnight: in this time it had become very much shrivelled; the sides of the jar were lined with dew. The air examined was found to have lost oxygen, and to contain carbonic acid gas. Sea-weed is sometimes suffered to ferment before it is used; but this process seems wholly unnecessary, for there is no fibrous matter rendered soluble in the process, and a part of the manure is lost. The best cultivators use it as fresh as it can be procured; and the practical results of this mode of applying it are exactly conformable to the theory of its operation. The carbonic acid formed by its incipient fermentation must be partly dissolved by the water set free in the same process; and thus become capable of absorption by the roots of plants. The effects of the sea-weed, as manure, must principally depend upon this carbonic acid, and upon the soluble mucilage the weed contains. Some *Fùcus* which had fermented so as to have lost about half its weight, afforded less than one twelfth of mucilaginous matter; from which it may be fairly concluded that some of this substance is destroyed in fermentation.

1905. *Mere woody fibre* seems to be the only vegetable matter that requires fermentation to render it nutritive to plants. Tanners' spent bark is a substance of this kind. A. Young, in his excellent *Essay on Manure*, states "that spent bark seemed rather to injure than assist vegetation;" which he attributes to the astringent matter that it contains. But, in fact, it is freed from all soluble substances, by the operation of water in the tan-pit; and, if injurious to vegetation, the effect is probably owing to its agency upon water, or to its mechanical effects. It is a substance very absorbent and retentive of moisture, and yet not penetrable by the roots of plants.

1906. *Inert peaty matter* is a substance of the same kind. It remains for years exposed to water and air without undergoing change, and in this state yields little or no nourishment to plants. Woody fibre will not ferment, unless some substances are mixed with it, which act the same part as the mucilage, sugar, and extractive or albuminous matters with which it is usually associated in herbs and succulent vegetables. Lord Meadowbank has judiciously recommended a mixture of common farm-yard dung for the purpose of bringing peat into fermentation: any putrescible or fermentable substance will answer the end; and the more a substance heats, and the more readily it ferments, the better will it be fitted for the purpose. Lord Meadowbank states, that one part of dung is sufficient to bring three or four parts of peat into a state in which it is fitted to be applied to land; but, of course, the quantity must vary according to the nature of the dung and of the peat. In cases in which some living vegetables are mixed with the peat, the fermentation will be more readily effected.

1907. *Tanners' spent bark*, shavings of wood, and saw-dust, will probably require as much dung to bring them into fermentation as the worst kind of peat. Woody fibre may be likewise prepared, so as to become a manure, by the action of lime. It is evident, from the analysis of woody fibre by Gay-Lussac and Thénard (which shows that it

consists principally of the elements of water and carbon, the carbon being in larger quantities than in the other vegetable compounds), that any process which tends to abstract carbonaceous matter from it must bring it nearer in composition to the soluble principles; and this is done in fermentation by the absorption of oxygen and production of carbonic acid; and a similar effect, it will be shown, is produced by lime.

1908. *Wood-ashes*, imperfectly formed, that is, wood-ashes containing much charcoal, are said to have been used with success as a manure. A part of their effects may be owing to the slow and gradual consumption of the charcoal, which seems capable, under other circumstances than those of actual combustion, of absorbing oxygen, so as to become carbonic acid. In April 1803, some well-burnt charcoal was enclosed by Sir H. Davy in a tube, which was half filled with pure water and half with common air, and then hermetically sealed. The tube was opened under pure water, in the spring of 1804, at a time when the atmospheric temperature and pressure were nearly the same as at the commencement of the experiment. Some water rushed in; and, on analysing a little air, which was expelled from the tube by the agency of heat, it was found to contain only seven per cent of oxygen. The water in the tube, when mixed with lime-water, produced a copious precipitate; so that carbonic acid had evidently been formed and dissolved by the water.

1909. *Yeast* is one of the most powerful and durable of all manures. It may be applied to every description of crop, either of the farmer or gardener, and all fruits and flowers which will bear manuring with fermented putrescent matter will equally bear yeast. Unfortunately the article is too expensive to be much used as a manure; but it will well pay for a trial on auriculars and fine plants. This we can assert from our own experience. The effect on the foliage of both is the production of a very vivid green.

1910. *Manures from animal substances*, in general, require no chemical preparation to fit them for the soil. The great object is to blend them with the earthy constituents in a proper state of division, and to prevent their too rapid decomposition.

1911. *The entire parts of the muscles of land animals* are not commonly used as manure, though there are many cases in which such an application might be easily made. Horses, dogs, sheep, deer, and other quadrupeds that have died accidentally or of disease, after their skins are separated, are often suffered to remain exposed to the air, or immersed in water till they are destroyed by birds or beasts of prey, or entirely decomposed; and, in this case, most of their organised matter is lost for the land in which they lie, and a considerable portion of it employed in giving off noxious gases to the atmosphere. By covering dead animals with five or six times their bulk of soil, mixed with one part of lime, and suffering them to remain for a few months, their decomposition would impregnate the soil with soluble matter, so as to render it an excellent manure; and by mixing a little fresh quicklime with it at the time of its removal, the disagreeable effluvia would be in a great measure destroyed, and it might be applied to crops in the same way as any other manure.

1912. *Fish* forms a powerful manure, in whatever state it is applied; but it cannot be used too fresh, though the quantity should be limited. A. Young records an experiment, in which herrings spread over a field, and ploughed in for wheat, produced so rank a crop, that it was entirely laid before harvest. The refuse pilehards in Cornwall are used throughout the country as a manure, with excellent effects. They are usually mixed with sand or soil, and sometimes with sea weed, to prevent them from raising too luxuriant a crop. The effects are perceived for several years. In the fens of Lincolnshire, Cambridgeshire, and Norfolk, the little fishes called sticklebacks are caught in the shallow waters in such quantities, that they form a great article of manure in the land bordering on the fens. It is easy to explain the operation of fish as a manure. The skin is principally gelatine, which, from its slight state of cohesion, is readily soluble in water; fat or oil is always found in fishes, either under the skin or in some of the viscera; and their fibrous matter contains all the essential elements of vegetable substances.

1913. *Amongst oily substances*, blubber has been employed as a manure. It is most useful when mixed with clay, sand, or any common soil, so as to expose a large surface to the air, the oxygen of which produces soluble matter from it. The carbon and hydrogen abounding in oily substances fully account for their effects; and their durability is easily explained from the gradual manner in which they change by the action of air and water.

1914. *Bones* are much used as a manure in various parts of England, and especially in Lincolnshire and Yorkshire. They are also used in Scotland wherever they can be got, and a knowledge of their great value is spreading rapidly over the Continent. They are not used till after being broken, and boiled for grease. The more divided they are, the more powerful are their effects. The expense of grinding them in a mill is amply repaid by the increase of their fertilising powers. Bone-dust and bone shavings, the refuse of the turning manufacture, may also be advantageously employed. The basis of

bone is constituted by earthy salts, principally phosphate of lime, with some carbonate of lime and phosphate of magnesia; the easily decomposable substances in bone are fat, gelatine, and cartilage, which seems of the same nature as coagulated albumen. According to the analysis of Fourcroy and Vauquelin, ox-bones are composed of decomposable animal matter 51, phosphate of lime 37.7, carbonate of lime 10, phosphate of magnesia 1.3; total 100. To apply bone manure with effect, it is essential that the soil be dry.

1915. *Horn* is a still more powerful manure than bone, as it contains a larger quantity of decomposable animal matter. From 500 grains of ox-horn, Hatchett obtained only 1.5 grains of earthy residuum, and not quite half of this was phosphate of lime. The shavings or turnings of horn form an excellent manure, though they are not sufficiently abundant to be in common use. The animal matter in them seems to be of the nature of coagulated albumen, and it is slowly rendered soluble by the action of water. The earthy matter in horn, and still more that in bones, prevents the too rapid decomposition of the animal matter, and renders it very durable in its effects.

1916. *Hair, woollen rags, and feathers* are all analogous in composition, and principally consist of a substance similar to albumen united to gelatine. This is shown by the ingenious researches of Hatchett. The theory of their operation is similar to that of bone and horn shavings.

1917. *The refuse of the different manufactures of skin and leather* forms very useful manures; such as curriers' shavings, furriers' clippings, and the offals of the tan-yard and of the glue-manufactory. The gelatine contained in every kind of skin is in a state fitted for its gradual solution or decomposition; and when buried in the soil, it lasts for a considerable time, and constantly affords a supply of nutritive matter to the plants in its neighbourhood.

1918. *Blood* contains certain quantities of all the principles found in other animal substances, and is consequently a very good manure. It has been already stated that it contains fibrine; it likewise contains albumen; the red particles in it, which have been supposed by many foreign chemists to be coloured by iron in a particular state of combination with oxygen and acid matter, Brande considers as formed of a peculiar animal substance containing very little iron. The scum taken from the boilers of the sugar-bakers, which is used as manure, principally consists of bullocks' blood which has been employed for the purpose of separating the impurities of common brown sugar, by means of the coagulation of its albuminous matter by the heat of the boiler.

1919. *The different species of corals, corallines, and sponges* must be considered as substances of animal origin. From the analysis of Hatchett, it appears that all these substances contain considerable quantities of a matter analogous to coagulated albumen; the sponges afford likewise gelatine. According to Merat Guillot, white coral contains equal parts of animal matter and carbonate of lime; red coral 46.5 of animal matter, and 53.5 of carbonate of lime; articulated coralline 51 of animal matter, and 49 of carbonate of lime. These substances are never used as manure in this country, except in cases when they are accidentally mixed with sea-weed; but it is probable that the corallines might be advantageously employed, as they are found in considerable quantity on the rocks, and bottoms of the rocky pools on many parts of our coast, where the land gradually declines towards the sea; and they might be detached by hoes, and collected without much trouble. On many parts of the Scottish coast, banks of shells have been deposited by the sea, and are applied with great advantage, both as a substitute for lime and in improving the mechanical texture of the clay soils within their reach.

1920. *Amongst excrementitious animal substances* used as manures, urine is the one upon which the greatest number of chemical experiments have been made, and the nature of which is best understood. The urine of the cow contains, according to the experiments of Brande: water 65; phosphate of lime 3; muriates of potassa and ammonia 15; sulphate of potassa 6; carbonates, potassa, and ammonia 4; urea 4.

1921. *The urine of the horse*, according to Fourcroy and Vauquelin, contains, of carbonate of lime 11, carbonate of soda 9, benzoate of soda 24, muriate of potassa 9, urea 7, water and mucilage 940. In addition to these substances, Brande found in it phosphate of lime. The urine of the ass, the camel, the rabbit, and domestic fowls, have been submitted to different experiments, and their constitution has been found similar. In the urine of the rabbit, in addition to most of the ingredients above mentioned, Vauquelin detected gelatine; and the same chemist discovered uric acid in the urine of domestic fowls. Human urine contains a greater variety of constituents than any other species examined. Urea, uric acid, and another acid similar to it in nature called rosacic acid, acetic acid, albumen, gelatine, a resinous matter, and various salts are found in it. The human urine differs in composition, according to the state of the body, and the nature of the food and drink made use of. In many cases of disease there is a much larger quantity of gelatine and albumen than usual in the urine, and in diabetes it contains sugar. It is probable that the urine of the same animal must likewise differ

according to the different nature of the food and drink used; and this will account for discordances in some of the analyses that have been published on the subject. Urine is very liable to change, and to undergo the putrefactive process; and that of carnivorous animals more rapidly than that of graminivorous animals. In proportion as there is more gelatine or albumen in urine, so in proportion does it putrefy more quickly. The species of urine which contain most albumen, gelatine, and urea, are the best as manures; and all urine contains the essential elements of vegetables in a state of solution. During the putrefaction of urine the greatest part of the soluble animal matter that it contains is destroyed: it should consequently be used as fresh as possible; but if not mixed with solid matter, it should be diluted with water, as, when pure, it contains too large a quantity of animal matter to form a proper fluid nourishment for absorption by the roots of plants.

1922. *Putrid urine* abounds in ammoniacal salts; and though less active than fresh urine, is a very powerful manure. According to a recent analysis published by Berzelius, 1000 parts of urine are composed of, water 933; urea 30.1; uric acid 1; muriate of ammonia, free lactic acid, lactate of ammonia, and animal matter 17.14. The remainder different salts, phosphates, sulphates, and muriates.

1923. *Dung of Birds*. Amongst excrementitious solid substances used as manures, one of the most powerful is the dung of birds that feed on animal food, particularly the dung of sea-birds. The guano, which is used to a great extent in South America, and which is the manure that fertilises the sterile plains of Peru, is a production of this kind. It exists abundantly, as we are informed by Humboldt, on the small islands in the South Sea, at Chinche, Ilo, Isa, and Arica. Fifty vessels are laden with it annually at Chinche, each of which carries from 1500 to 2000 cubical feet. It is used as a manure only in very small quantities; and particularly for crops of maize. Some experiments were made on specimens of guano in 1805. It appeared as a fine brown powder; it blackened by heat, and gave off strong ammoniacal fumes; treated with nitric acid, it afforded uric acid. In 1806, Fourcroy and Vauquelin published an elaborate analysis of guano. They state that it contains a fourth part of its weight of uric acid, partly saturated with ammonia, and partly with potassa; some phosphoric acid combined with the bases, and likewise with lime; small quantities of sulphate and muriate of potassa; a little fatty matter; and some quartzose sand. It is easy to explain its fertilizing properties: from its composition it might be supposed to be a very powerful manure. It requires water for the solution of its soluble matter, to enable it to produce its full beneficial effect on crops.

1924. *The dung of sea-birds* has never been much used as a manure in this country; but it is probable that even the soil of the small islands on our coast much frequented by them would fertilise. Some dung of sea-birds, brought from a rock on the coast of Merionethshire, produced a powerful, but transient, effect on grass. The rains in our climate must tend very much to injure this species of manure, where it is exposed to them soon after its deposition; but it may probably be found in great perfection in caverns or clefts in rocks haunted by cormorants and gulls. Some recent cormorants' dung, when examined, had not at all the appearance of guano; it was of a greyish-white colour; had a very fetid smell, like that of putrid animal matter; when acted on by quicklime, it gave abundance of ammonia; treated with nitric acid, it yielded uric acid.

1925. *Night soil*, it is well known, is a very powerful manure, and very liable to decompose. It differs in composition; but always abounds in substances composed of carbon, hydrogen, azote, and oxygen. From the analysis of Berzelius, it appears that a part of it is always soluble in water; and in whatever state it is used, whether recent or fermented, it supplies abundance of food to plants. The disagreeable smell of night-soil may be destroyed by mixing it with quicklime; and if exposed to the atmosphere in thin layers, strewn over with quicklime in fine weather, it speedily dries, and is easily pulverised for mixing with the earth. The Chinese, who have more practical knowledge of the use and application of manures than any other people existing, mix their night-soil with one third of its weight of fat marl, make it into cakes, and dry it by exposure to the sun. These cakes, we are informed by the French missionaries, have no disagreeable smell, and form a common article of commerce of the empire. The earth, by its absorbent powers, probably prevents, to a certain extent, the action of moisture upon the dung, and likewise defends it from the effects of air. Desiccated night-soil, in a state of powder, forms an article of internal commerce in France, and is known under the name of *poudrette*; in London it is mixed with quicklime, and sold in cakes under the name of "desiccated night-soil."

1926. *Pigeons' dung* comes next in order, as to fertilising power. 100 grains, digested in hot water for some hours, produced 23 grains of soluble matter; which afforded abundance of carbonate of ammonia by distillation, and left carbonaceous matter, saline matter principally common salt, and carbonate of lime, as a residuum.

Pigeons' dung, when moist, readily ferments, and, after fermentation, contains less soluble matter than before; from 100 parts of fermented pigeons' dung, only eight parts of soluble matter were obtained, which gave proportionably less carbonate of ammonia in distillation than recent pigeons' dung. It is evident that this manure should be applied as new as possible; and, when dry, it may be employed in the same manner as the other manures capable of being pulverised. The soil in woods, where great flocks of wood-pigeons roost, is often highly impregnated with their dung, and, it cannot be doubted, would form a valuable manure. Such soil will often yield ammonia when distilled with lime. In the winter, likewise, it usually contains abundance of vegetable matter, the remains of decayed leaves; and the dung tends to bring the vegetable matter into a state of solution. Manuring with pigeons' dung was, and still is, in great esteem in Persia.

1927. *The dung of domestic fowls* approaches very nearly in its nature to pigeons' dung. Uric acid is common to it, and the dung of birds of every kind. It gives carbonate of ammonia by distillation, and immediately yields soluble matter to water. It is very liable to ferment. The dung of fowls is employed, in common with that of pigeons, by tanners, to bring on a slight degree of putrefaction in skins that are to be used for making soft leather. For this purpose the dung is diffused through water, in which state it rapidly undergoes putrefaction, and brings on a similar change in the skin. The excrements of dogs are employed by the tanner with similar effects. In all cases the contents of the *grainer*, as the pit is called in which soft skins are prepared by dung, must form a very useful manure.

1928. *Rabbits' dung* has never been analysed. It is used with great success as a manure by some persons, who have found it profitable to keep rabbits in such a manner as to preserve their dung. It is laid on as fresh as possible, and is found better the less it has fermented.

1929. *The dung of cattle, oxen, and cows* has been chemically examined by Einhof and Thaer. They found that it contained matter soluble in water; and that it gave in fermentation nearly the same products as vegetable substances, absorbing oxygen, and producing carbonic acid gas.

1930. The recent *dung of sheep and of deer* affords, when long boiled in water, soluble matters which equal from two to three per cent. of their weight. These soluble substances, procured by solution and evaporation, when examined, contain a very small quantity of matter analogous to animal mucus; and are principally composed of a bitter extract, soluble both in water and in alcohol. They give ammoniacal fumes by distillation, and appear to differ very little in composition. Some blades of grass were watered for several successive days with a solution of these extracts; they evidently became greener in consequence, and grew more vigorously than grass in other respects under the same circumstances. The part of the dung of cattle, sheep, and deer, not soluble in water, appears to be mere woody fibre, and precisely analogous to the residuum of those vegetables that form their food after they have been deprived of all their soluble materials.

1931. *The dung of horses* gives a brown fluid, and this, when evaporated, yields a bitter extract, which affords ammoniacal fumes more copiously than that from the dung of oxen.

1932. *In the treatment of the pure dung of cattle, sheep, and horses*, there seems no reason why it should be made to ferment except in the soil, like the other pure dungs; or, if suffered to ferment, it should be only in a very slight degree. The grass, in the neighbourhood of recently voided dung, is always coarse and dark green; some persons have attributed this to a noxious quality in unfermenting dung; but it seems to be rather the result of an excess of food furnished to the plants.

1933. *Street and road dung and the sweepings of houses* may be all regarded as composite manures; the constitution of them is necessarily various, as they are derived from a number of different substances. These manures are usually applied without being fermented.

1934. *Soot*, which is principally formed from the combustion of pit-coal or coal generally, contains likewise substances derived from animal matters. This is a very powerful manure. It affords ammoniacal salts by distillation, and yields a brown extract to hot water, of a bitter taste. It likewise contains an empyreumatic oil. Its great basis is charcoal, in a state in which it is capable of being rendered soluble by the action of oxygen and water. This manure requires no preparation.

1935. *Liquid Manure*. The cultivators of German Switzerland give the name of *gülle*, and the French that of *lizier*, to the liquid manure obtained from their stalls and stables, and collected into underground pits or reservoirs, in which it is allowed to ferment in a mucous or slimy state. The manner of collecting it adopted by the cultivators of Zurich is as follows: — The floor on which the cattle are stalled is formed of boards, with an inclination of four inches from the head to the hinder part of the animal, whose excrements fall into a gutter behind, in the manner usual in English cow-houses; the

depth of this gutter is fifteen inches, its width ten inches. It is so formed as to be capable of receiving, at pleasure, water to be supplied by a reservoir near it; it communicates with five pits by holes, which are opened for the passage of the slime, or closed as occasion requires. The pits or reservoirs of manure are covered over with a floor of boarding, placed a little below that on which the animals stand. This covering is important as facilitating the fermentation. The pits or reservoirs are made in masonry, well cemented, and should be bottomed in clay, well beaten, in order to avoid infiltration. They should be five, in order that the liquid may not be disturbed during the fermentation, which lasts about four weeks. Their dimensions should be calculated according to the number of animals the stable holds, so that each may be filled in a week. But whether full or not, each pit must be closed at the week's end, in order to maintain the regularity of the system of emptying. The reservoirs are emptied by means of portable pumps. In the evening the keeper of the stables lets a proper quantity of water into the gutter; and on returning to the stable in the morning, he carefully mixes with the water the excrement that has fallen into it, breaking up the more compact parts, so as to form of the whole an equal and flowing liquid. On the perfect manner in which this process is performed the quality of the manure mainly depends. The liquid ought neither to be thick, for then the fermentation would be difficult; nor too thin, for in that case it would not contain sufficient nutritive matter. When the mixture is made, it is allowed to run off into the pit beneath, and the stable-keeper again lets water into the trench. During the day, whenever he comes into the stable, he sweeps whatever excrement may be found under the cattle into the trench, which may be emptied as often as the liquid it contains is found to be of a due thickness. The best proportion of the mixture is three fourths of water to one fourth of excrement, if the cattle be fed on corn; if in a course of fattening, one fifth of excrement to four fifths of water will be sufficient. (*Bull. du Comité d'Agri. de la Soc. des Arts de Genève.*) This mode of increasing the manure produced by stalled cattle and cows is in general use in Holland and the Netherlands; and we have seen it practised in France at Trappe and Grignon near Versailles, at Roville near Nancy, at Ebersberg, and Schleisheim near Munich, and at Hohenheim and Weil near Stuttgart. We would strongly recommend the practice to the British cultivator, and more especially to every cottager who keeps a cow or a pig; nay, to the cottager who is without these comforts, but who has a garden, in which he could turn the great accession of manure so acquired to due account. Let him sink five tubs or large earthen vessels in the ground, and let the contents of the portable receiver of his water-closet, all the water used for washing in the house, soap-suds, slops, and fermentable offals of every description during a week be carried, and poured into one of these tubs; and if not full on the Saturday night, let it be filled up with water of any kind, well stirred up, the lid replaced, and the whole left for a week. Begin on the Monday morning with another tub, and when, after five weeks, the whole five are filled, empty the first at the roots of a growing crop, and refill. Or use two larger tubs, and continue filling one for a month; then begin the other, and at the end of a month empty the first; and so on. (*Gard. Mag.*, vol. v. p. 549.)

SUBJECT. 3. *Of the Fermenting, Preserving, and Applying of Manures of Animal and Vegetable Origin.*

1936. *On the management of organic manures* depends much of their value as food to plants. The great mass of manures procured by the cultivator is a mixture of animal and vegetable matters, and the great source of supply is the farm or stable yard. Here the excrementitious matter of horses, cattle, swine, and poultry, is mixed with straw, haum, chaff, and various kinds of litter. To what degree should this be fermented before it is applied to the soil? and how can it best be preserved when not immediately wanted?

1937. *According to Sir Humphry Davy*, a slight incipient fermentation is all that is required in the dunghill, for the ordinary purposes of the garden or the farm. A great degree of fermentation, this eminent chemist considered as highly prejudicial to every description of compound organic manure. It is better, he says, that there should be no fermentation at all before the manure is used, than that it should be carried too far. The excess of fermentation tends to the destruction and dissipation of the most useful part of the manure; and the ultimate results of this process are like those of combustion. It is a common practice to suffer the farm-yard dung to ferment till the fibrous texture of the vegetable matter is entirely broken down; and till the manure becomes perfectly cold, and so soft as to be easily cut by the spade. Independently of the general theoretical views unfavourable to this practice, founded upon the nature and composition of vegetable substances, there are many arguments and facts which show that it is prejudicial. During the violent fermentation which is necessary for reducing farm-yard manure to the state in which it is called short muck, not only a large quantity of fluid, but likewise of gaseous matter, is lost; so much so, that the dung is reduced one half or two thirds in weight: the principal elastic matter disengaged is carbonic acid with some ammonia; and both these, if retained by the moisture in the soil, as has been stated before, are capable of becoming a useful nourishment of plants. In October, 1808, Sir H. Davy filled a large retort, capable of containing three pints of water, with some hot fermenting manure consisting principally of the litter and dung of cattle; he adapted a small receiver to the retort, and connected the whole with a mercurial pneumatic apparatus, so as to collect the condensable and elastic fluids which might rise from the dung. The receiver soon became lined with dew, and drops began in a few hours to trickle down the sides of it. Elastic fluid likewise was generated; in three days thirty-five cubical inches

had been formed; which, when analysed, were found to contain twenty-one cubical inches of carbonic acid; the remainder was hydrocarbonate mixed with some azote, probably no more than existed in the common air in the receiver. The fluid matter collected in the receiver at the same time amounted to nearly half an ounce; it had a saline taste and a disagreeable smell, and contained some acetate and carbonate of ammonia. Finding such products given off from fermenting litter, he introduced the beak of another retort, filled with similar dung, very hot at the time, into the soil amongst the roots of some grass in the border of a garden. In less than a week a very distinct effect was produced on the grass; upon the spot exposed to the influence of the matter disengaged in fermentation, it grew with much more luxuriance than the grass in any other part of the garden. Besides the dissipation of gaseous matter, when fermentation is pushed to the extreme, there is another disadvantage in the loss of heat, which, if excited in the soil, is useful in promoting the germination of the seed, and in assisting the plant in the first stage of its growth, when it is most feeble and most liable to disease. Again, it is a general principle in chemistry, that, in all cases of decomposition, substances combine much more readily at the moment of their disengagement, than after they have been perfectly formed. Now, in fermentation beneath the soil, the fluid matter produced is applied instantly, even while it is warm, to the organs of the plant, and, consequently, is more likely to be efficient, than that from manure which has gone through the process, and of which all the principles have entered into new combinations.

1838. *The doctrine of the proper application of manures from organised substances* offers an illustration of an important part of the economy of nature, and of the happy order in which it is arranged. The death and decay of animal substances tend to resolve organised forms into chemical constituents; and the pernicious effluvia disengaged in the process seem to point out the propriety of burying them in the soil, where they are fitted to become the food of vegetables. The fermentation and putrefaction of organised substances in the free atmosphere are noxious processes; beneath the surface of the ground, they are salutary operations. In this case the food of plants is prepared where it can be used; and that which would offend the senses and injure the health, if exposed, is converted by gradual processes into forms of beauty and of usefulness; the fetid gas is rendered a constituent of the aroma of the flower, and what might be poison becomes nourishment to animals and to man.

1939. *The practical cultivator*, on the other hand, notwithstanding Sir Humphry Davy's deductions from the above experiments, continues to prefer using manure in a highly fermented state, so as to be what in practice is called short muck. In defence of the practical man, it is contended that the decomposition of a dunghill does not throw off the most valuable and the most efficient parts of the dung, but chiefly vapour of water. It is allowed by those advocates that when the texture of the fibrous part of farm-yard manure begins to decompose, there will be an evolution of some of the gases which constitute the food of plants; "but what harm," it is asked "accrues to the dung as a manure from the escape of these gases? None whatever. We are told that these gases constitute the food of plants, and that, if they are permitted to be dissipated by decomposition, the quantity of nourishment in the heap of manure will of course be so much diminished; that if the bulk of the dung-heap be diminished one half, or one third, by excessive fermentation, the quantity of nourishment to the crops will be diminished in a greater ratio." Still it is contended, that, though some of the gases which constitute the food of plants are disengaged from fermenting stable manure, yet that it does not follow that plants will receive them as food directly as they are disengaged. On the contrary, it is considered that they would either reject food in that state; or, if they could not avoid taking it in, that they would be injured by it. "Accordingly, we invariably find that plants suffer from their contact with fermenting dung, and it is this well-known fact, more than any other circumstance, which deters farmers from applying dung in an unprepared state." What has experience determined as the least injurious state in which dung can be applied to any crop? The cultivator answers, in the state of short muck, that is, as "a soft cohesive mass," capable of being cut by a spade. What state has the cultivator determined to be the best for putrescent manure to be in when applied to soil not under crop, but which is to be sown or planted some days or weeks afterwards? A determinate answer to this question, founded on experience, has not yet been given. Farm-yard manure is sometimes applied to fallows in an unprepared state, but always a considerable time previously to the seed being committed to the soil.

1940. *The scientific accuracy of the cultivator's practice in applying dung in the state of short muck* is thus given in a recent number of the *Quarterly Journal of Agriculture*:—"In 1802, the celebrated Klaproth received from Palermo a substance which exuded spontaneously from the bark of a species of elm, and to which Dr. Thomson gave the temporary name of ulmin. It dissolves speedily in a small quantity of water, in which respect it is like a gum; but when the solution is very much concentrated by evaporation, it is not in the least mucilaginous or ropy, nor does it answer as a paste, and in this respect it differs essentially from gum. When a few drops of nitric or oxymuriatic acid are added to the solution, it becomes a gelatinous mass, which, when slowly evaporated to dryness, and heated with alcohol and again evaporated, leaves a light brown bitter and sharp resinous substance. Thus it appears that ulmin, by the addition of a little oxygen, is converted into a resinous substance. In this new state it is insoluble in water. This property is very singular. That a substance soluble in water should assume the resinous form with such facility, is very remarkable. (*Thomson's Chemistry*, vol. iv. p. 686.) Berzelius has found this curious substance in all barks; Braconnot in sawdust, starch, and sugar. But, what is more to our purpose, Sprengel and Polydore Boullay have found it to constitute a leading principle in all soils and manures. Sprengel appropriately calls it humin from its existence in all soils, ulmin being given to it by Dr. Thomson as a temporary name." (*Quart. Jour. Agr.*, vol. iv. p. 690.)

1941. *Humic acid and carbonic acid gas, mixed with water*, constitute, according to this discovery, the chief food of plants. Every description of manure is only valuable in proportion as it contains these substances. Humic acid is found in abundance in putrescent manure when it is so far rotted as that it may be cut with a spade. It has been proved that rotted dung contains much more carbonic acid gas and humic acid, weight for weight, than fresh dung. Fresh dung is injurious to vegetation in consequence of its ammonia, which, from its acridity, in practice is said to burn plants. Ammonia becomes concentrated in stale liquid manures, and such manures are, therefore, mixed lightly with water, "in order to dilute the ammonia, and allow the proper action of the humic acid, which exists in large quantity in them." Covering a dunghill with soil in hot weather "is now explained, not as it has hitherto been, viz. by asserting that the earth absorbs, and prevents the escape of, the carbonic acid gas, which it could

no more do than a balloon made of gauze could prevent the escape of hydrogen gas (*Grisebachite*); but that a violent fermentation in the dung is checked by the earth partly excluding the atmospheric air and rain water; the oxygen in either of which is indispensable to continue the process of forming carbonic acid gas by uniting with the dung. In regard to composts, it is found that to mix lime with fresh or rotten dung is to waste it; because the lime takes up and renders useless the carbonic acid gas which it contains. In like manner, a compost of fresh dung and weeds, green leaves, grass, turf, and green vegetables, without lime, is valuable, because all these substances supply abundance of humin. On the other hand, lime promotes the fermentation of peat earth, dry leaves, and every thing which contains hard woody fibre, and supplies humin in quantity" (*Quart. Jour. Agr.*, vol. iv. p. 683).

1492. *Such are the two leading theories of the operation of putrescent manures*; in the application of which the gardener must take especial care not to err on the side of over-fermentation. It is an undoubted fact, that the black spit dung from old hotheds, however moist, is not nearly so powerful a manure as dung in a comparatively recent state from the farm-yard. For our own part, we are inclined to place the happy moment of application in a middle point between littersy dung, which can only be lifted with a fork, and rotten dung, which can be easily cut with a spade. It will thus appear that we neither agree entirely with the theory of Sir Humphry Davy, which is also that of M. Chaptal in the edition for 1820 of his work entitled *La Chimie appliquée à l'Agriculture*, nor with the theory of Humin, of Klaproth, Sprengel, Thomson, and others.

SECT. II. Of Manures of Mineral Origin.

1943. *Earthy and saline manures* are probably of more recent invention, and, doubtless, of more uncertain use, than those of animal and vegetable origin. The conversion, into original forms, of matter which has belonged to living structures, is a process easily understood; it is more difficult to follow the operations by which earthy and saline matters are consolidated into vegetable fibre, and by which they are made subservient to the functions of plants. These operations can be materially elucidated by modern chemistry; and shall here be considered as to the theory of their operation and as to their specific kinds.

SUBSECT. 1. Theory of the Operation of Mineral Manures.

1944. *Saline and calcareous substances* form the principal fossil manures. Much has been written on lime and common salt, both in the way of speculation and reasoning from facts; which, from want of chemical knowledge, has turned to no useful account; and cultivators, till very lately, contented themselves with stating that these substances acted as stimuli to the soil, something like condiments to the digestive organs of animals. Even chemists themselves are not yet unanimous in all their opinions; but still, the result of their enquiries will be found of great benefit to the scientific cultivator.

1945. *Various opinions* exist as to the rationale of the operation of mineral manures. "Some enquirers," Sir H. Davy observes, "adopting that sublime generalisation of the ancient philosophers, that matter is the same in essence, and that the different substances, considered as elements by chemists, are merely different arrangements of the same indestructible particles, have endeavoured to prove that all the varieties of the principles found in plants, may be formed from the substances in the atmosphere; and that vegetable life is a process in which bodies, that the analytical philosopher is unable to change or to form, are constantly composed and decomposed. But the general results of experiments are very much opposed to the idea of the composition of the earths, by plants, from any of the elements found in the atmosphere, or in water; and there are various facts contradictory to the idea." Jacquin states, that the ashes of glass-wort (*Salsola Soda*), when it grows in inland situations, afford the vegetable alkali; when it grows on the sea-shore, where compounds, which afford the fossil or marine alkali are more abundant, it yields that substance. Du Hamel found that plants which usually grow on the sea-shore made small progress when planted in soils containing little common salt. The sun-flower, when growing in lands containing no nitre, does not afford that substance; though, when watered by a solution of nitre, it yields nitre abundantly. The tables of De Saussure show that the ashes of plants are similar in constitution to the soils in which they have vegetated. De Saussure made plants grow in solutions of different salts; and he ascertained that, in all cases, certain portions of the salts were absorbed by the plants, and found unaltered in their organs. Even animals do not appear to possess the power of forming the alkaline and earthy substances. Dr. Fordyce found that when canary birds, at the time they were laying eggs, were deprived of access to carbonate of lime, their eggs had soft shells; and if there is any process for which nature may be conceived most likely to supply resources of this kind, it is that connected with the reproduction of the species.

1946. *It seems a fair conclusion*, as the evidence on the subject now stands, that the different earths and saline substances found in the organs of plants, are supplied by the soils in which they grow; and in no cases composed by new arrangements of the elements in air or water. What may be our ultimate view of the laws of chemistry, or how far our ideas of elementary principles may be simplified, it is impossible to say. We can only reason from facts. We cannot imitate the powers of composition belonging to vegetable structures; but, at least, we can understand them: and, as far as our researches have gone, it appears that, in vegetation, compound forms are uniformly produced from simple ones; and the elements in the soil, the atmosphere, and the earth, absorbed and made parts of beautiful and diversified structures. The views which have been just developed lead to correct ideas of the operation of those manures which are not necessarily the

result of decayed organised bodies, and which are not composed of different proportions of carbon, hydrogen, oxygen, and azote. They must produce their effect, either by becoming a constituent part of the plant, or by acting upon its more essential food, so as to render it more fitted for the purposes of vegetable life.

SUBJECT. 2. *Of the different Species of Mineral Manures.*

1947. *Alkaline earths, or alkalies and their combinations*, which are found unmixed with the remains of any organised beings, are the only substances which can with propriety be called fossil manures. The only alkaline earths which have been hitherto applied in this way, are lime and magnesia; though potassa and soda, the two fixed alkalies, are both used, to a limited extent, in certain of their chemical compounds.

1948. *The most common form in which lime is found on the surface of the earth*, is in a state of combination with carbonic acid or fixed air. If a piece of limestone or chalk be thrown into a fluid acid, there will be an effervescence. This is owing to the escape of the carbonic acid gas. The lime becomes dissolved in the liquor. When limestone is strongly heated, the carbonic acid gas is expelled, and then nothing remains but the pure alkaline earth: in this case there is a loss of weight; and, if the fire has been very high, it approaches to one half the weight of the stone; but, in common cases, limestones, if well dried before burning, do not lose much more than 35 to 40 per cent., or from seven to eight parts out of twenty.

1949. *When burnt lime is exposed to the atmosphere*, in a certain time it becomes mild, and is the same substance as that precipitated from lime-water: it is combined with carbonic acid gas. Quicklime, when first made, is caustic and burning to the tongue, renders vegetable blues green, and is soluble in water; but when combined with carbonic acid, it loses all these properties, its solubility, and its taste: it regains its power of effervescing, and becomes the same chemical substance as chalk or limestone. Very few limestones or chalks consist entirely of lime and carbonic acid. The statuary marbles, or certain of the rhomboidal spars, are almost the only pure species; and the different properties of limestones, both as manures and cements, depend upon the nature of the ingredient mixed in the limestone; for the true calcareous element, the carbonate of lime, is uniformly the same in nature, properties, and effects, and consists of one proportion of carbonic acid 41.4, and one of lime 55. When a limestone does not copiously effervesce in acids, and is sufficiently hard to scratch glass, it contains siliceous, and probably aluminous earth: when it is deep brown or red, or strongly coloured of any of the shades of brown or yellow, it contains oxide of iron; when it is not sufficiently hard to scratch glass, but effervesces slowly, and makes the acid in which it effervesces milky, it contains magnesia; and when it is black, and emits a fetid smell if rubbed, it contains coaly or bituminous matter. Before any opinion can be formed of the manner in which the different ingredients in limestones modify their properties, it will be necessary to consider the operation of pure lime as a manure.

1950. *Calcareous earth* is found in the ashes of the greater number of plants: and, exposed to the air, lime cannot long continue caustic, for the reasons that were just now assigned, but soon becomes united to carbonic acid. When newly-burnt lime is exposed to air, it soon falls into powder: in this case it is called slacked lime; and the same effect is immediately produced by throwing water upon it, when it heats violently, and the water disappears. Slacked lime is merely a combination of lime, with about one third of its weight of water; i. e. fifty-five parts of lime absorb seventeen parts of water; and in this case it is composed of a definite proportion of water, and is called by chemists *hydrate of lime*; and when hydrate of lime becomes carbonate of lime by long exposure to air, the water is expelled, and the carbonic acid gas takes its place. When lime, whether freshly burnt or slacked, is mixed with any moist fibrous vegetable matter, there is a strong action between the lime and the vegetable matter, and they form a kind of compost together, of which a part is usually soluble in water. By this kind of operation, lime renders matter, which was before comparatively inert, nutritive; and, as charcoal and oxygen abound in all vegetable matters, it becomes at the same time converted into carbonate of lime.

1951. *Mild lime, powdered limestone, marls, or chalks*, have no action of this kind upon vegetable matter: they destroy worms, snails, slugs, frogs, and other tender-skinned insects and vermin; and they prevent the too rapid decomposition of substances already dissolved. It is obvious, from these circumstances, that the operations of quicklime, and marl or chalk, depend upon principles altogether different.

1952. *Marl, and even shell sand*, have been known to act chemically on peat bogs, and to produce astonishing benefits. True and genuine peat bogs contain a considerable quantity of an acid which has some affinity to gallic acid, and often yield phosphoric acid to analysis. It appears to be these acids which confer on peat earth its highly antiseptic qualities, and prevent the complete decay of woody fibre in such situations. When either true marl or shell sand is laid as a manure in such soils, a rapid decomposition of the

vegetable matter takes place, owing to the calcareous matter uniting with the acid which before impregnated the woody fibre; and such land soon becomes very productive, probably also because the carbonic acid of the marl and shell sand is applied to the growth of living vegetables as it is gradually disengaged by the union of these acids with the lime. (T. S. T.)

1953. *General principles for applying lime.* The solution of the question whether quicklime ought to be applied to a soil, depends upon the quantity of inert vegetable matter that it contains. The solution of the question, whether marl, mild lime, or powdered limestone ought to be applied, depends upon the quantity of calcareous matter already in the soil. All soils which do not effervesce with acids are improved by mild lime, and ultimately by quicklime; and sands more than clays. When a soil, deficient in calcareous matter, contains much soluble vegetable manure, the application of quicklime should always be avoided, as it either tends to decompose the soluble matters by uniting to their carbon and oxygen so as to become mild lime, or it combines with the soluble matters, and forms compounds having less attraction for water than the pure vegetable substance. The case is the same with respect to most animal manures; but the operation of the lime is different in different cases, and depends upon the nature of the animal matter. Lime forms a kind of insoluble soap with oily matters, and then gradually decomposes them by separating from them oxygen and carbon. It combines likewise with the animal acids, and probably assists their decomposition by abstracting carbonaceous matter from them combined with oxygen; and consequently it must render them less nutritive. It tends to diminish, likewise, the nutritive powers of albumen from the same causes; and always destroys, to a certain extent, the efficacy of animal manures, either by combining with certain of their elements, or by giving to them new arrangements. Lime should never be applied with animal manures, unless they are too rich, or for the purpose of preventing noxious effluvia. It is injurious when mixed with any common dung, and tends to render the extractive matter insoluble. According to Chaptal (*Chimie appliquée*, &c. vol. i. p. 153.), lime forms insoluble composts with almost all animal and vegetable substances that are soft, and thus destroys their fermentative properties. Such compounds, however, exposed to the continued action of the air, alter in course of time; the lime becomes carbonate; the animal or vegetable matters decompose by degrees, and furnish new products as vegetable nourishment. In this view, lime presents two great advantages for the nutrition of plants; the first, that of disposing certain insoluble bodies to form soluble compounds; the second, that of prolonging the action and nutritive qualities of substances, beyond the term during which they would be retained if these substances were not made to enter into combination with lime. Thus the nutritive qualities of blood, as it exists in the compound of lime and blood known as sugarbaker's scum, are moderated, prolonged, and given out by degrees; blood alone, applied directly to the roots of plants, will destroy them with few or no exceptions.

1954. *Lime promotes fermentation.* In those cases in which fermentation is useful to produce nutriment from vegetable substances, lime is always efficacious. Some moist spent tanners' bark was mixed with one fifth of its weight of quicklime, and suffered to remain in a close vessel for three months; the lime had become coloured, and was effervescent: when water was boiled upon the mixture, it gained a tint of fawn-colour, and by evaporation furnished a fawn-coloured powder, which must have consisted of lime united to vegetable matter, for it burnt when strongly heated, and left a residuum of mild lime.

1955. *Different kinds of limestones* have different effects. The limestones containing alumina and silica are less fitted for the purposes of manure than pure limestones; but the lime formed from them has no noxious quality. Such stones are less efficacious, merely because they furnish a smaller quantity of quicklime. There is very seldom any considerable portion of coal matter in bituminous limestones; never as much as five parts in 100; but such limestones make very good lime. The carbonaceous matter can do no injury to the land, and may, under certain circumstances, become a food of the plant.

1956. *Magnesian limestone*, though it has been found to injure crops, has yet been used with good effect in some cases. Magnesia has a much weaker attraction for carbonic acid than lime, and will remain in the state of caustic or calcined magnesia for many months, though exposed to the air; and, as long as any caustic lime remains, the magnesia cannot be combined with carbonic acid, for lime instantly attracts carbonic acid from magnesia. When a magnesian limestone is burnt, the magnesia is deprived of carbonic acid much sooner than the lime; and, if there is not much vegetable or animal matter in the soil to supply by its decomposition carbonic acid, the magnesia will remain for a long while in the caustic state, in which state it acts as a poison to certain vegetables; and that more magnesian lime may be used upon rich soils, seems to be owing to the circumstance, that the decomposition of the manure in them supplies carbonic acid. Magnesia in its mild state, *i. e.* fully combined with carbonic acid, seems to

be always a useful constituent of soils. It is obvious, from what has been said, that lime from the magnesian limestone may be applied in large quantities to peats; and that, where lands have been injured by the application of too large a quantity of magnesian lime, peat will be a proper and efficient remedy.

1957. A simple test of *magnesia in a limestone* is its slight effervescence with acids, and its rendering diluted nitric acid, or aqua fortis, milky. From the analysis of Tennant, it appears to contain from 20·3 to 22·5 magnesia; 29·5 to 31·7 lime; 47·2 carbonic acid; 0·8 clay and oxide of iron. Magnesian limestones are usually of a brown or pale yellow colour. They are found in Somersetshire, Leicestershire, Derbyshire, Shropshire, Durham, and Yorkshire; and in many parts of Ireland, particularly near Belfast. In general, when limestones are not magnesian, their purity will be indicated by their loss of weight in burning; the more they lose, the larger is the quantity of calcareous matter they contain. The magnesian limestones contain more carbonic acid than the common limestones; and all of them lose more than half their weight by calcination.

1958. *Gypsum*. Besides being used in the forms of lime and carbonate of lime, calcareous matter is applied as manure in other combinations. One of these bodies is gypsum, or sulphate of lime. This substance consists of sulphuric acid (the same body that exists combined with water in oil of vitriol) and lime; and when dry, it is composed of fifty-five parts of lime and seventy-five parts of sulphuric acid. Common gypsum, or selenite, such as that found at Sbotover Hill, near Oxford, contains, besides sulphuric acid and lime, a considerable quantity of water; and its composition may be thus expressed: sulphuric acid one proportion seventy-five; lime one proportion fifty-five; water two proportions thirty-four.

1959. *The nature of gypsum* is easily demonstrated: if oil of vitriol be added to quicklime, there is a violent heat produced; when the mixture is ignited, water is given off; and gypsum alone is the result, if the acid has been used in sufficient quantity; and gypsum mixed with quicklime, if the quantity has been deficient. Gypsum, free from water, is sometimes found in nature, when it is called anhydrous selenite; it is distinguished from common gypsum by giving off no water when heated. When gypsum, free from water, or deprived of water by heat, is made into a paste with water, it rapidly sets by combining with that fluid. Plaster of Paris is powdered dry gypsum, and its property as a cement, and its use in making casts, depend upon its solidifying a certain quantity of water, and making with it a coherent mass. Gypsum is soluble in about 500 times its weight of cold water, and is more soluble in hot water; so that when water has been boiled in contact with gypsum, crystals of this substance are deposited as the water cools. Gypsum is easily distinguished by its properties of affording precipitates to solutions of oxalates and of barytic salts. It has been much used in America, where it was first introduced by Franklin on his return from Paris, where he had been much struck with its effects. He sowed the words, *This has been sown with gypsum*, on a field of lucern, near Washington; the effects astonished every passenger, and the use of the manure quickly became general, and signally efficacious. It has been advantageously used in Kent, but in most counties of England it has failed, though tried in various ways, and upon different crops.

1960. *Very discordant notions have been formed as to the mode of operation of gypsum*. It has been supposed by some persons to act by its power of attracting moisture from the air; but this agency must be comparatively insignificant. When combined with water, it retains that fluid too powerfully to yield it to the roots of the plant; and its adhesive attraction for moisture is inconsiderable; the small quantity in which it is used likewise is a circumstance hostile to this idea. It has been erroneously said, that gypsum assists the putrefaction of animal substances, and the decomposition of manure.

1961. *The ashes of sainfoin, clover, and ryegrass, afford considerable quantities of gypsum*; and the substance probably is intimately combined as a necessary part of their woody fibre. If this be allowed, it is easy to explain the reason why it operates in such small quantities; for the whole of a clover crop, or sainfoin crop, on an acre, according to estimation, would afford by incineration only three or four bushels of gypsum. The reason why gypsum is not generally efficacious, is probably because most cultivated soils contain it in sufficient quantities for the use of the grasses. In the common course of cultivation, gypsum is furnished in the manure; for it is contained in stable dung, and in the dung of all cattle fed on grass: and it is not taken up in corn crops, or crops of peas and beans, and in very small quantities in turnip crops; but where lands are exclusively devoted to pasturage and hay, it will be continually consumed.

1962. *Upon the use of sulphate of iron, or green vitriol*, which is a salt produced from peat in Bedfordshire, some very interesting documents have been produced by Dr. Pearson; and there is little doubt that the peat salt and the vitriolic water acted chiefly by producing gypsum. The soils on which both are efficacious are calcareous; and sulphate of iron is decomposed by the carbonate of lime in such soils. The sulphate of iron consists of sulphuric acid and oxide of iron, and is an acid and a very soluble salt;

when a solution of it is mixed with carbonate of lime, the sulphuric acid quits the oxide of iron to unite to the lime, and the compounds produced are insipid and comparatively insoluble.

1963. *Vitriolic impregnations* in soils where there is no calcareous matter are injurious; but it is probably in consequence of their supplying an excess of ferruginous matter to the sap. Oxide of iron, in small quantities, forms a useful part of soils; it is found in the ashes of plants, and probably is hurtful only in its acid combinations. The ashes of all peats do not afford gypsum. In general, when a recent peat-ash emits a strong smell, resembling that of rotten eggs when acted upon by vinegar, it will furnish gypsum. There is a curious agency of iron in soils, which may here be mentioned. Soils containing iron at a minimum of oxidation decompose carbonic acid: the oleaginous parts of manures, by converting the brown oxide, which occurs in every soil, into that with a minimum of oxygen, form a substance capable of aiding the nutrition of plants, by affording them carbon from carbonic acid. (T.)

1964. *Phosphate of lime* is a combination of phosphoric acid and lime, one proportion of each. It is a compound insoluble in pure water, but soluble in water containing any acid matter. It forms the greater part of calcined bones. It exists in most excrementitious substances, and is found both in the straw and grain of wheat, barley, oats, and rye, and likewise in beans, peas, and tares. It exists in some places in these islands native, but only in very small quantities. Phosphate of lime is generally conveyed to the land in the composition of other manure, and it is probably necessary to corn crops and other white crops.

1965. *Bone-ashes* calcined and ground to powder will probably be found useful on soils containing much vegetable matter, and may perhaps enable soft peats to produce wheat; but the powdered bone in an uncalcined state is much to be preferred in all cases when it can be procured.

1966. *The saline compounds of magnesia* will require very little discussion with regard to their uses as manures. In combination with sulphuric acid, magnesia forms a soluble salt. This substance, it is stated by some enquirers, has been found of use as a manure; but it is not found in nature in sufficient abundance, nor is it capable of being made by art sufficiently cheap, to be of useful application in the common course of husbandry.

1967. *Wood-ashes* consist principally of the vegetable alkali united to carbonic acid; and as this alkali is found in almost all plants, it is not difficult to conceive that it may form an essential part of their organs. The general tendency of the alkalies is to give solubility to vegetable matters; and in this way they may render carbonaceous and other substances capable of being taken up by the tubes in the radical fibres of plants. Vegetable alkali likewise has a strong attraction for water, and even in small quantities may tend to give a due degree of moisture to the soil, or to other manures; though this operation, from the small quantities used or existing in the soil, can be only of a secondary kind.

1968. *The mineral alkali, or soda*, is found in the ashes of sea-weed, and may be procured by certain chemical agencies from common salt. Common salt consists of the metal named sodium, combined with chlorine; and pure soda consists of the same metal united to oxygen. When water is present, which can afford oxygen to the sodium, soda may be obtained in several modes from salt. The same reasoning will apply to the operation of the pure mineral alkali, or the carbonated alkali, as to that of the vegetable alkali; and when common salt acts as a manure, it is probably by entering into the composition of the plant in the same manner as gypsum, phosphate of lime, and the alkalies. Sir John Pringle has stated, that salt in small quantities assists the decomposition of animal and vegetable matter. This circumstance may render it useful in certain soils. Common salt, likewise, is offensive to insects. In small quantities it is sometimes a useful manure, and it is probable that its efficacy depends upon many combined causes. It is not unlikely, that the same causes as those which act in modifying the operation of gypsum influence the effects of salt. Most lands in this island, particularly those near the sea, probably contain a sufficient quantity of salt for all the purposes of vegetation; and in such cases the supply of it to the soil will not only be useless, but may be injurious. In great storms the spray of the sea has been carried more than fifty miles from the shore; so that from this source salt must be often supplied to the soil. Salt is found in almost all sandstone rocks, and it must exist in the soil derived from these rocks. It is a constituent likewise of almost every kind of animal and vegetable manure. A variety of curious and often contradictory experiments on this subject will be found in the *Gardener's Magazine*, vols. ii. and iii.

1969. *Other compounds.* Besides these compounds of the alkaline earths and alkalies, many others have been recommended for the purposes of increasing vegetation; such are nitre, or the nitrous acid combined with potassa. Sir Kenelm Digby states that he made barley grow very luxuriantly by watering it with a very weak solution of nitre; but he is

too speculative a writer to awaken confidence in his results. This substance consists of one proportion of azote, six of oxygen, and one of potassium; and it is not unlikely that it may furnish azote to form albumen or gluten in those plants which contain them; but the nitrous salts are too valuable for other purposes to be used as manures. Dr. Home states that sulphate of potassa, which was just now mentioned as found in the ashes of some peats, is a useful manure: but Nasmyth (*Elements of Agriculture*, p. 78.) questions his results; and quotes experiments hostile to his opinions, and, as he conceives, unfavourable to the efficacy of any species of saline manure. Much of the discordance of the evidence relating to the efficacy of saline substances depends upon the circumstance of their having been used in different proportions, and, in general, in quantities much too large.

1970. *Solutions of saline substances* were used twice a week, in the quantity of two ounces, on spots of grass and corn, sufficiently remote from each other to prevent any interference of results. The substances tried were bi-carbonate, sulphate, acetate, nitrate, and muriate of potassa; sulphate of soda; and sulphate, nitrate, muriate, and carbonate of ammonia. It was found, that, in all cases when the quantity of the salts equalled one thirtieth part of the weight of the water, the effects were injurious; but least so in the instance of the carbonate, sulphate, and muriate of ammonia. When the quantities of the salts were one three hundredth part of the solution, the effects were different. The plants watered with the solutions of the sulphates grew just in the same manner as similar plants watered with rain-water. Those acted on by the solution of nitre, acetate, and carbonate of potassa, and muriate of ammonia, grew rather better. Those treated with the solution of carbonate of ammonia grew most luxuriantly of all. This last result is what might be expected; for carbonate of ammonia consists of carbon, hydrogen, azote, and oxygen. There was, however, another result which was not anticipated; the plants watered with solution of nitrate of ammonia did not grow better than those watered with rain-water. The solution reddened litmus paper; and probably the free acid exerted a prejudicial effect, and interfered with the result.

1971. *Soot* doubtless owes part of its efficacy to the ammoniacal salts it contains. The liquor produced by the distillation of coal contains carbonate and acetate of ammonia, and is said to be a very good manure.

1972. *Soapers' waste* has been recommended as a manure, and it has been supposed that its efficacy depended upon the different saline matters it contains; but their quantity is very minute indeed, and its principal ingredients are mild lime and quicklime. In the soapers' waste, from the best manufactories, there is scarcely a trace of alkali. Lime, moistened with sea-water, affords more of this substance, and is said to have been used in some cases with more benefit than common lime.

1973. *The result of Sir H. Davy's discussion as to the extent of the effects of saline substances on vegetation* is, that except the ammoniacal compounds, or the compounds containing nitric, acetic, and carbonic acid, none of them can afford by their decomposition any of the common principles of vegetation, viz. carbon, hydrogen, and oxygen. The alkaline sulphates and the earthy muriates are so seldom found in plants, or are found in such minute quantities, that it can never be an object to apply them to the soil. The earthy and alkaline substances seem never to be formed in vegetation; and there is every reason to believe that they are never decomposed; for, after being absorbed, they are found in the ashes. The metallic bases of them cannot exist in contact with aqueous fluids; and these metallic bases, like other metals, have not as yet been resolved into any other forms of matter by artificial processes; they combine readily with other elements, but they remain indestructible, and can be traced undiminished in quantity through their diversified combinations.

CHAP. III.

Of the Agency of Heat, Light, Electricity, and Water, in Vegetable Culture.

1974. The particular agency of heat, light, and water, in vegetation and culture, has been so frequently illustrated, that it only remains to give a general idea of their natures, and to offer some remarks on electricity.

SECT. I. *Of Heat and Light.*

1975. *The heat of the sun is the cause of growth, and its light the cause of maturity, in the vegetable kingdom.* This is universally acknowledged: animals will live without light or with very little; but no plants whatever can exist for any time without the presence of this element. The agency of electricity in vegetation is less known.

1976. *Two opinions are current respecting the nature of heat.* By some philosophers it

is conceived to be a peculiar subtle fluid, of which the particles repel each other, but have a strong attraction for the particles of other matter : by others it is considered as a motion or vibration of the particles of matter, which is supposed to differ in velocity in different cases, and thus to produce the different degrees of temperature. Whatever decision be ultimately made respecting these opinions, it is certain that there is matter moving in the space between us and the heavenly bodies capable of communicating heat ; the motions of which are rectilinear : thus the solar rays produce heat in acting on the surface of the earth. The beautiful experiments of Dr. Herschel have shown that there are rays transmitted from the sun which do not illuminate, and which yet produce more heat than the visible rays ; and Ritter and Dr. Wollaston have shown that there are other invisible rays distinguished by their chemical effects.

1977. *Heat is radiated by the sun to the earth*, and if suffered to accumulate, Dr. Wells observes, would quickly destroy the present constitution of our globe. This evil is prevented by the radiation of heat from the earth to the heavens, during the night, when it receives from them little or no heat in return. But through the wise economy of means, which is witnessed in all the operations of nature, the prevention of this evil is made the source of great positive good ; for the surface of the earth, having thus become colder than the neighbouring air, condenses a part of the watery vapour of the atmosphere into dew, the utility of which is too manifest to require elucidation. This fluid appears chiefly where it is most wanted, on herbage and low plants, avoiding, in great measure, rocks, bare earth, and considerable masses of water. Its production, too, tends to prevent the injury that might arise from its own cause ; since the precipitation of water, upon the tender parts of plants, must in them lessen the cold which occasions it. The prevention, either wholly or in part, of cold, from radiation, in substances on the ground, by the interposition of any solid body between them and the sky, arises in the following manner : the lower body radiates its heat upwards, as if no other intervened between it and the sky ; but the loss, which it hence suffers, is more or less compensated by what is radiated to it, from the body above, the under surface of which possesses always the same, or very nearly the same temperature as the air. The manner in which clouds prevent, or occasion to be small, the appearance of a cold at night, upon the surface of the earth, is by radiating heat to the earth, in return for that which they intercept in its progress from the earth towards the heavens. For although, upon the sky becoming suddenly cloudy during a calm night, a naked thermometer, suspended in the air, commonly rises 2 or 3 degrees, little of this rise is to be attributed to the heat evolved by the condensation of watery vapour in the atmosphere ; for the heat so extricated must soon be dissipated, whereas the effect of greatly lessening, or preventing altogether, the appearance of a superior cold on the earth to that of the air, will be produced by a cloudy sky, during the whole of a long night.

1978. *Dense clouds, near the earth, reflect back the heat they receive from it by radiation.* But similar dense clouds, if very high, though they equally intercept the communication of the earth with the sky, yet being, from their elevated situation, colder than the earth, will radiate to it less heat than they receive from it, and may, consequently, admit of bodies on its surface becoming several degrees colder than the air. Islands, and parts of continents close to the sea, being, by their situations, subject to a cloudy sky, will, from the smaller quantity of heat lost by them through radiation to the heavens, at night, in addition to the reasons commonly assigned, be less cold in winter than countries considerably distant from any ocean. But the chief cause why islands, and the coasts of the ocean, are more temperate than continents and inland situations is, that the temperature of the ocean a little from the surface, and where not cooled by contact with ice, is very uniformly about 54° Fahr. in all latitudes. The ocean is the great equaliser of heat. (T.)

1979. *Fogs, like clouds, will arrest heat*, which is radiated upwards by the earth, and if they are very dense, and of considerable perpendicular extent, may remit to it as much as they receive. Fogs do not, in any instance, furnish a real exception to the general rule, that whatever exists in the atmosphere, capable of stopping or impeding the passage of radiant heat, will prevent or lessen the appearance at night of a cold on the surface of the earth, greater than that of the neighbouring air. The water deposited upon the earth, during a fog at night, may sometimes be derived from two different sources, one of which is a precipitation of moisture from a considerable part of the atmosphere, in consequence of its general cold ; the other, a real formation of dew, from the condensation, by means of the superficial cold of the ground, of the moisture of that portion of the air which comes in contact with it. In such a state of things, all bodies will become moist, but those especially which most readily attract dew in clear weather.

1980. *When bodies become cold by radiation*, the degree of effect observed must depend, not only on their radiating power, but in part also on the greater or less ease with which they can derive heat, by conduction, from warmer substances in contact with them. Bodies, exposed in a clear night to the sky, must radiate as much heat to it during the

prevalence of wind, as they would do if the air were altogether still. But in the former case, little or no cold will be observed upon them above that of the atmosphere, as the frequent application of warm air must quickly return a heat equal, or nearly so, to that which they had lost by radiation. A slight agitation of the air is sufficient to produce some effect of this kind; though, as has already been said, such an agitation, when the air is very pregnant with moisture, will render greater the quantity of dew; one requisite for a considerable production of this fluid being more increased by it, than another is diminished.

1981. It has been remarked, that *the hurtful effects of cold occur chiefly in hollow places*. If this be restricted to what happens on the serene and calm nights, two reasons, from different sources, are to be assigned for it. The first is, that the air, being stiller in such a situation than in any other, the cold, from radiation in the bodies contained in it, will be less diminished by renewed applications of warmer air; the second, that, from the longer continuance of the same air in contact with the ground, in depressed places than in others, less dew will be deposited, and therefore less heat extricated, during its formation.

1982. An observation, closely connected with the preceding, namely, that, *in clear and still nights, frosts are less severe upon the hills than in the neighbouring plains*, has excited more attention, chiefly from its contradicting what is commonly regarded an established fact, that the cold of the atmosphere always increases with the distance from the earth. But, on the contrary, the fact is certain, that, in very clear and still nights, the air near to the earth is colder than that which is more distant from it, to the height of at least 220 feet, this being the greatest to which experiments relate. If, then, a hill be supposed to rise from a plain to the height of 220 feet, having upon its summit a small flat surface covered with grass; and if the atmosphere, during a calm and serene night, be admitted to be 10° warmer there than it is near the surface of the low grounds, which is a less difference than what sometimes occurs in such circumstances it is manifest that, should both the grass upon the hill, and that upon the plain, acquire a cold of 10° by radiation, the former will, notwithstanding, be 10° warmer than the latter. Hence, also, the tops of trees are sometimes found dry, when the grass on the ground's surface has been found covered with dew.

1983. *A very slight covering will exclude much cold*. "I had often," observes Dr. Wells, "in the pride of half knowledge, smiled at the means frequently employed by gardeners, to protect tender plants from cold, as it appeared to me impossible that a thin mat, or any such flimsy substance, could prevent them from attaining the temperature of the atmosphere, by which alone I thought them liable to be injured. But, when I had learned that bodies on the surface of the earth become, during a still and serene night, colder than the atmosphere, by radiating their heat to the heavens, I perceived immediately a just reason for the practice which I had before deemed useless. Being desirous, however, of acquiring some precise information on this subject, I fixed, perpendicularly, in the earth of a grass-plot, four small sticks, and over their upper extremities, which were six inches above the grass, and formed the corners of a square, the sides of which were two feet long, drew tightly a very thin cambric handkerchief. In this disposition of things, therefore, nothing existed to prevent the free passage of air from the exposed grass, to that which was sheltered, except the four small sticks, and there was no substance to radiate heat downwards to the latter grass, except the cambric handkerchief. The temperature of the grass which was thus shielded from the sky, was, upon many nights afterwards, examined by me, and was always found higher than that of neighbouring grass, which was uncovered, if this was colder than the air."

1984. *The covering has most effect when placed at a little distance above the plants or objects to be sheltered*. A difference in temperature, of some magnitude, was always observed on still and serene nights, between bodies sheltered from the sky by substances touching them, and similar bodies which were sheltered by a substance a little above them. "I found, for example, upon one night," says Dr. Wells, that "the warmth of grass, sheltered by a cambric handkerchief raised a few inches in the air, was 3° greater than that of a neighbouring piece of grass, which was sheltered by a similar handkerchief actually in contact with it. On another night, the difference between the temperatures of two portions of grass, shielded in the same manner as the two above mentioned, from the influence of the sky, was 4° . Possibly, experience has long ago taught gardeners the superior advantage of defending tender vegetables, from the cold of clear and calm nights, by means of substances not directly touching them; though I do not recollect ever having seen any contrivance for keeping mats, or such like bodies, at a distance from the plants which they were meant to protect."

1985. *Heat produced by walls*. "Walls," Dr. Wells continues, "as far as warmth is concerned, are regarded as useful, during a cold night, to the plants which touch them or are near to them, only in two ways: first, by the mechanical shelter which they afford against cold winds; and, secondly, by giving out the heat which they had acquired during

the day. It appearing to me, however, that, on clear and calm nights, those on which plants frequently receive much injury from cold, walls must be beneficial in a third way, namely, by preventing, in part, the loss of heat which the plants would sustain from radiation, if they were fully exposed to the sky, the following experiment was made for the purpose of determining the justness of this opinion. A cambric handkerchief having been placed, by means of two upright sticks, perpendicularly to a grass-plot, and at right angles to the course of the air, a thermometer was laid upon the grass, close to the lower edge of the handkerchief, on its windward side. The thermometer, thus situated, was several nights compared with another, lying on the same grass-plot, but on a part of it fully exposed to the sky. On two of these nights, the air being clear and calm, the grass close to the handkerchief was found to be 4° warmer than the fully exposed grass. On a third, the difference was 6° . An analogous fact is mentioned by Gersten, who says that a horizontal surface is more abundantly dewed than one which is perpendicular to the ground."

1986. *Heat from a covering of snow.* "The covering of snow," the same author observes, "which countries in high latitudes enjoy during the winter, has been very commonly thought to be beneficial to vegetable substances on the surface of the earth, as far as their temperature is concerned, solely by protecting them from the cold of the atmosphere. But, were this supposition just, the advantage of the covering would be greatly circumscribed; since the upper parts of trees and of tall shrubs are still exposed to the influence of the air. Another reason, however, is furnished for its usefulness, by what has been said above; which is, that it prevents the occurrence of the cold, which bodies on the earth acquire, in addition to that of the atmosphere, by the radiation of their heat to the heavens during still and clear nights. The cause, indeed, of this additional cold, does not constantly operate; but its presence, during only a few hours, might effectually destroy plants which now pass unhurt through the winter. Again, as things are, while low vegetable productions are prevented, by their covering of snow, from becoming colder than the atmosphere, in consequence of their own radiation, the parts of trees and tall shrubs which rise above the snow are little affected by cold from this cause; for their uttermost twigs, now that they are destitute of leaves, are much smaller than the thermometers suspended by me in the air, which, in this situation, very seldom became more than 2° colder than the atmosphere. The larger branches, too, which, if fully exposed to the sky, would become colder than the extreme parts, are in a great degree sheltered by them; and, in the last place, the trunks are sheltered both by the smaller and larger parts; not to mention that the trunks must derive heat by conduction through the roots from the earth kept warm by the snow. In a similar way is partly to be explained the manner in which a layer of earth or straw preserves vegetable matters from the injurious effects of cold in winter." (*Essay on Dew.*)

1987. *The nature of light* is totally unknown. The light which proceeds from the sun seems to be composed of three distinct substances. Scheele discovered that a glass mirror, held before the fire, reflected the rays of light, but not the rays of caloric; but when a metallic mirror was placed in the same situation, both heat and light were reflected. The mirror of glass became hot in a short time, but no change of temperature took place on the metallic mirror. This experiment shows that the glass mirror absorbed the rays of caloric, and reflected those of light; while the metallic mirror, suffering no change of temperature, reflected both. If a glass plate be held before a burning body, the rays of light are not sensibly interrupted, but the rays of caloric are intercepted; for no sensible heat is observed on the opposite side of the glass; but when the glass has reached a proper degree of temperature, the rays of caloric are transmitted with the same facility as those of light; and thus the rays of light and caloric may be separated. But the curious experiments of Dr. Herschel have clearly proved that the invisible rays which are emitted by the sun have the greatest heating power. In those experiments, the different coloured rays were thrown on the bulb of a very delicate thermometer, and their heating power was observed. The heating power of the violet, green, and red rays were found to be to each other as the following numbers: — violet, 16.0; green, 22.4; red, 55.0. The heating power of the most refrangible rays was least, and this power increases as the refrangibility diminishes. The red ray, therefore, has the greatest heating power; and the violet, which is the most refrangible, the least. The illuminating power, it has been already observed, is greatest in the middle of the spectrum, and it diminishes towards both extremities; but the heating power, which is least at the violet end, increases from that to the red extremity: and when the thermometer was placed beyond the limit of the red ray, it rose still higher than in the red ray, which has the greatest heating power in the spectrum. The heating power of these invisible rays was greatest at the distance of half an inch beyond the red ray; but it was sensible at the distance of one inch and a half.

1988. *The influence of the different solar rays on vegetation* has not yet been studied; but it is certain that the rays exercise an influence independent of the heat they produce.

Thus, plants kept in darkness, but supplied with heat, air, and moisture, grow for a short time, but they never gain their natural colours; their leaves are white and pale, and their juices watery and peculiarly saccharine: according to Knight, they merely expend the sap previously generated under the influence of light. (*Notes to Sir H. Davy's Agr. Chem.*, p. 402.)

SECT. II. Of Electricity.

1889. *Electrical changes are constantly taking place* in nature, on the surface of the earth, and in the atmosphere; but, as yet, the effects of this power on vegetation have not been correctly estimated. It has been shown by experiments made by means of the voltaic battery, that compound bodies in general are capable of being decomposed by electrical powers; and it is probable that the various electrical phenomena occurring in our system must influence both the germination of seeds and the growth of plants. It has been found that seeds have sprouted much more rapidly in water positively electrified by the voltaic instrument, than in water negatively electrified; and experiments made upon the atmosphere show that clouds are usually negative; and, as, when a cloud is in one state of electricity, the surface of the earth beneath is brought into the opposite state, it is probable that in common cases the surface of the earth is positive. A similar experiment is related by Dr. Darwin. (*Phytologia*, sect. xiii. 2, 3.)

1990. *Respecting the nature of electricity*, different opinions are entertained among scientific men. By some, the phenomena are conceived to depend upon a single subtle fluid in excess in the bodies said to be positively electrified, and in deficiency in the bodies said to be negatively electrified; a second class suppose the effects to be produced by two different fluids, called by them the vitreous fluid and the resinous fluid; and others regard them as affections or motions of matter, or an exhibition of attractive powers similar to those which produce chemical combination and decomposition, but usually exerting their action on masses.

1991. *A profitable application of electricity*, Dr. Darwin observes, to promote the growth of plants is not yet discovered; it is nevertheless probable, that, in dry seasons, the erection of numerous metallic points on the surface of the ground, but a few feet high, might in the night-time contribute to precipitate the dew by facilitating the passage of electricity from the air into the earth; and that an erection of such points higher in the air by means of wires wrapped round tall rods, like angling rods, or elevated on buildings, might frequently precipitate showers from the higher parts of the atmosphere. Such points erected in gardens might promote a quicker vegetation of the plants in their vicinity, by supplying them more abundantly with the electric ether. (*Phytologia*, xiii. 4.) J. Williams (*Climate of Great Britain*, p. 348.), enlarging on this idea, proposes to erect large electrical machines, to be driven by wind, over the general face of the country, for the purpose of improving the climate, and especially for lessening that superabundant moisture which he contends is yearly increasing from the increased evaporating surface produced by the vegetation of improved culture, and especially from the increase of pastures, hedges, and ornamental plantations.

SECT. III. Of Water.

1992. *Water is a compound of oxygen and hydrogen gas*, though primarily reckoned a simple or elementary substance. "If the metal called potassium be exposed in a glass tube to a small quantity of water, it will act upon it with great violence; elastic fluid will be disengaged, which will be found to be hydrogen; and the same effects will be produced upon the potassium, as if it had absorbed a small quantity of oxygen; and the hydrogen disengaged and the oxygen added to the potassium, are in weight as 2 to 15; and if two in volume of hydrogen, and one in volume of oxygen, which have the weights of 2 and 15, be introduced into a close vessel, and an electrical spark passed through them, they will inflame, and condense into 17 parts of pure water."

1993. *Water is absolutely necessary to the economy of vegetation* in its elastic and fluid states; and it is not devoid of use even in its solid form. Snow and ice are bad conductors of heat; and when the ground is covered with snow, or the surface of the soil or of water is frozen, the roots or bulbs of the plants beneath are protected by the congealed water from the influence of the atmosphere, the temperature of which, in northern winters, is usually very much below the freezing point; and this water becomes the first nourishment of the plant in early spring. The expansion of water during its congelation, at which time its volume increases one twelfth, and its contraction of bulk during a thaw, tend to pulverise the soil, to separate its parts from each other, and to make it more permeable to the influence of the air.

CHAP. IV.

Of the Agency of the Atmosphere in Vegetation.

1994. *The aerial medium which envelopes the earth* may be studied chemically and physically: the first study respects the elements of which the atmosphere is composed; and the second, their action in a state of combination, and as influenced by various causes, or those phenomena which constitute the weather.

SECT. I. *Of the Elements of the Atmosphere.*

1995. *Water, carbonic acid gas, oxygen, and azote*, are the principal substances composing the atmosphere; but more minute enquiries respecting their nature and agencies are necessary to afford correct views of its uses in vegetation.

1996. *That water exists in the atmosphere* is easily proved. If some of the salt, called muriate of lime, which has been just heated red, be exposed to the air, even in the driest and coldest weather, it will increase in weight, and become moist; and in a certain time will be converted into a fluid. If put into a retort and heated, it will yield pure water; will gradually recover its pristine state, and, if heated red, its former weight: so that it is evident that the water united to it was derived from the air. That it existed in the air in an invisible and elastic form, is proved by the circumstances, that if a given quantity of air be exposed to the salt, its volume and weight will diminish, provided the experiment be correctly made.

1997. *The quantity of water which exists in air*, as vapour, varies with the temperature. In proportion as the weather is hotter, the quantity is greater. At 50° of Fahrenheit, air contains about $\frac{1}{10}$ of its volume of vapour; and, as the specific gravity of vapour is to that of air nearly as 10 to 15, this is about $\frac{1}{15}$ of its weight. At 100°, supposing that there is a free communication with water, it contains about $\frac{1}{10}$ part in volume, or $\frac{1}{15}$ in weight. It is the condensation of vapour, by diminution of the temperature of the atmosphere, which is probably the principal cause of the formation of clouds, and of the deposition of dew, mist, snow, or hail.

1998. *The power of different substances to absorb aqueous vapour* from the atmosphere by cohesive attraction has been already referred to. The leaves of living plants appear to act upon this vapour in its elastic form, and to absorb it. Some vegetables increase in weight from this cause, when suspended in the atmosphere and unconnected with the soil; such are the house-leek, and different species of the aloe. In very intense heats, and when the soil is dry, the life of plants seems to be preserved by the absorbent power of their leaves; and it is a beautiful circumstance in the economy of nature, that aqueous vapour is most abundant in the atmosphere when it is most needed for the purposes of life; and that, when other sources of its supply are cut off, this is most copious.

1999. *The existence of carbonic acid gas in the atmosphere* is proved by the following process: if a solution of lime and water be exposed to the air, a pellicle will speedily form upon it, and a solid matter will gradually fall to the bottom of the water, and in a certain time the water will become tasteless; this is owing to the combination of the lime which was dissolved in the water with carbonic acid gas, which existed in the atmosphere, as may be proved by collecting the film and the solid matter, and igniting them strongly in a little tube of platina or iron; they will give out carbonic acid gas, and will become quicklime, which, added to the same water, will again bring it to the state of lime-water.

2000. *The quantity of carbonic acid gas in the atmosphere* is very small. It is not easy to determine it with precision, and it must differ in different situations; but, where there is a free circulation of air, it is probably never more than one 500th, nor less than one 800th, of the volume of air. Carbonic acid gas is nearly one third heavier than the other elastic parts of the atmosphere in their mixed state; hence, at first view, it might be supposed that it would be most abundant in the lower regions of the atmosphere; but, unless it has been immediately produced at the surface of the earth in some chemical process, this does not seem to be the case; elastic fluids of different specific gravities have a tendency to equable mixture by a species of attraction, and the different parts of the atmosphere are constantly agitated and blended together by winds or other causes. Saussure found lime-water precipitated on Mont Blanc, the highest point of land in Europe; and carbonic acid gas has been always found, apparently in due proportion, in the air brought down from great heights in the atmosphere by aeronautic adventurers.

2001. *The principal consumption of the carbonic acid* in the atmosphere seems to be in affording nourishment to plants; and some of them appear to be supplied with carbon chiefly from this source.

2002. *The formation of carbonic acid gas* takes place during fermentation, combustion, putrefaction, respiration, and a number of operations taking place upon the surface of

the earth; and there is no other extensive operation known in nature, by which it can be destroyed but by vegetation.

2003. *Oxygen and azote are the remaining constituents of the atmosphere.* After a given portion of common air has been deprived of aqueous vapour and carbonic acid gas, it appears little altered in its properties; it remains a compound of oxygen and azote, which supports combustion and animal life. There are many modes of separating these two gases from each other. A simple one is by burning phosphorus in a confined volume of air; this absorbs the oxygen and leaves the azote; and 100 parts in volume of air, in which phosphorus has been burnt, yield seventy-nine parts of azote; and by mixing this azote with twenty-one parts of fresh oxygen gas artificially procured, a substance having the original characters of air is produced. To procure pure oxygen from air, quicksilver may be kept heated in it, at about 600°, till it becomes a red powder; this powder, when ignited, will be restored to the state of quicksilver by giving off oxygen.

2004. *Oxygen is necessary to some functions of vegetables;* but its great importance in nature is its relation to the economy of animals. It is absolutely necessary to their life. Atmospheric air taken into the lungs of animals, or passed in solution in water through the gills of fishes, loses oxygen; and for the oxygen lost, about an equal volume of carbonic acid appears.

2005. *The effects of azote in vegetation are not distinctly known.* As it is found in some of the products of vegetation, it may be absorbed by certain plants from the atmosphere. It prevents the action of oxygen from being too energetic, and serves as a medium in which the more essential parts of the air act; nor is this circumstance unaccommodable to the analogy of nature; for the elements most abundant on the solid surface of the globe are not those which are the most essential to the existence of the living beings belonging to it.

2006. *The action of the atmosphere on plants differs at different periods of their growth, and varies with the various stages of the development and decay of their organs.* If a healthy seed be moistened, and exposed to air at a temperature not below 45°, it soon germinates, and shoots forth a plume, which rises upwards, and a radicle which descends. If the air be confined, it is found that in the process of germination the oxygen, or a part of it, is absorbed. The azote remains unaltered; no carbonic acid is taken away from the air; on the contrary, some is added. Seeds are incapable of germinating, except when oxygen is present. In the exhausted receiver of the air-pump, in pure azote, or in pure carbonic acid, when moistened they swell, but do not vegetate; and, if kept in these gases, lose their living powers, and undergo putrefaction. If a seed be examined before germination, it will be found more or less insipid, at least not sweet; but after germination it is always sweet. Its coagulated mucilage, or starch, is converted into sugar in the process; a substance difficult of solution is changed into one easily soluble; and the sugar carried through the cells or vessels of the cotyledons is the nourishment of the infant plant. The absorption of oxygen by the seed in germination has been compared to its absorption in producing the evolution of fetal life in the egg; but this analogy is only remote. All animals, from the most to the least perfect classes, require a supply of oxygen. From the moment the heart begins to pulsate till it ceases to beat, the aeration of the blood is constant, and the function of respiration invariable: carbonic acid is given off in the process; but the chemical change produced in the blood is unknown; nor is there any reason to suppose the formation of any substance similar to sugar. It is evident that, in all cases of semination, the seeds should be sown so as to be fully exposed to the influence of the air; and one cause of the unproductiveness of cold clayey adhesive soils is, that the seed is coated with matter impermeable to air. In sandy soils the earth is always sufficiently penetrable by the atmosphere; but in clayey soils there can scarcely be too great a mechanical division of parts. Any seed not fully supplied with air, always produces a weak and diseased plant. We have already seen that carbon is added to plants from the air by the process of vegetation in sunshine; and oxygen is added to the atmosphere at the same time. It is worthy of remark, that the absence of light is necessary to the formation of sugar in the germination of seeds; and its presence to the production of sugar in fruits. The following is the late Dr. Murray's ingenious explanation of these remarkable facts. The seed consists chiefly of farinaceous matter, which requires oxygen to convert it into sugar. Now, living vegetables appear to absorb oxygen in the dark: unripe fruits usually contain an acid, that is, have an excess of oxygen; and light is favourable to the evolution of oxygen from living plants. (T.)

2007. *Those changes in the atmosphere which constitute the most important meteorological phenomena may be classed under five distinct heads:* the alterations that occur in the weight of the atmosphere; those that take place in its temperature; the changes produced in its quantity by evaporation and rain; the excessive agitation to which it is frequently subject; and the phenomena arising from electric and other causes, which at particular times occasion or attend the precipitations and agitations alluded to. All the above

phenomena prove to demonstration that constant changes take place, the consequences of new combinations and decompositions rapidly following each other.

2008. *With respect to the changes in the weight of the atmosphere, it is generally known that the instrument called the barometer shows the weight of a body of air immediately above it, extending to the extreme boundary of the atmosphere, and the base of which is equal to that of the mercury contained within it. As the level of the sea is the lowest point of observation, the column of air over a barometer placed at that level is the longest that can be obtained.*

2009. *The variations of the barometer between the tropics are very trifling; they increase gradually as the latitude advances towards the poles, till in the end it amounts to two or three inches. The following Table will explain this gradual increase:—*

Latitude.	Place.	Range of the Barometer.	
		Greatest.	Annual.
0° 0'	Peru - - -	0 20	— —
22 23	Calcutta - -	0 77	— —
33 55	Cape Town -	— —	0 89
40 55	Naples - - -	1 00	— —
51 8	Dover - - -	2 47	1 80
53 13	Middlewich -	3 00	1 94
53 53	Liverpool - -	2 89	1 96
59 56	Petersburgh -	3 45	2 77

2010. *The range of the barometer is considerably less in North America than in the corresponding latitudes of Europe, particularly in Virginia, where it never exceeds 1.1. The range is more considerable at the level of the sea than on mountains; and in the same degree of latitude it is in the inverse ratio of the height of the place above the level of the sea. Cotte composed a table, which has been published in the *Journal de Physique*, from which it appears extremely*

probable, that the barometer has an invariable tendency to rise between the morning and the evening, and that this impulse is most considerable from two in the afternoon till nine at night, when the greatest elevation is accomplished; but the elevation at nine differs from that at two by four twelfths, while that of two varies from the elevation of the morning only by one twelfth, and that in particular climates the greatest elevation is at two o'clock. The observations of Cotte confirm those of Luke Howard; and from them it is concluded, that the barometer is influenced by some depressing cause at new and full moon, and that some other makes it rise at the quarters. This coincidence is most considerable in fair and calm weather; the depression in the interval between the quarters and conjunctions amounts to one tenth of an inch, and the rise from the conjunctions to the quarters is to the same amount. The range of this instrument is found to be greater in winter than in summer; for instance, the mean at York, during the months from October to March inclusive, in the year 1774, was 1.42, and in the six summer months 1.016.

2011. *The more serene and settled the weather, the higher the barometer ranges: calm weather, with a tendency to rain, depresses it; high winds have a similar effect on it; and the greatest elevation occurs with easterly and northerly winds; but the south produces a directly contrary effect.*

2012. *The variations in the temperature of the air in any particular place, exclusive of the differences of seasons and climates, are very considerable. These changes cannot be produced by heat derived from the sun, as its rays concentrated have no kind of effect on air; these, however, heat the surface of our globe, from which heat is communicated to the immediate atmosphere; it is through this fact that the temperature is highest where the place is so situated as to receive with most effect the rays of the sun, and that it varies in each region with the season; it is also the cause why it decreases in proportion to the height of the air above the surface of the earth. The most perpendicular rays falling on the globe at the equator, there its heat is the greatest, and that heat decreases gradually to the poles, of course the temperature of the air is in exact unison; from this it appears that the air acquires the greatest degree of warmth at the equator, whence it becomes insensibly cooler till we arrive at the poles; in the same manner the air immediately above the equator cools gradually. Though the temperature sinks as it approaches the pole, and is highest at the equator, yet as it varies continually with the seasons, it is impossible to form an accurate idea of the progression without forming a mean temperature for a year, from that of the temperature of every degree of latitude for every day of the year, which may be accomplished by adding together the whole of the observations and dividing by their number, when the quotient will be the mean temperature for the year. The "diminution," says Dr. Thomson, from the pole to the equator takes place in arithmetical progression; or, to speak more properly, the annual temperature of all the latitudes are arithmetical means between the mean annual temperature of the equator and the pole; and, as far as heat depends on the action of solar rays, that of each month is as the mean altitude of the sun, or rather as the sine of the sun's altitude. Later observations, however, have shown that all the formule for calculating the mean temperatures of different latitudes, which are founded on Mayer's Empirical Equation, though tolerably accurate in the Northern Atlantic Ocean, to latitude 60°, are totally irreconcilable with observations in very high latitudes; and*

on the meridians, from 70° to 90° W. and E. of London. The results of late arctic voyages, and of Russian travels, have been satisfactorily shown by Dr. Brewster (*Edin. Phil. Tr.*), to prove the existence of *two meridians of greatest cold* in the northern hemisphere; and the mean temperature of particular countries varies, not only according to the parallels of latitude, but also according to their proximity to these two *cold meridians*. (T.)

2013. *Inconsiderable seas*, in temperate and cold climates, are colder in winter and warmer in summer than the main ocean, as they are necessarily under the influence of natural operations from the land. Thus, the Gulf of Bothnia is generally frozen in winter, but the water is sometimes heated in the summer to seventy degrees, a state which the opposite part of the Atlantic never acquires; the German Sea is five degrees warmer in summer than the Atlantic, and more than three colder in winter; the Mediterranean is almost throughout warmer both in winter and summer, which therefore causes the Atlantic to flow into it; and the Black Sea, being colder than the Mediterranean, flows into the latter.

2014. *The eastern parts of North America*, as it appears from meteorological tables, have a much colder air than the opposite European coast, and fall short of the standard by about ten or twelve degrees. There are several causes which produce this considerable difference. The greatest elevation in North America is between the 40th and 50th degree of north latitude, and the 100th and 110th of longitude west from London; and there the most considerable rivers have their origin. The height alone will partly explain why this tract is colder than it would otherwise be; but there are other causes, and those are most extensive forests, and large swamps and morasses, all of which exclude heat from the earth, and consequently prevent it from ameliorating the rigour of winter. Many extensive lakes lie to the east, and Hudson's Bay more to the north; a chain of mountains extends on the south of the latter, and those equally prevent the accumulation of heat; besides, this bay is bounded on the east by the mountainous country of Labrador, and has many islands; from all which circumstances arise the lowness of the temperature, and the piercing cold of the north-west winds. The annual decrease of the forests for the purpose of clearing the ground, and the consumption for building and fuel, is supposed to have occasioned a considerable decrease of cold in the winter; and if this should be the result, much will yet be done towards bringing the temperature of the European and American continents to something like a level.

2015. *Continents* have a colder atmosphere than islands situated in the same degree of latitude; and countries lying to the windward of the superior classes of mountains, or forests, are warmer than those which are to the leeward. Earth, always possessing a certain degree of moisture, has a greater capacity to receive and retain heat than sand or stones; the latter, therefore, are heated and cooled with more rapidity: it is from this circumstance that the intense heats of Africa and Arabia, and the cold of Terra del Fuego, are derived. The temperature of growing vegetables changes very gradually; but there is a considerable evaporation from them: if those exist in great numbers, and congregated, or in forests, their foliage preventing the rays of the sun from reaching the earth, it is perfectly natural that the immediate atmosphere must be greatly affected by the ascent of chilled vapours.

2016. Our next object is *the ascent and descent of water*: the principal appearances of this element are vapour, clouds, dew, rain, frost, hail, snow, and ice.

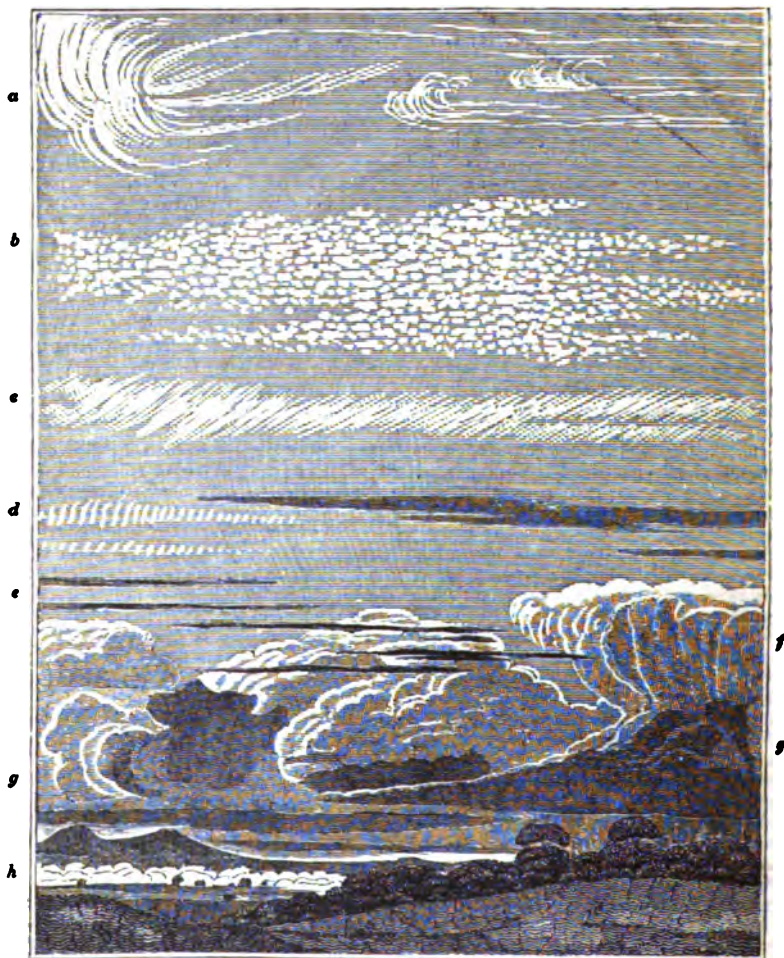
2017. *Vapour* is water rarefied by heat, in consequence of which, becoming lighter than the atmosphere, it is raised considerably above the surface of the earth, and afterwards by a partial condensation forms clouds. It differs from exhalation, which is properly a dispersion of dry particles from a body. When water is heated to 212° it boils, and is rapidly converted into steam; and the same change takes place in much lower temperatures; but in that case the evaporation is slower, and the elasticity of the steam is smaller. As a very considerable proportion of the earth's surface is covered with water, and as this water is constantly evaporating and mixing with the atmosphere in the state of vapour, a precise determination of the rate of evaporation must be of very great importance in meteorology. Evaporation is confined entirely to the surface of the water; hence it is, in all cases, proportional to the surface of the water exposed to the atmosphere. Much more vapour of course rises in maritime countries, or those interspersed with lakes, than in inland countries. Much more vapour rises during hot weather than during cold: hence the quantity evaporated depends in some measure upon temperature. The quantity of vapour which rises from water, even when the temperature is the same, varies according to circumstances. It is least of all in calm weather, greater when a breeze blows, and greatest of all with a strong wind. From experiments, it appears, that the quantity of vapour raised annually at Manchester is equal to about twenty-five inches of rain. If to this we add five inches for the dew, with Dalton, it will make the annual evaporation thirty inches. Now, if we consider the situation of England, and the greater quantity of vapour raised from water, it will not surely be considered as too great an

allowance, if we estimate the mean annual evaporation over the whole surface of the globe at thirty-five inches.

2018. *A cloud is a mass of vapour, more or less opaque, formed and sustained at considerable height in the atmosphere, probably by the joint agencies of heat and electricity. The first successful attempt to arrange the diversified forms of clouds under a few general modifications was made by Luke Howard, Esq. We shall give here a brief account of his ingenious classification.*

2019. *The simple modifications are thus named and defined:—1. Cirrus, a parallel, flexuous, or diverging fibre, extensible in any or in all directions (fig. 287. a);*

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2. Cumulus, a convex or conical heap, increasing upwards from a horizontal base (b); 3. Stratus, a widely-extended, continuous, horizontal sheet, increasing from below (c).

2020. *The intermediate modifications which require to be noticed are, 4. Cirro-cumuli, small, well-defined, roundish masses, in close horizontal arrangement (d); 5. Cirro-strata, horizontal, or slightly-inclined masses, attenuated towards a part or the whole of their circumference, bent downward or undulated, separate, or in groups consisting of small clouds having these characters (e).*

2021. *The compound modifications are, 6. Cumulo-stratus, or twain cloud; the cirro-*

stratus blended with the cumulus, and either appearing intermixed with the heaps of the latter, or superadding a wide-spread structure to its base (*f*); 7. Cumulo-cirro-stratus, or Nimbus; the rain-cloud, a cloud or system of clouds from which rain is falling. It is a horizontal sheet, above which the cirrus spreads, while the cumulus enters it laterally and from beneath (*g g*); 8. The Fall Cloud, resting apparently on the surface of the ground (*h*).

2022. The *cirrus* appears to have the least density, the greatest elevation, the greatest variety of extent and direction, and to appear earliest in serene weather, being indicated by a few threads, pencilled on the sky. Before storms, these threads appear lower and denser, and usually in the quarter opposite to that from which the storm arises. Steady high winds are also preceded and attended by cirrous streaks, running quite across the sky, according to the direction in which they blow.

2023. The *cumulus* has the densest structure, is formed in the lower atmosphere, and moves along with the current next the earth. A small irregular spot first appears, and is, as it were, the nucleus on which the cumuli increase. The lower surface continues irregularly plane, while the upper rises into conical or hemispherical heaps, which may afterwards continue long nearly of the same bulk, or rapidly rise into mountains. They will begin, in fair weather, to form some hours after sunrise, arrive at their maximum in the hottest part of the afternoon, then begin to diminish, and totally disperse about sunset. Previously to rain, the cumulus increases rapidly, appears lower in the atmosphere, and with its surface full of loose fleeces or protuberances. The formation of large cumuli, to leeward, in a strong wind, indicates the approach of a calm, with rain. When they do not disappear or subside about sunset, but continue to rise, thunder is to be expected in the night.

2024. The *stratus* has a mean degree of density, and is the lowest of clouds, its inferior surface commonly resting on the earth or water. This is properly the cloud of night, appearing about sunset. It comprehends all those creeping mists which, in calm weather, ascend in spreading sheets (like an inundation of water) from the bottoms of vallies and the surfaces of lakes and rivers. On the return of the sun, the level surface of this cloud begins to put on the appearance of cumulus, the whole at the same time separating from the ground. The continuity is next destroyed, and the cloud ascends and evaporates, or passes off with the appearance of the nascent cumulus. This has long been experienced as a prognostic of fair weather.

2025. *Transition of forms.* The cirrus, having continued for some time increasing or stationary, usually passes either to the cirro-cumulus or the cirro-stratus, at the same time descending to a lower station in the atmosphere. This modification forms a very beautiful sky, and is frequently, in summer, an attendant on warm and dry weather. The cirro-stratus, when seen in the distance, frequently gives the idea of shoals of fish. It precedes wind and rain; is seen in the intervals of storms; and sometimes alternates with the cirro-cumulus in the same cloud, when the different evolutions form a curious spectacle. A judgment may be formed of the weather likely to ensue, by observing which modification prevails at last. The solar and lunar haloes, as well as the parhelia and paraselene (mock sun and mock moon), prognostics of foul weather, are occasioned by this cloud. The cumulo-stratus precedes, and the nimbus accompanies, rain.

2026. *Dew* is the moisture insensibly deposited from the atmosphere on the surface of the earth. This moisture is precipitated by the cold of the body on which it appears, and will be more or less abundant, not in proportion to the coldness of that body, but in proportion to the existing state of the air in regard to moisture. It is commonly supposed that the formation of dew produces cold; but, like every other precipitation of water from the atmosphere, it must eventually produce heat.

2027. *Phænomena of dew.* Aristotle justly remarked, that dew appears only on calm and clear nights. Dr. Wells shows, that very little is ever deposited in opposite circumstances; and that little only when the clouds are very high. It is never seen on nights both cloudy and windy; and if, in the course of the night, the weather, from being serene, should become dark and stormy, dew, which has been deposited, will disappear. In calm weather, if the sky be partially covered with clouds, more dew will appear than if it were entirely uncovered. Dew probably begins, in the country, to appear upon grass in places shaded from the sun, during clear and calm weather, soon after the heat of the atmosphere has declined, and continues to be deposited through the whole night, and for a little after sunrise. Its quantity will depend, in some measure, on the proportion of moisture in the atmosphere; and is, consequently, greater after rain than after a long tract of dry weather; and, in Europe, with southerly and westerly winds, than with those which blow from the north and the east. The direction of the sea determines this relation of the winds to dew; for, in Egypt, dew is scarcely ever observed, except while the northerly or Etesian winds prevail. Hence, also, dew is generally more abundant in spring and autumn than in summer. It is always very copious on

those clear nights which are followed by misty mornings, which show the air to be loaded with moisture; and a clear morning, following a cloudy night, determines a plentiful deposition of the retained vapour. When warmth of atmosphere is compatible with clearness, as is the case in southern latitudes, though seldom in our country, the dew becomes much more copious, because the air then contains more moisture. Dew continues to form with increased copiousness as the night advances, from the increased refrigeration of the ground.

2028. *Cause of dew.* Dew, according to Aristotle, is a species of rain formed in the lower atmosphere, in consequence of its moisture being condensed by the cold of the night into minute drops. Opinions of this kind, says Dr. Wells, are still entertained by many persons, among whom is the very ingenious Professor Leslie. (*Relat. of Heat and Moisture*, p. 87. and 132.) A fact, however, first taken notice of by Garstin, who published his *Treatise on Dew* in 1773, proves them to be erroneous; for he found that bodies, a little elevated in the air, often become moist with dew; while similar bodies, lying on the ground, remain dry; though necessarily, from their position, as liable to be wetted, by whatever falls from the heavens, as the former. The above notion is perfectly refuted by the fact, that metallic surfaces, exposed to the air in a horizontal position, remain dry, while every thing around them is covered with dew. After a long period of drought, when the air was very still, and the sky serene, Dr. Wells exposed to the sky, twenty-eight minutes before sunset, previously weighed parcels of wool and swandown, upon a smooth, unpainted, and perfectly dry fir table, five feet long, three broad, and nearly three in height, which had been placed, an hour before, in the sunshine, in a large level grass field. The wool, twelve minutes after sunset, was found to be 14° colder than the air, and to have acquired no weight. The swandown, the quantity of which was much greater than that of the wool, was, at the same time, 13° colder than the air, and was also without any additional weight. In twenty minutes more, the swandown was $14\frac{1}{2}^{\circ}$ colder than the neighbouring air, and was still without any increase of its weight. At the same time the grass was 15° colder than the air, four feet above the ground. Dr. Wells, by a copious induction of facts, derived from observation and experiment, establishes the proposition, that bodies become colder than the neighbouring air, before they are dewed. The cold, therefore, which Dr. Wilson and M. Six conjectured to be the effect of dew, now appears to be its cause. But what makes the terrestrial surface colder than the atmosphere? The radiation or projection of heat into free space. Now, the researches of Professor Leslie and Count Rumford have demonstrated that different bodies project heat with very different degrees of force. In the operation of this principle, therefore, conjoined with the power of a concave mirror of cloud, or any other awning, to reflect or throw down again those caloric emanations which would be dissipated in a clear sky, we shall find a solution of the most mysterious phenomena of dew.

2029. *Rain.* Luke Howard, who may be considered as one of our most accurate scientific meteorologists, is inclined to think that rain is, in almost every instance, the result of the electrical action of clouds upon each other.

2030. *Phenomena of rain.* Rain never descends till the transparency of the air ceases, and the invisible vapours become vesicular, when clouds form; and, at length, the drops fall. Clouds, instead of forming gradually at once throughout all parts of the horizon, generate in a particular spot, and imperceptibly increase till the whole expanse is obscured.

2031. *The cause of rain* is thus accounted for by Hutton and Dalton. If two masses of air, of unequal temperatures, are, when saturated with vapour, intermixed by the ordinary currents of the winds, a precipitation ensues. If the masses are under saturation, then less precipitation takes place, or none at all, according to the degree. Also, the warmer the air, the greater is the quantity of vapour precipitated in like circumstances. Hence the reason why rains are heavier in summer than in winter, and in warm countries than in cold.

2032. *The quantity of rain*, taken at an annual mean, is the greatest at the equator, and it lessens gradually to the poles, at which there are fewer days of rain, the number increasing in proportion to the distance from them. From north latitude 12° to 43° , the mean number of rainy days is 78; from 43° to 46° , the mean number is 103; from 46° to 50° , 134; and from 51° to 60° , 161. Winter often produces a greater number of rainy days than summer, though the quantity of rain is more considerable in the latter than in the former season. At Petersburg, rain and snow fall, on an average, eighty-four days of the winter; and the quantity amounts to about five inches: on the contrary, the summer produces eleven inches in about the same number of days. Mountainous districts are subject to great falls of rain; among the Andes, particularly, it rains almost incessantly; while the flat country of Egypt is consumed by endless drought. Dalton estimates the quantity of rain falling in England at thirty-one inches. The mean annual quantity of rain for the whole globe is thirty-four inches.

2033. *The cause why less rain falls in the first six months of the year, than in the last six months, is thus explained.* The whole quantity of water in the atmosphere in January is usually about three inches, as appears from the dew point, which is then about 32° ; now, the force of vapours of that temperature is 0.2 of an inch of mercury, which is equal to 2.8 or three inches of water. The dew point in July is usually about 58° or 59° , corresponding to 0.5 of an inch of mercury, which is equal to seven inches of water. Thus it is evident that, in the latter month, the atmosphere contains four inches of water more than in the former month. Hence, supposing the usual intermixture of currents of air, in both the intervening periods, to be the same, the rain ought to be four inches less in the former period of the year than the average, and four inches more in the latter period, making a difference of eight inches between the two periods, which nearly accords with the preceding observations.

2034. *The mean monthly and annual quantities of rain, at various places, deduced from the average for many years, by Dalton, is given in the following table.*

	Manchester, 55 years.	Liverpool, 25 years.	Charlestown, 16 years.	Lancaster, 50 years.	Kendal, 25 years.	Dunelm, 16 years.	Glasgow, 17 years.	London, 40 years.	Paris, 10 years.	Vienna, 40 years.	General Average.
January	Inch. 2.310	Inch. 2.177	Inch. 2.196	Inch. 3.461	Inch. 5.299	Inch. 3.095	Inch. 1.595	Inch. 1.464	Fr. In. 1.228	Fr. In. 2.477	Inch. 2.530
February	2.568	1.847	1.652	2.995	5.126	2.637	1.741	1.250	1.232	1.700	2.295
March	2.098	1.523	1.322	1.753	3.151	2.164	1.184	1.172	1.190	1.927	1.748
April	2.010	2.104	2.078	2.180	2.286	2.017	0.979	1.379	1.185	2.686	1.950
May	2.896	2.573	2.118	2.460	3.480	2.568	1.641	1.636	1.767	2.351	2.407
June	2.502	2.616	2.286	2.512	2.722	2.374	1.343	1.738	1.697	2.562	2.315
July	2.597	2.683	3.006	4.140	4.689	3.356	2.363	2.418	1.800	1.582	3.115
August	3.665	3.311	2.435	4.581	5.089	3.199	2.746	1.807	1.900	2.947	3.103
September	3.221	3.654	2.289	3.751	4.874	4.350	1.617	1.948	1.550	4.140	3.135
October	3.922	3.724	3.079	4.151	5.439	4.143	2.297	2.092	1.780	4.741	3.537
November	3.360	3.441	2.634	3.775	4.785	3.174	1.904	2.232	1.720	4.187	3.120
December	3.832	3.288	2.569	3.955	6.084	3.142	1.981	1.736	1.600	2.397	3.068
	36.140	34.121	27.664	39.714	53.944	36.919	21.331	20.686	18.649	33.977	

2035. *Frost, being derived from the atmosphere, naturally proceeds from the upper parts of bodies downwards; so, the longer a frost is continued, the thicker the ice becomes upon the water in ponds, and the deeper into the earth the ground is frozen.* In about sixteen or seventeen days' frost, Boyle found it had penetrated fourteen inches into the ground. At Moscow, in a hard season, the frost will penetrate two feet deep into the ground; and Captain James found it penetrated ten feet deep in Charlton Island, and the water in the same island was frozen to the depth of six feet. Scheffer assures us, that, in Sweden, the frost pierces two cubits (a Swedish ell) into the earth, turning what moisture is found there into a whitish substance, like ice; and into standing water three ells or more. The same author also mentions sudden cracks or rifts in the ice of the lakes of Sweden, nine or ten feet deep, and many leagues long; the rupture being made with a noise not less loud than if many guns were discharged together. By such means, however, the fishes are furnished with air, so that they are rarely found dead.

2036. *The history of frosts furnishes very extraordinary facts.* The trees are often scorched and burnt up, as with the most excessive heat, in consequence of the separation of water from the air, which is therefore very drying. In the great frost in 1683, the trunks of oak, ash, walnut, and other trees, were miserably split and cleft, so that they might be seen through, and the cracks often attended with dreadful noises like the explosion of fire-arms.

2037. *Hail is generally defined as frozen rain; it differs from it in that the hailstones for the most part are not formed of single pieces of ice, but of many little spherules agglutinated together; neither are those spherules all of the same consistence; some of them being hard and solid, like perfect ice; others soft, and mostly like snow hardened by a severe frost.* Hailstone has sometimes a kind of core of this soft matter; but more frequently the core is solid and hard, while the outside is formed of a softer matter. Hailstones assume various figures, being sometimes round, at other times pyramidal, crenated, angular, thin or flat, and sometimes stellated with six radii, like the small crystals of snow. Natural historians furnish us with various accounts of surprising showers of hail, in which the hailstones were of extraordinary magnitude.

2038. *Snow is formed by the freezing of the vapours in the atmosphere.* It differs from hail and hoar frost, in being, as it were, crystallised, while they are not. As the flakes fall down through the atmosphere, they are continually joined by more of these radiated spicula, and they increase in bulk like the drops of rain or hailstones. The lightness of snow, although it is firm ice, is owing to the excess of its surface in comparison with the

matter contained under it: as gold itself may be extended in surface till it will ride upon the least breath of air. The whiteness of snow is owing to the small particles into which it is divided; for ice, when pounded, will become equally white.

2039. *Snow is of great use to the vegetable kingdom.* Were we to judge from appearance only, we might imagine, that, so far from being useful to the earth, the cold humidity of snow would be detrimental to vegetation: but the experience of all ages asserts the contrary. Snow, particularly in those northern regions where the ground is covered with it for several months, fructifies the earth, by guarding the corn or other vegetables from the intenser cold of the air, and especially from the cold piercing winds. It has been a vulgar opinion, very generally received, that snow fertilises the land on which it falls more than rain, in consequence of the nitrous salts which it is supposed to acquire by freezing: but it appears from the experiments of Margraaf, in the year 1731, that the chemical difference between rain and snow-water is exceedingly small; that the latter contains a somewhat less proportion of earth than the former; but neither of them contains either earth, or any kind of salt, in any quantity which can be sensibly efficacious in promoting vegetation. The peculiar agency of snow as a fertiliser, in preference to rain, may be ascribed to its furnishing a covering to the roots of vegetables, by which they are guarded from the influence of the atmospherical cold, and the internal heat of the earth is prevented from escaping. Different vegetables are able to preserve life under different degrees of cold, but all of them perish when the cold which reaches their roots is extreme. Providence has, therefore, in the coldest climates, provided a covering of snow for the roots of vegetables, by which they are protected from the influence of the atmospherical cold. The snow keeps in the internal heat of the earth, which surrounds the roots of vegetables, and defends them from the cold of the atmosphere.

2040. *Ice is water in the solid state, during which the temperature remains constant, being 32° of the scale of Fahrenheit.* Ice is considerably lighter than water, namely, about one eighth part; and this increase of dimensions is acquired with prodigious force, sufficient to burst the strongest iron vessels, and even pieces of artillery. Congelation takes place much more suddenly than the opposite process of liquefaction; and of course, the same quantity of heat must be more rapidly extricated in freezing than it is absorbed in thawing; the heat thus extricated being disposed to fly off in all directions, and little of it being retained by the neighbouring bodies, more heat is lost than is gained by the alternation: so that where ice has once been formed, its production is in this manner redoubled.

2041. *The northern ice extends during summer about 9° from the pole; the southern 18° or 20°; in some parts even 30°; and floating ice has occasionally been found in both hemispheres as far as 40° from the poles, and sometimes, as it has been said, even in latitude 41° or 42°.* Between 54° and 60° south latitude, the snow lies on the ground, at the sea-side, throughout the summer. The line of perpetual congelation is three miles above the surface at the equator, where the mean heat is 84°; at Teneriffe, in latitude 28°, two miles; in the latitude of London, a little more than a mile; and in latitude 80° north, only 1250 feet. At the pole, according to the analogy deduced by Kirwan, from Mayer's Formula, and which is not however found to agree very exactly with what takes place, from a comparison of various observations, the mean temperature should be 31°. In London the mean temperature is 50°; at Rome and at Montpelier, a little more than 60°; in the island of Madeira, 70°; and in Jamaica, 80°.

2042. *Wind.* Were it not for this agitation of the air, putrid effluvia arising from the habitations of man, and from vegetable substances, besides the exhalations from water, would soon render it unfit for respiration, and a general mortality would be the consequence. The prevailing winds of our own country, which were ascertained by order of the Royal Society of London, at London, are,

<i>Winds.</i>	<i>Days.</i>	<i>Winds.</i>	<i>Days.</i>	<i>Winds.</i>	<i>Days.</i>
South-west	- 112	West	- 53	South	- 18
North-east	- 58	South-east	- 32	North	- 16
North-west	- 50	East	- 26		

The westerly winds blow more upon an average in each month of the year than any other, particularly in July and August; the north-east wind prevails during January, March, April, May, and June, and is most unfrequent in February, July, September, and December; the north-west occurring more frequently from November to March, and less so in September and October than in any other months.

2043. *Near Glasgow, the average is stated as follows:—*

<i>Winds.</i>	<i>Days.</i>	<i>Winds.</i>	<i>Days.</i>
South-west	- 174	North-east	- 104
North-west	40	South-east	- 47

2044. *In Ireland, the prevailing winds are the west and south-west.*

2045. *The different degrees of motion of wind next excite our attention; and it seems almost superfluous to observe, that it varies in gradation from the mildest zephyr, which plays upon the leaves of plants, gently undulating them, to the furious tempest, calculated to inspire horror in the breast of the most callous. It is also a remarkable fact, that violent currents of air pass along, as it were, within a line, without sensibly agitating that beyond them. An instance of the fury of the wind being bounded "by a line" occurs in the hurricane of America; where its devastating course is often accurately marked in the forests for a great extent in one direction.*

2046. *Causes of wind.* There are many circumstances attending the operations of the air, which we term wind, which serve for a basis for well-founded conjectures, and those, united to the result of daily observation, render the explanation of its phenomena tolerably satisfactory.

2047. *It must be clear to the most common capacity, that as the rays of the sun descend perpendicularly on the surface of the earth under the torrid zone, that part of it must receive a greater proportion of heat than those parts where they fall obliquely; the heat thus acquired communicates to the air, which it rarefies, and causes to ascend, and the vacuum occasioned by this operation is immediately filled by the chill air from the north and south. The diurnal motion of the earth gradually lessens to the poles from the equator, at which point it moves at the rate of fifteen geographical miles in a minute, and this motion is communicated to the atmosphere in the same degree; but if part of the atmosphere were conveyed instantaneously to the equator from latitude 30°, it would not directly acquire the equatorial velocity; consequently, the ridges of the earth must meet it, and give it the appearance of an east wind. The effect is similar upon the cold air proceeding from the north and south, and the similarity must be admitted to extend to each place particularly heated by the beams of the sun. The moon, being a large body situated comparatively near the earth, is known to affect the atmosphere; and this, and the continual shifting of the point of the earth's surface over which the sun is vertical, to the west, are given as the causes of the tides and of the trade-winds. The moon's revolutions, by pressing the atmosphere upon the sea, cause the flux and reflux which we call tides; it cannot, therefore, be doubted, that some of the winds we experience are caused by the moon's motion.*

2048. *The regular motion of the atmosphere, known by the name of land and sea breezes, may be explained by the effects of rarefaction: the air heated over the land rises up, because rarefied, and its place is supplied by the cooler air which flows in from the sea; this produces the sea breeze; at sunset, the equilibrium is first restored; but as the earth cools faster by radiation than the water, the air over it becomes cooler than that over the sea, especially if there be mountains in the vicinity; the air over the land then displaces the light air from the sea, and thus the land breeze is formed. Granting that the attraction of the moon, and the diurnal movement of the sun, affect our atmosphere, there cannot be a doubt but a westward motion of the air must prevail within the boundaries of the trade-winds, the consequence of which is an easterly current on each side: from this, then, it proceeds that south-west winds are so frequent in the western parts of Europe, and over the Atlantic Ocean. Kirwan attributes our constant south-west winds, particularly during winter, to an opposite current prevailing between the coast of Malabar and the Moluccas at the same period: this, he adds, must be supplied from regions close to the pole, which must be recruited in its turn from the countries to the south of it, in the western parts of our hemisphere.*

2049. *The variable winds cannot be so readily accounted for; yet it is evident that, though they seem the effect of capricious causes, they depend upon a regular system, arranged by the great Author of nature. That accurate and successful observer of part of his works, the celebrated Franklin, discovered, in 1740, that winds originate at the precise points towards which they blow. This philosopher had hoped to observe an eclipse of the moon at Philadelphia, but was prevented by a north-east storm, that commenced at seven in the evening. This he afterwards found did not occur at Boston till eleven; and upon enquiry, he had reason to suppose, it passed to the north-east at the rate of about 100 miles an hour. The manner in which he accounts for this retrograde proceeding is so satisfactory, that we shall give it in his own words, particularly as his assertions are supported by recent observations, both in America and Scotland. He argued thus:—"I suppose a long canal of water, stopped at the end by a gate. The water is at rest till the gate is opened; then it begins to move out through the gate, and the water next the gate is put in motion and moves on towards the gate; and so on successively, till the water at the head of the canal is in motion, which it is last of all. In this case all the water moves indeed towards the gate; but the successive times of beginning the motion are in the contrary way, viz. from the gate back to the head of the canal. Thus, to produce a north-east storm, I suppose some great rarefaction of the air in or near the Gulf of Mexico; the air rising thence has its place supplied by the next*

more northern, cooler, and therefore denser and heavier air; a successive current is formed, to which our coast and inland mountains give a north-east direction." According to the observations made by Captain Cook, the north-east winds prevail in the Northern Pacific Ocean during the same spring months they do with us, from which facts it appears the cold air from America and the north of Europe flows at that season into the Pacific and Atlantic Oceans.

2050. *Other descriptions of winds* may arise from a variety of causes. The atmosphere has been ascertained to be composed of air, vapour, and carbonic acid and water; and as it is well known that these frequently change their aerial form, and combine with different substances, and the reverse, consequently partial winds and accumulations must continually occur, which occasion winds of different degrees of violence, continuance, and direction.

2051. *The principal electrical phenomena of the atmosphere* are thunder and lightning.

2052. *Thunder* is the noise occasioned by the explosion of a flash of lightning passing through the air: or it is that noise which is excited by a sudden explosion of electrical clouds, which are therefore called thunder-clouds.

2053. *The rattling*, in the noise of thunder, which makes it seem as if it passed through arches, is probably owing to the sound being excited among clouds hanging over one another, between which the agitated air passes irregularly.

2054. *The explosion*, if high in the air and remote from us, will do no mischief, but when near, it may; and it has, in a thousand instances, destroyed trees, animals, &c. This proximity, or small distance, may be estimated nearly by the interval of time between seeing the flash of lightning and hearing the report of the thunder, reckoning the distance after the rate of 1142 feet to a second of time, or three seconds and a half to the mile. Dr. Wallis observes, that commonly the difference between the two is about seven seconds, which, at the rate above mentioned, gives the distance almost two miles: but sometimes it comes in a second or two, which argues the explosion very near to us, and even among us; and in such cases, the doctor assures us, he has sometimes foretold the mischiefs that happened.

2055. *Season of thunder.* Although in this country thunder may happen at any time of the year, yet the months of July and August are those in which it may almost certainly be expected. Its devastations are of very uncertain continuance; sometimes only a few peals will be heard at any particular place during the whole season; at other times the storm will return, at intervals of three or four days, for a month, six weeks, or even longer; not that we have violent thunder in this country directly vertical in any one place so frequently in any year, but in many seasons it will be perceptible that thunder-clouds are formed in the neighbourhood, even at these short intervals. Hence it appears, that, during this particular period, there must be some natural cause operating for the production of this phenomenon, which does not take place at other times. This cannot be the mere heat of the weather, for we have often a long tract of hot weather without any thunder; and, besides, though not common, thunder is sometimes heard in the winter also. As therefore the heat of the weather is common to the whole summer, whether there is thunder or not, we must look for the causes of it in those phenomena, whatever they are, which are peculiar to the months of July, August, and the beginning of September. Now, it is generally observed, that from the month of April, an east or south-east wind generally takes place, and continues with little interruption till towards the end of June. At that time, sometimes sooner and sometimes later, a westerly wind takes place; but as the causes producing the east wind are not removed, the latter opposes the west wind with its whole force. At the place of meeting, there are naturally a most vehement pressure of the atmosphere, and friction of its parts against one another; a calm ensues, and the vapours brought by both winds begin to collect and form dark clouds, which can have little motion either way, because they are pressed almost equally on all sides. For the most part, however, the west wind prevails, and what little motion the clouds have is towards the east: whence, the common remark in this country, that "thunder-clouds move against the wind." But this is by no means universally true: for if the west wind happens to be excited by any temporary cause before the natural period when it should take place, the east wind will very frequently get the better of it; and the clouds, even although thunder is produced, will move westward. Yet in either case, the motion is so slow, that the most superficial observers cannot help taking notice of a considerable resistance in the atmosphere.

2056. *Thunderbolts.* When lightning acts with extraordinary violence, and breaks or shatters any thing, it is called a thunderbolt, which the vulgar, to fit it for such effects, suppose to be a hard body, and even a stone. But that we need not have recourse to a hard solid body to account for the effects commonly attributed to the thunderbolt, will be evident to any one who considers those of gunpowder, and the several chemical fulminating powders, but more especially the astonishing powers of electricity, when only collected and employed by human art, and much more when directed and exercised in

the course of nature. When we consider the known effects of electrical explosions, and those produced by lightning, we shall be at no loss to account for the extraordinary operations vulgarly ascribed to thunderbolts. As stones and bricks struck by lightning are often found in a vitrified state, we may reasonably suppose, with Beccaria, that some stones in the earth, having been struck in this manner, gave occasion to the vulgar opinion of the thunderbolt.

2057. *Thunder-clouds* are those clouds which are in a state fit for producing lightning and thunder. The first appearance of a thunder-storm, which usually happens when there is little or no wind, is one dense cloud, or more, increasing very fast in size, and rising into the higher regions of the air. The lower surface is black, and nearly level; but the upper finely arched, and well defined. Many of these clouds often seem piled upon one another, all arched in the same manner; but they are continually uniting, swelling, and extending their arches. At the time of the rising of this cloud, the atmosphere is commonly full of a great many separate clouds, which are motionless, and of odd whimsical shapes; all these, upon the appearance of the thunder-cloud, draw towards it, and become more uniform in their shapes as they approach; till, coming very near the thunder-cloud, their limbs mutually stretch towards one another, and they immediately coalesce into one uniform mass. Sometimes the thunder-cloud will swell, and increase very fast, without the conjunction of any adjoining clouds; the vapours in the atmosphere forming themselves into clouds whenever it passes. Some of the additional clouds appear like white fringes, at the skirts of the thunder-cloud, or under the body of it; but they keep continually growing darker and darker, as they approach to unite with it. When the thunder-cloud is grown to a great size, its lower surface is often ragged, particular parts being detached towards the earth, but still connected with the rest. Sometimes the lower surface swells into various large protuberances, bending uniformly downward; and sometimes one whole side of the cloud will have an inclination to the earth, and the extremity of it will nearly touch the ground. When the eye is under the thunder-cloud, after it is grown large and well-formed, it is seen to sink lower, and to darken prodigiously; at the same time that a number of small clouds (the origin of which can never be perceived) are seen in a rapid motion, driving about in very uncertain directions under it. While these clouds are agitated with the most rapid motions, the rain commonly falls in the greatest plenty; and if the agitation be exceedingly great, it commonly hails.

2058. *Lightning*. While the thunder-cloud is swelling, and extending its branches over a large tract of country, the lightning is seen to dart from one part of it to another, and often to illuminate its whole mass. When the cloud has acquired a sufficient extent, the lightning strikes between the cloud and the earth, in two opposite places; the path of the lightning lying through the whole body of the cloud and its branches. The longer this lightning continues, the less dense does the cloud become, and the less dark its appearance; till at length it breaks in different places, and shows a clear sky. Those thunder-clouds are said to be sometimes in a positive as well as a negative state of electricity. The electricity continues longer of the same kind, in proportion as the thunder-cloud is simple and uniform in its direction; but when the lightning changes its place, there commonly happens a change in the electricity of the atmosphere over which the clouds passed. It changes suddenly after a very violent flash of lightning; but gradually when the lightning is moderate, and the progress of the thunder-cloud slow.

2059. *Lightning is an electrical explosion or phenomenon*. Flashes of lightning are usually seen in broad and undefined masses; when their path appears angular or zigzag, they are reckoned most dangerous. They strike the highest and most pointed objects in preference to others, as hills, trees, spires, masts of ships, &c.; so all pointed conductors receive and throw off the electric fluid more readily than those that are terminated by flat surfaces. Lightning is observed to take and follow the readiest and best conductor; and the same is the case with electricity in the discharge of the Leyden phial; whence it is inferred, that in a thunder-storm it would be safer to have one's clothes wet than dry. Lightning burns, dissolves metals, rends some bodies, sometimes strikes persons blind, destroys animal life, deprives magnets of their virtue, or reverses their poles; and all these are well-known properties of electricity.

2060. *With regard to places of safety in times of thunder and lightning*, Dr. Franklin's advice is, to sit in the middle of a room, provided it be not under a metal lustre, suspended by a chain, sitting on one chair, and laying the feet on another. It is still better, he says, to bring two or three mattresses or beds into the middle of the room, and, folding them double, to place the chairs upon them; for, as they are not so good conductors as the walls, the lightning will not be so likely to pass through them. But the safest place of all is in a hammock hung by silken cords, at an equal distance from all the sides of the room. Dr. Priestley observes, that the place of most perfect safety must be the cellar, and especially the middle of it; for, when a person is lower than the surface of the earth,

the lightning must strike it before it can possibly reach him. In the fields, the place of safety is within a few yards of a tree, but not quite near it. Beccaria cautions persons not always to trust too much to the neighbourhood of a higher or better conductor than their own body, since he has repeatedly found that the lightning by no means descends in one undivided track, but that bodies of various kinds conduct their share of it at the same time, in proportion to their quantity and conducting power.

SECT. II. *Of the Means of Prognosticating the Weather.*

2061. *The study of atmospherical changes* has, in all ages, been more or less attended to by men engaged in the culture of vegetables, or the pasturage of animals; and we, in this country, are surprised at the degree of perfection to which the ancients attained in this knowledge; but it ought to be recollected, that the study of the weather in the countries occupied by the ancients, as Egypt, Greece, Italy, and the continent of Europe, is a very different thing from its study in an island situated like ours. It is easy to foretell weather in countries where months pass away without rain or clouds, and where some weeks together, at stated periods, are as certainly seasons of rain or snow. It may be asserted with truth, that there is a greater variety of weather in London in one week, than in Rome, Moscow, or Petersburg in three months. It is not, therefore, entirely a proof of our degeneracy, or the influence of our artificial mode of living, that we cannot predict the weather with such certainty as the ancients; but a circumstance rather to be accounted for from the peculiarities of our situation.

2062. *A variable climate, such as ours*, admits of being studied, both generally and locally; but it is a study which requires habits of observation and reflection, like all other studies; and, to be brought to any useful degree of perfection, must be attended to, not as it commonly is, as a thing by chance, and which every body knows, or is fit for, but as a serious undertaking. The weather may be foretold from natural data, artificial data, and from precedent.

2063. *The natural data* for this study are, — 1. The vegetable kingdom; many plants shutting or opening their flowers, contracting or expanding their parts, &c. on approaching changes in the humidity or temperature of the atmosphere: 2. The animal kingdom; most of those familiar to us exhibiting signs on approaching changes, of which those by cattle and sheep are more especially remarkable; and hence shepherds are generally, of all others, the most correct in their estimate of weather: 3. The mineral kingdom; stones, earths, metals, salts, and water of particular sorts, often showing indications of approaching changes: 4. Appearances of the atmosphere, the moon, the general character of seasons, &c. The characters of clouds, the prevalence of particular winds, and other signs, are very commonly attended to.

2064. *The influence of the moon on the weather* has, in all ages, been believed by the generality of mankind: the same opinion was embraced by the ancient astronomers; and several eminent philosophers of later times have thought the opinion not unworthy of notice. Although the moon only acts (as far at least as we can ascertain) on the waters of the ocean by producing tides, it is nevertheless highly probable, according to the observations of Lambert, Toaldo, and Cotte, that, in consequence of the lunar influence, great variations do take place in the atmosphere, and consequently in the weather. The following principles will show the grounds and reasons for their embracing the received notions on this interesting topic: —

2065. *There are ten situations in the moon's orbit* when she must particularly exert her influence on the atmosphere; and when, consequently, changes of the weather most readily take place. These are, —

1st, The *new*, and 2d, The *full* moon, when she exerts her influence in conjunction with, or in opposition to, the sun.

3d and 4th, The *quadratures*, or those aspects of the moon when she is 90° distant from the sun; or when she is in the middle point of her orbit, between the points of conjunction and opposition, namely, in the first and third quarters.

5th, The *perigee*, and 6th, The *apogee*, or those points of the moon's orbit, in which she is at the *least* and *greatest* distance from the earth.

7th and 8th, The two passages of the moon over the equator, one of which Toaldo calls the moon's *ascending*, and the other the moon's *descending*, equinox; or the two *lunistices*, as De la Lande terms them.

9th, The *boreal lunistice*, when the moon approaches as near as she can in each lunation (or period between one new moon and another) to our zenith (that point in the horizon which is directly over our heads).

10th, The *austral lunistice*, when she is at the greatest distance from our zenith; for the action of the moon varies greatly, according to her obliquity. With these ten points Toaldo compared a table of forty-eight years' observations; the result is, that the probabilities, that the weather will change at a certain period of the moon are in the following proportions: — New moon, 6 to 1. First quarter, 5 to 2. Full moon, 5 to 2. Last

quarter, 5 to 4. Perigee, 7 to 1. Apogee, 4 to 1. Ascending equinox, 13 to 4. Northern lunistics, 11 to 4. Descending equinox, 11 to 4. Southern lunistics, 3 to 1.

2066. *That the new moon will bring with it a change of weather* is in the doctrine of chances as 6 to 1. Each situation of the moon alters that state of the atmosphere which has been occasioned by the preceding one: and it seldom happens that any change in the weather takes place without a change in the lunar situations. These situations are combined, on account of the inequality of their revolutions, and the greatest effect is produced by the union of the syzgies, or the conjunction and opposition of a planet with the sun, with the apsides, or points in the orbits of planets, in which they are at the greatest and least distance from the sun or earth. The proportions of their powers to produce variations are as follows:—New moon coinciding with the perigee, 33 to 1. Ditto, with the apogee, 7 to 1. Full moon coinciding with the perigee, 10 to 1. Ditto, with the apogee, 8 to 1. The combination of these situations generally occasions storms and tempests: and this perturbing power will always have the greater effect, the nearer these combined situations are to the moon's passage over the equator, particularly in the months of March and September. At the new and full moons, in the months of March and September, and even at the solstices, especially the winter solstice, the atmosphere assumes a certain character, by which it is distinguished for three and sometimes six months. The new moons which produce no change in the weather are those that happen at a distance from the apsides. As it is perfectly true that each situation of the moon alters that state of the atmosphere which has been produced by another, it is also observed, that many situations of the moon are favourable to good and others to bad weather.

2067. *The situations of the moon favourable to bad weather* are the perigee, new and full moon, passage of the equator, and the northern lunistics. Those belonging to the former are, the apogee, quadratures, and the southern lunistics. Changes of the weather seldom take place on the very days of the moon's situations, but either precede or follow them. It has been found by observation, that the changes affected by the lunar situations in the six winter months precede, and in the six summer months follow them.

2068. *The octants.* Besides the lunar situations to which the above observations refer, attention must be paid also to the fourth day before new and full moon, which days are called the octants. At these times the weather is inclined to changes; and it may be easily seen, that these will follow at the next lunar situation. Virgil calls this fourth day a very sure prophet. If on that day the horns of the moon are clear and well defined, good weather may be expected; but if they are dull, and not clearly marked on the edges, it is a sign that bad weather will ensue. When the weather remains unchanged on the fourth, fifth, and sixth day of the moon, we may conjecture that it will continue so till full moon, even sometimes till the next new moon; and in that case the lunar situations have only a very weak effect. Many observers of nature have also remarked, that the approach of the lunar situations is somewhat critical for the sick. According to Dr. Herschel, the nearer the time of the moon's entrance at full, change, or quarters, is to midnight (that is, within two hours before and after midnight), the more fair the weather is in summer, but the nearer to noon the less fair. Also, the moon's entrance at full, change, or quarters, during six of the afternoon hours, viz. from four to ten, may be followed by fair weather; but this is mostly dependent on the wind. The same entrance during all the hours after midnight, except the first two, is unfavourable to fair weather; the like nearly may be observed in winter.

2069. *The artificial data* are, the barometer, hygrometer, rain-gauge, and thermometer.

2070. "*By means of the barometer,*" Taylor observes, "we are enabled to regain, in some degree at least, that foreknowledge of the weather, which the ancients unquestionably did possess; though we know not the data on which they founded their conclusions." Chaptal considers that the value of the barometer, as an indicator of the approaching weather, is greater than that of the lunar knowledge of the most experienced countryman, and indeed of all other means put together. (*La Chimie appliquée, &c.*) We shall therefore annex such rules as have hitherto been found most useful in ascertaining the changes of the weather by means of the barometer.

2071. *The rising of the mercury* presages, in general, fair weather; and its falling foul weather, as rain, snow, high winds, and storms.

The sudden falling of the mercury foretells thunder, in very hot weather, especially if the wind is south.

The rising in winter indicates frost; and in frosty weather, if the mercury falls three or four divisions, there will follow a thaw: but if it rises in a continued frost, snow may be expected.

When foul weather happens soon after the falling of the mercury, it will not be of long duration; nor are we to expect a continuance of fair weather, when it soon succeeds the rising of the quicksilver.

If, in foul weather, the mercury rises considerably, and continues rising for two or three

days before the foul weather is over, a continuance of fair weather may be expected to follow.

In fair weather, when the mercury falls much and low, and continues falling for two or three days before rain comes, much wet must be expected, and probably high winds.

The unsettled motion of the mercury indicates changeable weather.

2072. *Respecting the words engraved on the register plate of the barometer, it may be observed, that their exact correspondence with the state of the weather cannot be strictly relied upon, though they will in general agree with it as to the mercury rising and falling. The engraved words are to be regarded only as indicating probable consequences of the varying pressure of the atmosphere. The barometer, in fact, only shows the pressure of the aërial column; and the precipitation of rain, or the agitations of the atmosphere, are merely events which experience has shown usually to accompany the sinking of the mercurial column, but are not necessarily connected with fluctuations of pressure. The words deserve to be particularly noticed when the mercury removes from "changeable" upwards; as those on the lower part should be adverted to, when the mercury falls from "changeable" downwards. In other cases, they are of no use: for, as its rising in any part forebodes a tendency to fair, and its falling to foul weather, it follows that, though it descend in the tube from "settled" to "fair," it may nevertheless be attended with a little rain, and when it rises from the words "much rain" to "rain" it shows only an inclination to become fair, though the wet weather may still continue in a less considerable degree than it was when the mercury began to rise. But if the mercury, after having fallen to "much rain," should ascend to "changeable," it foretells fair weather, though of a shorter continuance than if the mercury had risen still higher; and so, on the contrary, if the mercury stood at "fair" and descends to "changeable," it announces foul weather, though not of so long continuance as if it had fallen lower.*

2073. *Concavity of the surface of the mercury.* Persons who have occasion to travel much in the winter, and who are doubtful whether it will rain or not, may easily ascertain this point by the following observation:—A few hours before he departs, let the traveller notice the mercury in the upper part of the tube of the barometer; if rain is about to fall, it will be indented, or concave; if otherwise, convex or protuberant.

2074. *Barometer in spring.* Towards the end of March, or more generally in the beginning of April, the barometer sinks very low with bad weather; after which it seldom falls lower than 29 degrees 5 minutes till the latter end of September or October, when the quicksilver falls again low with stormy winds, for then the winter constitution of the air takes place. From October to April, the great falls of the barometer are from 29 degrees 5 minutes to 28 degrees 5 minutes, and sometimes lower; whereas, during the summer constitution of the air, the quicksilver seldom falls lower than 29 degrees 5 minutes. It therefore follows that a fall of one tenth of an inch, during the summer, is as sure an indication of rain, as a fall of between two and three tenths is in the winter.

2075. *The hygrometer is of various sorts, but cord, fiddlestring, and most of the substances commonly used, become sensibly less and less accurate, so as at length not to undergo any visible alteration from the different states of the air, in regard to dryness or moisture. The most common of all barometers is that formed of the beard of the wild oat, *Avena fatua*.*

2076. *A sponge makes a good hygrometer on this account, as being less liable to be changed by use than cord. To prepare the sponge, first wash it in water, and when dry wash it again in water wherein sal ammoniac or salt of tartar has been dissolved; and let it dry again. Now, if the air becomes moist, the sponge will grow heavier; and if dry, it will become lighter.*

2077. *Oil of vitriol is found to grow sensibly lighter or heavier in proportion to the less or greater quantity of moisture it imbibes from the air. The alteration is so great, that it has been known to change its weight from three drachms to nine. The other acid oils, or, as they are usually called, spirits, or oil of tartar *per deliquium*, may be substituted for the oil of vitriol.*

2078. *Steelyard hygrometer.* In order to make a hygrometer with those bodies which acquire or lose weight in the air, place such a substance in a scale on the end of a steelyard, with a counterpoise which shall keep it in *equilibrium* in fair weather; the other end of the steelyard, rising or falling, and pointing to a graduated index, will show the changes.

2079. *Line and plummet.* If a line be made of good well-dried whipcord, and a plummet be fixed to the end of it, and the whole be hung against a wainscot, and a line be drawn under it, exactly where the plummet reaches, in very moderate weather it will be found to rise above such line, and to sink below it when the weather is likely to become fair.

2080. *The hair hygrometer of Saussure, and the whalebone hygrometer*, originally invented by De Luc, are esteemed two of the most convenient now in use. The hygrometer invented by Mr. Daniells is one of the best which has been constructed, both for facility of observation, and perfect accuracy of indication; it is that used in the garden of the London Horticultural Society.

2081. *The only perfect hygrometer*, however, is that of Professor Lealie. It consists of a siphon tube, with a ball blown at each end (*fig. 288.*), and filled with air. A coloured liquid fills one leg of the siphon; the ball on the opposite limb, smoothly coated with tissue paper, is the evaporating surface; this is kept perpetually moist by means of a thread passing from a jar with water as high as the instrument to the covered ball. The cold produced by evaporation causes the air in the ball to contract, and the coloured liquid is forced into that stem by the elasticity of the air included in the naked ball. This rise is exactly proportional to the dryness of the air. (*T.*)

2082. *The rain-gauge, pluviometer, or hyetometer*, is a machine for measuring the quantity of rain that falls.

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2083. *A hollow cylinder forms one of the best constructed rain-gauges*; it has within it a cork ball attached to a wooden stem (*fig. 289.*), which passes through a small opening at the top, on which is placed a large funnel. When this instrument is placed in the open air in a free place, the rain that falls within the circumference of the funnel will run down into the tube and cause the cork to float, and the quantity of water in the tube may be seen by the height to which the stem of the float is raised. The stem of the float is so graduated as to show by its divisions the number of perpendicular inches of water which fell on the surface of the earth since the last observation. After every observation the cylinder must be emptied.

2084. *A copper funnel forms another very simple rain-gauge*: the area of the opening must be exactly ten square inches. Let this funnel be fixed in a bottle, and the quantity of rain caught is ascertained by multiplying the weight, in ounces, by 173, which gives the depth in inches and parts of an inch.

2085. *In fixing these gauges*, care must be taken that the rain may have free access to them: hence the tops of buildings are usually the best places; though some conceive that the nearer the rain-gauge is placed to the ground the more rain it will collect.

2086. *In order to compare the quantities of rain collected in pluviometers at different places*, the instruments should be fixed at the same heights above the ground in all such places; because, at different heights, the quantities are always different, even at the same place.

2087. *Thermometer.* As the weight of the atmosphere is measured by the barometer, so the thermometer shows the variations in the temperature of the weather; for every change of the weather is attended with a change in the temperature of the air, which a thermometer placed in the open air will point out, sometimes before any alteration is perceived in the barometer.

2088. *The scales of different thermometers are as follows*:—In Fahrenheit's the freezing point is 32 degrees, and the boiling point 212 degrees. In Reaumur's, the freezing point is 0, and the boiling point 80 degrees. In the centigrade thermometer, which is generally used in France, and is the same as that of Celsius, which is the thermometer of Sweden, the freezing point is 0, and the boiling point 100 degrees. As a rule for comparing or reducing these scales, it may be stated that 1 degree of Reaumur's scale contains $2\frac{1}{4}$ degrees of Fahrenheit; and to convert the degrees of the one to the other, the rule is, to multiply by 9, divide by 84, and add 32. One degree of the centigrade scale is equal to one degree and eight tenths of Fahrenheit; and the rule here is, to multiply by 9, divide by 5, and add 32. Any of these thermometers may be proved by immersing it in pounded ice for the freezing point, and in boiling water for the boiling point; and if the space between these points is equally divided, the thermometer is correct.

2089. *The study of the weather from precedent*, affords useful hints as to the character of approaching seasons. From observing the general character of seasons for a long period, certain general results may be deduced. On this principle, Kirwan, on comparing a number of observations taken in England from 1677 (*Trans. Irish Acad.*) to 1789, a period of 112 years, found:—

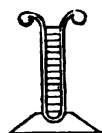
That when there has been no storm before or after the vernal equinox, the ensuing summer is generally dry, at least five times in six.

That when a storm happens from an easterly point, either on the 19th, 20th, or 21st of May, the succeeding summer is generally dry, at least four times in five.

That when a storm arises on the 25th, 26th, or 27th of March, and not before, in any point, the succeeding summer is generally dry, four times in five.

If there be a storm at S. W., or W. S. W., on the 19th, 20th, 21st, or 22d of March, the succeeding summer is generally wet, five times in six.

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In this country, *winters and springs, if dry, are most commonly cold; if moist, warm*: on the contrary, dry summers and autumns are usually hot, and moist summers cold; so that, if we know the moistness or dryness of a season, we can form a tolerably accurate judgment of its temperature. In this country, also, it generally rains less in March than in November, in the proportion, at a medium, of seven to twelve. It generally rains less in April than October, in the proportion of one to two, nearly, at a medium. It generally rains less in May than September: the chances that it does so are at least four to three; but, when it rains plentifully in May, as 1·8 inches or more, it generally rains but little in September; and when it rains one inch, or less, in May, it rains plentifully in September.

2090. *The probabilities of particular seasons being followed by others*, have been calculated by Kirwan; and, although his rules chiefly relate to the climate of Ireland, yet, as there exists but little difference between that island and Great Britain, in the general appearance of the seasons, we shall mention some of his conclusions.

2091. *In forty-one years* there were six wet springs, twenty-two dry, and thirteen variable; twenty wet summers, sixteen dry, and five variable; eleven wet autumns, eleven dry, and nineteen variable.

2092. *A season is accounted wet* when it contains two wet months. In general, the quantity of rain which falls in dry seasons is less than five inches; in wet seasons more. Variable seasons are those in which there fall between thirty pounds and thirty-six pounds, a pound being equal to ·157639 of an inch.

2093. *January is the coldest month* in every latitude; and July is the warmest month in all latitudes above forty-eight degrees: in lower latitudes, August is generally the warmest. The difference between the hottest and coldest months increases in proportion to the distance from the equator. Every habitable latitude enjoys a mean heat of sixty degrees for at least two months; which heat is necessary for the production of corn.

SECT. III. *Of the Climate of Britain.*

2094. *The climate of the British isles*, relatively to others in the same latitude, is temperate, humid, and variable. The moderation of its temperature, and its humidity, are owing to our being surrounded by water; which, being less affected by the sun than the earth, imbibes less heat in summer; and, from its fluidity, is less easily cooled in winter. As the sea on our coast never freezes, its temperature must always be above 33° or 34°; and hence, when air from the polar regions, at a much lower temperature, passes over it, that air must be in some degree heated by the radiation from the water. On the other hand, in summer, the warm currents of air from the south necessarily give out part of their heat in passing over a surface so much lower in temperature. The variable nature of our climate is chiefly owing to the unequal breadths of watery surface which surround us: on one side, a channel, of a few leagues in breadth; on the other, the Atlantic Ocean. The temperature of the British seas rarely descends below 53° or 54°.

2095. *The British climate varies materially within itself*: some districts are dry, as the east; others moist, as the west coast: in the northern extremity, dry, cold, and windy; in the south, warm and moist. Even in moist districts, some spots are excessively dry, as part of Wiltshire, from the influence of the Isle of Man in warding off the watery clouds of the Atlantic; and, in dry districts, some spots are moist, from the influence of high mountains in attracting and condensing clouds charged with watery vapour. The mean temperature of London equals 50° 36'; that of Edinburgh equals 47° 84'; and the probable mean temperature of all Britain will equal 48°. The usual range of the barometer is within three inches. The mean annual rain is probably about 32 inches. The climate is variable, and subject to sudden alternations of heat and cold, which are supposed to render pulmonary complaints common with us: but, on the whole, it is healthy; and the moisture of our clouded atmosphere clothes our fields with a lasting verdure, unknown to the more favoured regions of southern Europe. (T.)

2096. *The deterioration of the British climate* is an idea entertained by some; but, whether in regard to general regularity, temperature, moisture, or wind, the alleged changes are unsupported by satisfactory proofs. It is not improbable but the humidity of our climate, as Williams alleges (*Climate of Britain*, &c., 1816), has of late years been increased by the increase of evaporating surface, produced by the multiplicity of hedges and plantations; a surface covered with leaves being found to evaporate considerably more than a naked surface. If the humidity of the climate were greater before the drainage of morasses and the eradication of forests for agricultural purposes, a comparative return to the same state, by artificial planting and irrigation, must have a tendency to produce the same results. However, it will be long before the irrigation of lands is carried to such a degree as to produce the insalubrious effects of undrained morasses: and as to our woods and hedges, we must console ourselves with the beauty and the shelter which they produce, for the increase of vapour supposed to proceed from them. Many arguments in favour of the belief that a change has taken place

in the British climate, have been drawn from old books on horticulture, in which, seeds are directed to be sown at seasons when we know they would now perish; and fruit is said to ripen in months when it is now never ripe. In Evelyn's *Sylva*, published in 1664, we are informed that cherries, strawberries, &c. were ripe in the open ground in May; raspberries, corinths (currants), melons, &c. in June; and peaches, nectarines, and plums, in July and August; and even after making allowance for the fact that, before the change of style, May extended to what is now the middle of the second week in June, we shall find that these fruits are now full a fortnight or three weeks later in ripening than they were in his time. Some curious remarks on the change of climate in Britain, during the last thirty years of the eighteenth century, may be found in *Garnett's Tour through the Highlands of Scotland* in 1800, and in *Pinkerton's Geography*, vol. i. p. 70. Both these writers assert that the British climate is now more cold and moist than it was formerly; but in an article in the *Edinburgh Review*, vol. xxx. p. 1., on "Polar Ice, and a North-West Passage," it is asserted that no material change has taken place in the climate of Europe for the last 1000 years.

BOOK III.

MECHANICAL AGENTS EMPLOYED IN GARDENING.

2097. HAVING considered the nature of vegetables, and the nature of the materials by which their culture or improvement is effected by art, the next step is to consider the *means by which art is applied in the practice of cultivation*. In general it may be observed, that every change effected in the circumstances of materials either consists in, or must be preceded by, a mechanical change in their position. To effect mechanical changes, the fundamental engine is the human frame; but its agency is essentially increased by the use of certain implements, utensils, machines, and buildings. The primary implements of gardening, as an art of culture, would necessarily be confined to a few tools for stirring the ground, and one or two instruments for pruning trees or gathering crops. But in the present state of the art, both the number and kind of agents are greatly extended and diversified. There are tools, instruments, and machines for culture, as the spade, knife, and water-engine; for beautifying scenery, as the broom, scythe, and roller; utensils for portable habitations of plants, or conveying materials, as pots and baskets; structures for culture, as glass frames, hot-houses, and awnings; and buildings for use, convenience, or decoration, as tool-houses, arbours, and obelisks. The whole may be included under implements, structures, and edifices, as in the following Table:—

Implements	Tools		Lever Pick Spade Shovel Fork Dibber Planter's back	Planter's trowel Planter's pickaxe Garden trowel Transplanter Hoe Rake	Turf-riser Turf-bottle Turf-scraper Wander Besom Implement-cleaner
	Instruments	Of operation	Garden-knife Garden-chisel Pruning-knife Forest-saw Pruning-saw	Averrormaster Shears Scythe Scarfifier Barking-iron	Hammer Pincers Fruit-gatherers Climbing-spurs
		Of direction	Garden-line Ground-measure Timber-measure	Ground-compasses Boring-plate Level	Staff Straight-edge Stake
		Of designation	Notch numbering-stick Written number-stick	Name-stick	Label
	Utensils	Of preparation and deportation	Screens Sieves	Mould-entile Pot-carrier	Basket Packing-case
		Of culture	Pots Water-saucers	Plant-box Plant-tub	Watering-pot Syringe
		Of protection or modification	Cover Shade	Blancher Hand-glass	Bell-glass
		For vermin	Bird-trap-cage	Bottle-trap	Wasp and fly trap
		Of labour	Barrow Watering engine Roller	Ladder Platform	Tree transplanter Seed separator
Machines	For vermin		Engines of destruction	Engines of alarm or snare	Living vermin-killers
	For regulation		Registering thermometer	Alarm thermometer	Regulating thermometer
	Of adaptation		Temporary coping Horizontal shelter Netting screen	Garden-hurdle Movable edging	Protecting bag Shoe-scraper
		Of manufacture	Canvases Guttas	Netting Wall-tree nails	Wall-tree lists
	Of preparation		Props Ties	Covering materials Planks	Various articles

Structures	Portable or movable	The flower-stage	Glassed frame or sash	Hothed-frame
		Opaque covering-frame	Glass case	
	Partly movable	Pit	Adapted frame	
	Fixed	Wall	Esplanade rail	
Edifices	Permanent	Hot-house	Mushroom-house	Cold-house
	Economical	Head-gardener's dwelling-house	Seed-room	Entrance-lodge and gate
		Official or administrative apartment	Fruit-room	Building for raising water
			Under-gardener's lodge	Reservoir
	Anomalous	Ice-house	Aptary	A viary
	Useful	Cottage	Boat	Gate
		Bridge	Sepulchre	Fence
	Decorative	Prospect-tower	Cavern	Waterfall
		Temple	Grotto	Cascade
		Porch	Roofed seat	Jet or spout
		Parterre	Exposed seat	Bundial
	Convenient	Arbour	Swing	Vase
		Cave		
	Characteristic	Rocks	Rarities	Vegetable sculptures
		Ruins	Monuments	Inscriptions
		Antiquities	Statues	Eye-traps.

CHAP. I.

Implements of Gardening.

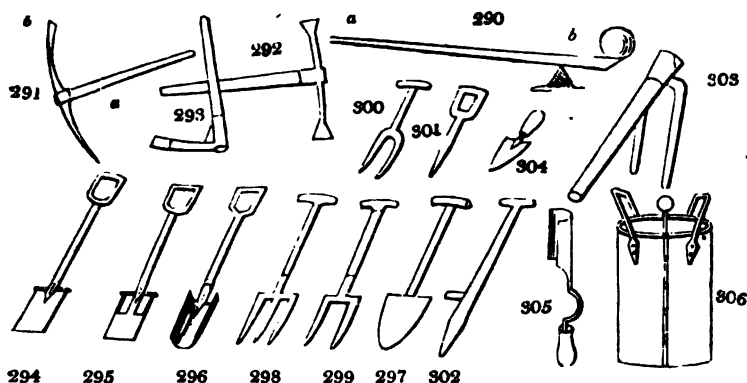
2098. *The usual mechanical agents employed in garden-culture* may be classed as follows: — 1. *Tools*, or simple implements for performing operations on the soil, and other dead or mineral matters; 2. *Instruments* for performing operations on plants, or on insects and vermin; 3. *Utensils* for habitations of plants, or the deportation or retention of either dead or living materials; 4. *Machines*, or compound implements, for any of the above or other purposes; and, 5. *Articles* adapted, manufactured, or prepared, so as to serve various useful purposes.

SECT. I. Tools.

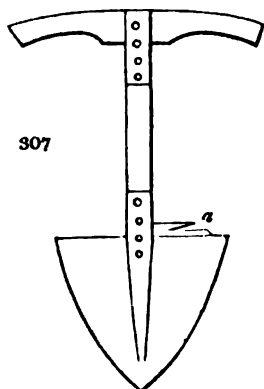
2099. *The common character of tools* is, that they are adapted for labour which requires more force than skill; they are generally large, and require the use of both hands and the muscular action of the whole frame, often aided by its gravity. Tools consist of two parts, the head, blade or acting part; and the handle or lever, by which the power is communicated, and the tool put in action. As almost all tools operate by effecting a mechanical separation between the parts of bodies, they generally act on the principle of the wedge and lever, and consequently the wedge-shape ought to enter, more or less, into the shape of the head or blade of most of them, and the lever or handle ought to be of some length. Where the handle is intended to be grasped and held firm, its form may be adapted for that end, as in the upper termination of the handle of the shovel or the spade; but where the human hand is to slide along the handle, then it should be perfectly cylindrical, as producing least friction, as in the hoe and the mattock. The materials of which tools are composed are almost exclusively iron and timber; and of the latter the ash is reckoned to combine most strength and toughness, the willow to be lightest, and fir or pine deal the straightest. The best quality of both materials should, if possible, be used, as *scrap-iron* and cast-steel, and root-cut young ash from rocky steeps. For light tools, such as the hoe and rake, the willow, or pine deal, may be used for the handles, but in scarcely any case can inferior iron or steel be admitted for the blades.

2100. *Garden-levers* are of two species, the removing and the carrying lever. *The removing-lever* (fig. 290.) is a straight, and generally cylindrical or polygonal, bar of iron, somewhat tapered and wedge-shaped or flattened in the thick end: it is used for the removal of large stones or other heavy bodies, in which its advantage is as the distance of the power (*a*), from the fulcrum (*b*), &c. *The carrying-lever*, or handspoke, is used in pairs for carrying tubs of plants or other bodies or materials furnished with hooks or bearing staples, under or in which to insert the handspokes. Two of them united to a platform of boards form the common hand-barrow.

2101. *The pick* (fig. 291.) is a double or compound lever, and consists of the handle (*a*), which ought to be formed of sound ash timber, and the head (*b*), which ought to be made of the best iron, and pointed with steel. There are several varieties: the first, the pick with the ends of the head pointed (fig. 291.) is used for loosening hard ground, gravel, &c.; the second, or pickaxe (fig. 292.) with both ends wedge-shaped, in reversed positions, and sharp, is used for cutting through the roots in felling timber; the third, or mattock (fig. 293.) is used chiefly for loosening hard surfaces, and for grubbing up roots of small trees or bushes. It is sometimes called a crow, and also a grubbing-axe, hoe-axe, &c.



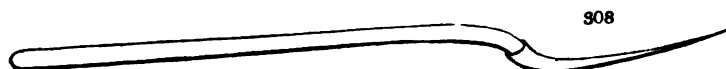
2102. *The spade* (fig. 294.) consists of two parts; the blade, of plate-iron, and the handle, of tough root-cut ash timber, rather longer than the handle of the pick, but generally about two feet nine inches. The blade consists of two parts; the plate, by which the soil is cut and carried, and the tread, which is a piece of strong iron fixed on the upper edge of the blade, to receive the impulse of the foot of the operator. Spades are manufactured of different sizes, and usually with a flat blade; but perforated blades (fig. 295.) are sometimes prized, as cleaning or freeing themselves better from earth in adhesive soils; and semicylindrical blades, or what canal-diggers call *grafting-tools*, are preferred for the same reason, and also as entering the soil easier, because gradually, and in effect as if a flat spade with a pointed or shield-like curved edge were used. Spades with curved edges or pointed blades are easiest to thrust into the earth in hard or stiff soils, and clean themselves better, but they are



more apt to leave untouched parts (baulks) in the bottom of the trench than the common square-mouthed spade. They are the best species for new-ground work, but are not well adapted for culture. (See *Gard. Mag.*, vol. v. p. 135.)

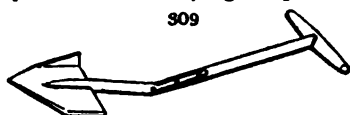
2103. *The under-foot spade* (fig. 307.) should be made very strong, the shaft, or handle, square, with the angles rounded off, and strongly plated over where it is joined to the cross angle at top and to the blade below. The blade is about fourteen inches across and twelve inches deep; quite perpendicular, with sharp cutting edges, and a hilt or piece of iron (a) riveted on for the feet. For the stubbing of hedges, taking the top sods off drains, and various uses where strength is wanted, this spade will be found a most powerful instrument. (*Gard. Mag.*, vol. vii. p. 86.)

2104. *The Flemish spade* (fig. 308.) has a long handle, in some cases to the extent of six or eight feet, but no tread for the foot of the operator. As the long handle forms a very powerful lever, when the soil is easily penetrated, it may be dug with greater ease by this spade, than with any of the common forms. For the same reason, the labour of filling carts with earth, and that of throwing earth to a distance, is less with the Flemish spade than with any other.



2105. *The turf spade* (fig. 324.) consists of a cordate or scutiform blade, joined to a handle by a kneed or bent iron shank. It is used for cutting turf from old sheep-pastures, with a view to its being employed either for turving garden-grounds, or being thrown together in heaps to rot into mould. It is also used in removing ant-hills and other inequalities in sheep-pastures, in parks, or rough lawns. A thin section often is first removed, then the protuberance of earth beneath it is taken out, and the section is replaced, which, having been cut thin, especially on the edges, readily refits; and the

operation is finished by a gentle pressure by the foot, back of the spade, beetle, or roller.



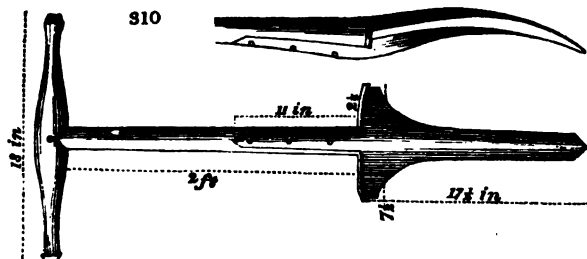
One variety of the turf-spade (*fig. 309.*) has one edge turned up, and made quite sharp: this spade is preferable where the turves are to be cut square-edged, and somewhat thick.

2106. *The shovel* (*fig. 297.*) consists of two parts, the handle and the blade; the latter of plate-iron, and the former of ash timber. There are several varieties. Such as are turned up on the edges, and are used for shovelling mud, or, when formed of wood (generally of beech), for turning grain, seeds, or potatoes; square-mouthed shovels, for gathering up dung in stables, and used by gardeners in the melon-ground; heart-shaped or pointed-mouthed shovels, used for lifting earth out of trenches, in ditch-making, trenching, or in other excavations; and long narrow-mouthed shovels, for cleaning out drains, &c.

2107. *The fork* (*figs. 298, 299, and 300.*) Of this tool there are three principal species: — The first (*fig. 298.*), for working with litter, haulm, or stable-dung; the second (*fig. 297.*), for stirring the earth among numerous roots, as in fruit trees and flower-borders, or for taking up roots; and the third (*fig. 298.*), for plunging pots in bark-pits, or for taking up asparagus or other roots. The prongs of the last are small and round, and should be kept clear or polished by use, or by friction with sand. In adhesive soils, a strong two-pronged fork (*fig. 299.*) is one of the most useful of garden-tools, and is advantageously used on most occasions where the spade or even the hoe would be resorted to in free soils, but especially in stirring between crops.

2108. *The dibber* (*figs. 301. and 302.*) is a short piece of cylindrical wood, obtusely pointed, and sometimes shod with iron on the one end, and formed into a convenient spade-like handle in the other. There are three species. The common garden-dibber (*fig. 301.*), the potato-dibber (*fig. 302.*), and the forester's or planter's dibber. The forester's dibber has a wedge-shaped blade, forked at the extremity, for the purpose of carrying down with it the tap-root of seedling trees, and has been much used in planting extensive tracts. There are also dibbers that make two holes at once, sometimes used in planting leeks or other articles that are placed within a few inches of each other; dibbers which make several holes for planting beans and other seeds; and wedge-shaped dibbers which in soft sandy soils are easily worked, and admit of spreading the roots better than the round kind. These wedge-shaped tools also admit of putting two plants in a hole, one at each extremity.

2109. *The perforator* (*fig. 310.*) is tried as a substitute for the spade, in planting



young tap-rooted trees in rough ground. It was invented by Mr. Munro, formerly of the Bristol Nursery, and costs in that part of the country about 8s. In using it, one man employs the instrument, while another man or boy holds a bundle of plants. The man first inserts the instrument in the soil, holding it up for the reception of the plant; round which, when introduced, he inserts the iron three times, in order to loosen the soil about the roots; then treads down the turf, and the plant becomes as firmly set in the ground as if it had been long planted. Two men will set in one day from 500 to 600 plants with this instrument, at 1s. per hundred; whereas, by digging holes, the expense would be 3s. per hundred, and the planting not done so well. (*Gard. Mag.*, vol. iii. p. 215.)

2110. *The tree-planter's hack, or double mattock* (*fig. 303.*), is used for the same purpose as the forester's dibber, and is much to be preferred. (See *Pontey's Profitable Planter.*)

2111. *The tree-planter's trowel* is a triangular blade of iron joined to a short handle, used for planting young trees in free but unprepared soils, as heaths, moors, &c. (*Song's Planter's Kalender.*)

2112. *The forester's pickaxe* is the tool of that name (fig. 292.) in miniature; or sometimes merely a small mattock (fig. 293.) used for planting in stony uncultivated soils.

2113. *The garden-trowel* is a tongue-shaped piece of iron, with a handle attached; the blade or tongue either flat (fig. 304.), or semicylindrical (fig. 305.), or merely turned up on the sides. It is used to plant, or take up for transplanting, herbaceous plants and small trees. Trowels are also used for loosening the roots of weeds, and are then called weeding-irons. Sometimes they are used for stirring the soil among tender plants in confined situations. Wooden trowels, or spatulas, are sometimes used in potting plants to fill in the earth; but the garden-trowel with the edges turned up is the best for this purpose.

2114. *The flower transplanter* (fig. 306.) consists of two semicylindrical pieces of iron with handles, and which are so inserted in the ground as to enclose a plant with a ball of earth between them. In this state they are attached to each other by two iron pins, and, being pulled up, bring with them the plant to be removed, surrounded by a ball of earth. This being set in a prepared excavation surrounded by loose earth, the transplanter is then separated as at first, and, being withdrawn,



one half at a time, the earth is gently pressed to the ball containing the plant, and the whole well watered. Tender plants thus transplanted receive no check, even if in flower. The French have a transplanter (fig. 311.) which has been improved on by Mr. Saul, and found particularly useful for transplanting tulips, and other bulbs, when in flower. *Saul's tulip transplanter* (fig. 312.) has a spring handle (a), which closes the apparatus, and which, after the plant is placed in the hole for it, admits of readily discharging the ball of earth, without injuring the roots. (*Gard. Mag.*, vol. viii. p. 44.)



2115. *Hurd's flower-transplanter* (fig. 313.) consists of a cylinder about six inches long and five inches and a half wide, open at top and bottom, and with two handles (a): the



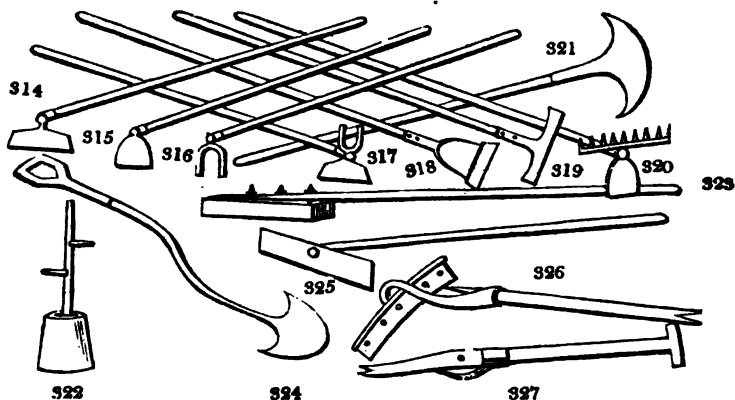
lower edge of this cylinder is serrated, with four saw teeth, which, with the rest of the edge, are sharpened by a file when necessary. There is a bottom into which the cylinder fits (b); two segments (c); and a pronged instrument (d). Supposing it desired to remove a hyacinth, the cylinder is placed over the plant, and worked into the soil till it is filled up to the brim. The cylinder, with the plant and soil which it contains, should be then lifted up, and placed on the bottom (b), which fits so tightly as to adhere, without any fastening. The two flat semicircular pieces are afterwards to be placed on the surface of the soil, on each side of the stem of the plant. It may now be watered

and kept in the instrument as in a common flower-pot, or carried to any distance; when it is to be replanted, the bottom (b) being taken off, the plant and ball of earth may be pushed through the cylinder into a pot, or a hole in the soil, as may be desired, by pressing on the semicircular plates (c) with the pronged instrument (d). The same arrangement is particularly favourable for packing or sending to a distance. (*Gard. Mag.*, vol. viii. p. 667.)

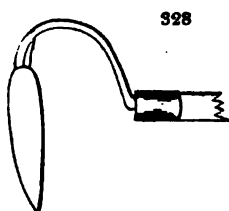
2116. *Hoes* are of two species, the draw-hoe and the thrust-hoe, of each of which there are several varieties.

2117. *The draw-hoe* (figs. 314. to 317.) is a plate of iron, six or seven inches long by two or three broad, attached to a handle about four feet long, at an angle less than a right angle. The blade is either broad, for cutting weeds (fig. 314.); deep and strong, for drawing earth to the stems of plants (fig. 315.); curved, so as to act like a double mould-boarded plough in drawing drills; formed into two strong broad prongs, for stirring hard adhesive soils (fig. 316.); or it is formed to accomplish the first and last purposes, as in the double hoe (fig. 317.).

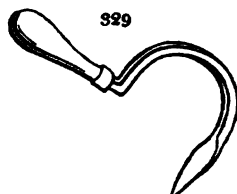
2118. *The Spanish hoe* (fig. 328.), lately called Lord Vernon's new tillage hoe (see L 1 4



Gard. Mag., vol. viii. p. 689.) is a powerful implement for penetrating into hard

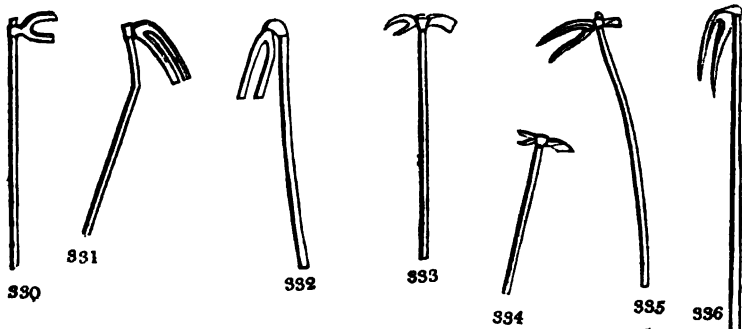


soils; or, when made on a small scale, with a short handle (as in *fig. 329.*), it is well adapted for stirring the ground among small articles.



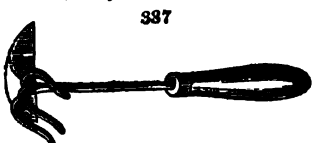
2119. *Pronged hoes* are of several kinds; seven varieties (*figs. 330. to 336.*) are in use among the French. There is also a short-handled sort for flower-beds, and for lady gardeners (*fig. 337.*).

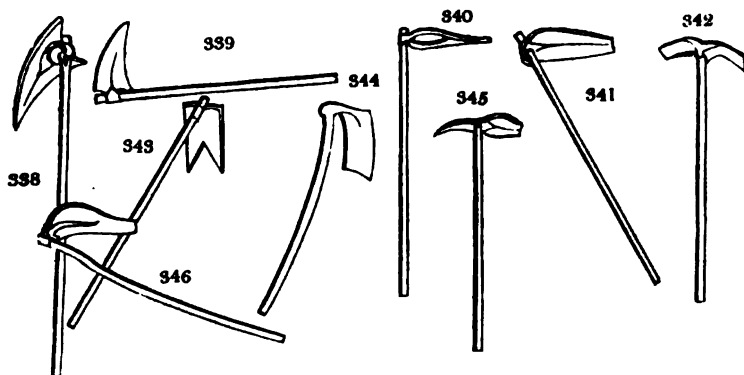
2120. *The digging-hoes of the French and Spaniards (figs. 338. to 346.) are very nu-*



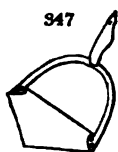
merous; they are used as substitutes for the spade in stirring the soil of the vineyards, and they are better adapted for hilly, stony surfaces, and for women and men who do not wear shoes, than spades. They are, however, gradually disappearing before the latter implement, in all the best cultivated districts of France.

2121. *The thrust-hoe (figs. 318. and 319.)* consists of a plate of iron attached somewhat obliquely to the end of a handle, either by a bow (*fig. 318.*), or a straight piece (*fig. 319.*). These hoes, which are sometimes called *Dutch hoes*, are used only for killing weeds, or loosening ground which is to be afterwards raked. As a man can draw more than he can push, most heavy work will be

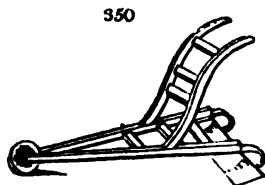
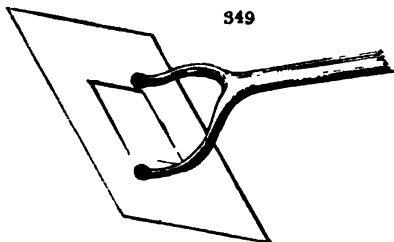




easiest done by the draw-hoe. Several improvements have been recently made in the hoe, by varying the form of the blade, as in (figs. 347. and 348.), or sharp on all its edges, as in (fig. 349.). This last form is the invention of Mr. Booker, of Cronstadt.



2122. *The wheel-hoe* (fig. 350.) is a compound between the draw and thrust hoes, being drawn by one man and thrust by another. It is used for hoeing garden-walks in the Low Countries and in France, where the walks are either of sand or earth. In this country it could seldom be employed for a similar purpose; and, indeed, for any object it is a bad implement, as it requires two men to work it; and two men working with the same tool will never do so much work as if they used separate tools.



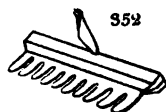
2123. *The garden-rake* consists of a range of teeth inserted in a straight bar of iron or wood from six to eighteen inches in length, and attached at right angles across the end of a handle. Rakes vary in size, and in the length and strength of their teeth: they are used for covering seeds, or raking off weeds or cut grass, for smoothing surfaces, and for removing or replacing thin strata of pulverised surfaces, as in cuffling (cuffling is a mode of covering tree seeds sown in beds, by spreading the earth, previously drawn off to the sides, over the seeds by a smart blow, or cuff, with the back of the rake). For the latter purpose a wooden-headed rake is preferable; for the others, iron is generally more eligible.

2124. *The drill-rake* has large couller-formed teeth, about six inches long and the same distance apart: it is used for drawing drills across beds for receiving small seeds, and also serves to stir the soil between the rows after the seeds come up. In very loose soils, where a wide drill is required, a sheath of wood may be fixed to the upper part of each prong in order to spread the earth; but this is seldom necessary. When the drills are not to be quite so wide as six inches, the operator has only to work the implement diagonally.

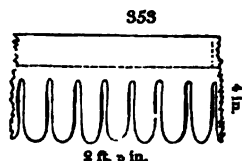


2125. *The daisy-rake* (fig. 351.) has teeth sharpened on both edges like lancets, and is used for raking the grass in order to tear off the flower heads or buds of daisies, and other plants, in grass lawns.

2126. *Hislop's short grass-rake* (fig. 352.) consists of a piece of thin plate iron (fig. 353.), cut into



teeth, with two slips of ash, or other tough wood, between which it is firmly riveted to form a back, and to keep it from bending. When put together, the back is one inch and three quarters thick. The wood is beveled off half an inch above the interstices of the teeth; at which point the iron is slightly bent longi-



tudinally, to admit the thickness of wood underneath, and to give a proper inclination to the handle. This instrument serves both for a grass-rake and a daisy-rake; and has the advantage, over the daisy-rakes in common use, of being easier cleaned, from the wideness of the interstices between the teeth. (*Gard. Mag.*, vol. v. p. 597.)

2127. *The hoe-rake* combines a hoe and rake; either at opposite ends of the same handle, as in France, or back to back at one end, as in England (*fig. 320.*). Hoe-rakes are used for giving slight dressings to borders.

2128. *The turf-raser (raser, Fr. to shave or trim)* (*fig. 321.*) consists of a narrow kidney-shaped blade fixed to a straight handle, and is used for paring the edges of verges or borders of turf; and for cutting the outlines of turves to be raised with the turf-spade.

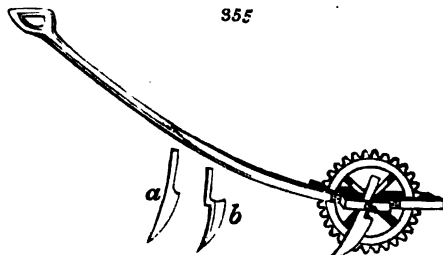
2129. *Of wheel turf-rasers, or verge-cutters, or edging-irons*, there are two kinds; one in use by the French (*fig. 354.*), and the other invented by Mr. Mac Intosh. (*fig. 355.*)

With Mac Intosh's verge-cutter, a man may cut as much in one day, as he will cut in four or five days with the one in general use. Unless there be a long straight line to be edged, a garden line is unnecessary; but where one is used, it may be placed between the wheel and the coulter, or cutting part, of the machine (*a*). A certain degree of pressure is necessary on the handle, when the ground is hard; and the kneed coulter (*b*) may be employed where the edgings are not very regular. When in use, the coulters should be sharpened every morning, and several should be taken out by the operator, in order that the instant one loses its cutting edge, its place may be supplied by another. (*Gard. Mag.*, vol. i. p. 139.)



2130. *The turf-beetle* (*fig. 322.*) is a cylindrical or conical piece of wood, of one hundred or two hundred pounds' weight, with an upright handle and two cross-handlets attached; it is used chiefly for pressing down and levelling new-laid turf. There is a variety, consisting of a rectangular block with a handle placed obliquely (*fig. 323.*) which is used when a less powerful pressure is desirable.

2131. *The turf-scraper* is a head or plate of wood (*fig. 325.*) or iron (*fig. 326.*), fixed at right angles across the end of a long handle, and is used chiefly to scrape off earth, or the exuviae of worms, snails, &c. from lawns, grass verges, or walks, early in spring. In some cases, teeth, like those of a saw, are formed in the edge of the blade of such scrapers, in order to tear out the moss from lawns; in many situations, however, a mossy lawn is much to be preferred to grass, as softer, and requiring less frequent mowing.



Wire besouns are used with good effect for this purpose, as well as for removing moss from walls, or the trunks of large trees.

2132. *The dock-weeder* (*fig. 327.*) is composed of a narrow iron blade attached to a spade-like handle, with a protruding iron stay joined to the lower end of the handle, or

to the iron shank of the blade, to act as a fulcrum. It is used for digging up long conical roots of weeds in pastures or close crops, where the spade or two-pronged fork cannot be introduced; or for taking up crops of fusiform roots, as the parsnep, scorsonera, &c.

2133. *A thistle extirpator, and weeding-piercers* will be found figured and described in our *Encyclopædia of Agriculture*, § 2466. and § 2467.

2134. *The besoms* used in gardening are of three kinds. The first is made of a small faggot of spray (generally that of birch, or of spartium), with a handle inserted, and is generally used in the open air; the second is formed of a brush of bristles with a similar handle, and is mostly used in hot-houses, seed-rooms, &c.; and the third, which consists of a bundle of iron or copper wires, of one twentieth of an inch in diameter, fixed to a long handle, and is used for sweeping gravelled paths which have become mossy, mossy walls, mossy trunks of trees, &c. Besoms of this last description require to be dipped occasionally in oil, to retard the progress of oxidation.

2135. *Implement-cleaners* are small spatule formed of wood, generally by the operator himself. A small brush of wire, like a painter's large brush, is useful for cleaning pots, and some have a particular description of knife for that purpose, and for spades, hoes, &c.

2136. *Of garden tools the essential kinds* are the *spade*, the *dung-fork*, and the *rake*; for with these, all the operations for which the others are employed may be performed, though with much less facility, expedition, and perfection. There are diminutive sizes of most of them to be had in the shops, for infant gardeners; and portable and convertible sets, for ladies and amateur practitioners.

SECT. II. Instruments.

2137. *The common character of cutting-implements* is, that they require in their use more skill than physical force: they may be divided into instruments for operations, as the knife, saw, &c.; instruments of direction, as the measuring-rod, level, &c.; and instruments of designation, as numbering-tallies, name-pieces, &c.

SUBSECT. 1. Instruments of Operation.

2138. *Operative instruments* are used in labours of a comparatively light kind. They may be used in general with one hand, and commonly bring into action but a part of the muscular system; the scythe, however, is an exception. They are similarly constructed to tools, and act on the same principles, differing from those only in being generally reducible to levers of the third kind, or those in which the power or hand is between the weight, or matter to be cut or separated, and the fulcrum or arm, as in cutting off a shoot with a knife. But in clipping, the fulcrum is between the hand and the weight or object to be clipped off, and therefore shears act as wedges moved by levers of the second kind. The materials of instruments are in general the same as tools, but the handles of knives are usually made of horn, bone, ivory, or a species of sea-weed, instead of wood, and the greatest attention is requisite as to the iron and steel of the blades.

2139. *Garden knives* are of several species and varieties:—

The common garden-knife consists of a blade of prepared steel, fixed without a joint in a handle of bone or horn, and kept in a sheath of leather or pasteboard. It varies in size and shape, and in the quality of the blade; the best in England are generally made in London, but the great mass disposed of in commerce are manufactured at Sheffield. Every working-gardener ought to carry one of these knives in a side-pocket on his thigh, that he may be always ready to cut off pieces of dead, decayed, or injured plants, or to gather crops, independently of other operations.

The common pruning-knife is similar to the former, but less hooked at the point; for though the hook be useful in gathering some crops, and in cutting over or pruning herbaceous vegetables, yet, as all knives cut on the same principle as the saw, a hooked knife is injurious when it is used to cut woody shoots: therefore, wherever a clean section is of importance, the pruning-knife with a straight-edged blade, and not the common garden-knife with a hooked blade, ought to be employed.

The folding pruning-knife differs from the other in having the blade jointed in the handle, for the purpose of rendering it portable with greater ease, and in any description of pockets; such knives are more especially used by master-gardeners. There are varieties of these, with saws, chisels, penknives, &c.; but, generally speaking, they are more curious than useful.

2140. *The grafting-knife* (fig. 358.) differs from the common pruning-knife, in having a thinner and more narrow blade fixed in a bone or horn handle. It is used for

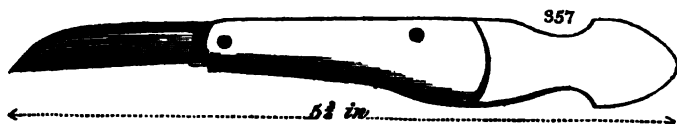
grafting, inarching, &c. The French use an instrument (fig. 356.) having an angle (α) in the opening of the blade, for scooping out the wood of the stock.

2141. *The budding-knife* (fig. 359.) differs from the grafting-knife, in having the point

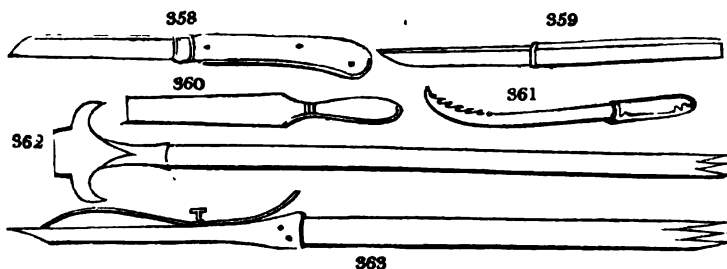
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of the sharp edge of the blade rounded off in the same manner as is the back or blunt edge of the grafting and pruning knives. It has also a thin wedge-shaped ivory or bone handle for raising up the bark, in the operation of inoculation. *Godsall's budding-knife* (fig. 357.) is distinguished by its cordiform end, which is said to be better adapted for opening the incision in the bark than the square end.



2142. *The asparagus-knife* consists of a strong blade, fixed in a handle, blunt on both edges, and straight (fig. 360.); or slightly hooked, and serrated at one end (fig. 361.).

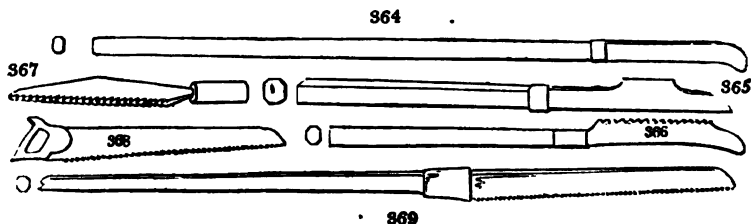


2143. *Garden chisels* are of two species, of which there are several varieties.

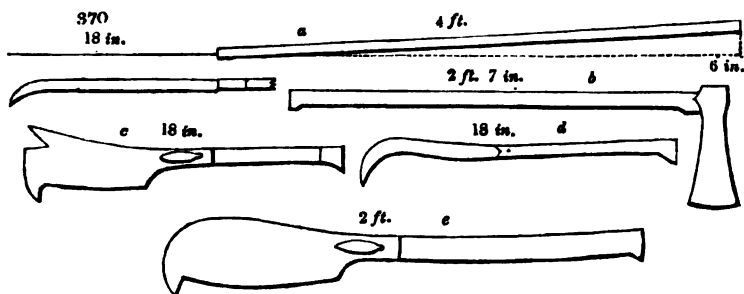
2144. *The grafting-chisel* differs from the carpenter's chisel, in being a narrow wedge tapering equally on both sides. It is used to split stocks when the common pruning-knife is not deemed sufficiently strong.

2145. *The forest-chisel* (fig. 362.) is a sharp edge of steel, with or without a sharp steel hook or hooks, generally called ears: the blade or wedge is attached to a handle, from six to ten feet long or upwards; or, what is better, to a handle capable of being lengthened by additional joints. This chisel is used for cutting off small branches of forest trees close by the bole or trunk: with one hand it is placed and adjusted under the branch, and with the other a smart blow is given by a wooden mallet; which, either at once or by repetition, effects separation, and leaves a smooth section. A variety of this instrument, used for pruning orchards, is furnished with a guard or plate behind the blade, to prevent its entering too far into the trunk or main branch (fig. 363.).

2146. *The pruning-bill* is generally a hooked blade, sometimes sharpened on one, and sometimes on both edges, attached to a handle of from one to four feet in length. There are several varieties: one resembles the pruning-knife on a large scale (fig. 364.), having a handle four feet long, and is used for pruning hedges in the best hedge-districts, such as Northumberland and Berwickshire; another (fig. 365.) has a handle of only a foot, or a foot and a half long, being sharpened in part on the back, which forms a sort of halberd-like blade, and is used where hedges are plashed, as in Middlesex and Hertfordshire; and the last we shall mention contains a saw on one edge of the blade, and a knife on the other (fig. 366.). Of this and of the first-mentioned sorts there are small portable varieties with cases, &c. for amateur foresters.



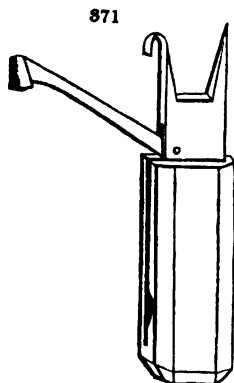
2147. *Blaikie's hedge-bills* are of five different kinds. The scimitar (fig. 370, a), which has a handle four feet long, but a little out of the direction of the blade, in order



to admit of the free action of the operator's arm while standing by the side of a hedge, and cutting upwards; the axe (b), which is used for cutting strong boughs or small trees; the bill-hook (c), for faggoting and stopping gaps in hedges; the dress-hook (d), for cutting the twigs in very young hedges, and for dressing faggots; and the bill-hook (e) for lopping branches close at hand.

2148. *The forest-axe* is a steel wedge fixed at right angles to the end of a handle of wood, from two and a half to four feet long, and is chiefly used for cutting roots or trunks at the ground's surface, where the saw cannot operate. Axes vary in dimensions, and also in the shape of the head or wedge, which, for the purposes of gardening, ought to be long and narrow.

2149. *The scorer* (fig. 371.) is used by foresters for marking numbers on the trunks of trees, and by gardeners, for ringing branches, to throw them into blossom.



2150. *The daisy knife* (fig. 372.) is a two-edged blade, about two feet long, fixed obliquely to a long handle. In using it, the handle is held with both hands, and the blade is moved to the right and left, along the surface of the grass; the operator advancing from behind the work, as in mowing.

2151. *Occasional instruments.* Besides the above, there may be wanted, in extraordinary cases, adzes, gouges, carving-chisels, and peculiar-shaped instruments, which the intelligent gardener will search for, or procure to be made to answer his intentions.

2152. *The pruning-saw* (fig. 367.) is a blade of steel, serrated in what is called the double manner on one side, and is either jointed, like a folding pruning-knife; jointless, as the common knife; shaped like a carpenter's saw (fig. 368.); or of some length, say with a handle of six or eight feet, as in the forest-saw (fig. 369.). The small saws are used for cutting off branches where the knife cannot easily act owing to want of room, and the forest-saw is used in cutting off large branches. In either case the section must be smoothed with the forest-chisel or pruning-knife, and, if possible, or at least in delicate

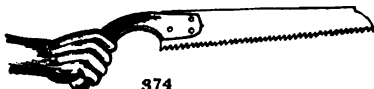
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cases, should always be covered with some tenacious air-excluding composition. *The Indian pole-saw* (fig. 373.) has a blade four inches broad and eighteen inches long, fixed to a pole handle of any required length; the line of the teeth should be inclined a few degrees from the line of the pole, to allow of the saw cutting easily without any pressure on the handle. *The Indian hand-saw* (fig. 374.) has a blade of the same size as that of

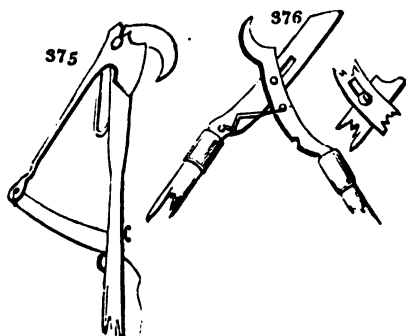


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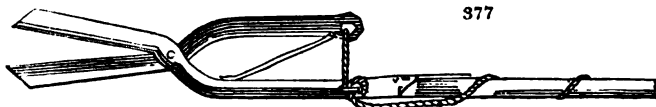
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the pole-saw, and a grip or handle, which should be such as to bring the fore-finger and thumb of the right hand nearly to a line with the teeth of the blade. The sole advantage of these saws consists in their operating by pulling, instead of by thrusting. As they have stiffness enough to carry them through the wood when not cutting, there is no danger of breaking them during the operation. (*Mem. of the Cal. Hort. Soc.*)

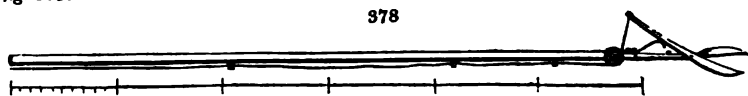


2153. *The averruncator* (fig. 375.) is a compound blade attached to a handle from five to eight feet in length, and operating by means of a lever moved by a cord and pulley. Its use is to enable a person standing on the ground to prune standard trees, which it readily does when the handle is eight feet long, to the height of fifteen feet; and, by using step-ladders, any greater height may be attained. Branches one inch and a half in diameter may readily be cut off with this instrument. There is a species made entirely of metal, to be used with one hand for pruning shrubs or hedges: of this species there are varieties made at Sheffield of different sizes and qualities. There are

other implements of this kind employed for cutting young shoots in summer; one by the Dutch (fig. 377.), and another in Britain (fig. 378.). This last is a valuable instrument,

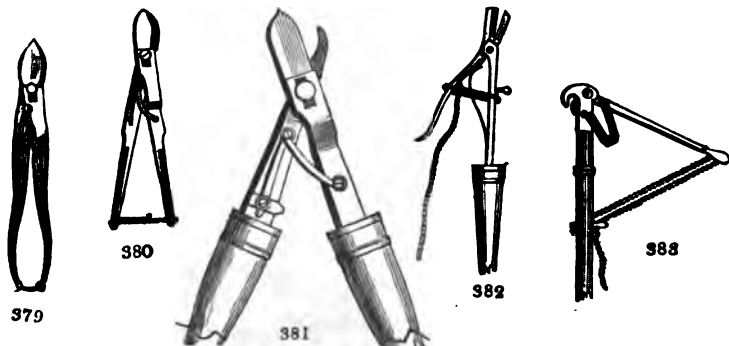


not only for checking rival leading shoots of young forest trees in June and July, but for thinning out the summer shoots in standard fruit trees, and in training plants of different kinds on high walls. Fig. 383. is another species of averruncator very similar to fig. 375.



2154. *The shears used in gardening are of several species.*

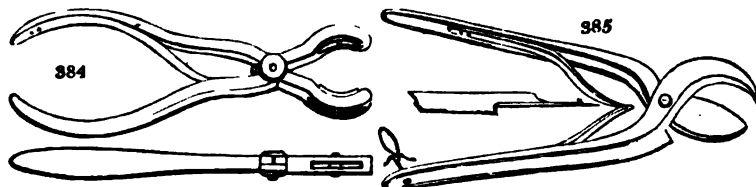
2155. *The pruning-shears* (fig. 376.) differ from the common sort, in having a movable centre (a) for the motion of one of the blades, by which means, instead of a crushing-cut, they make a draw-cut, leaving the section of the part attached to the tree as firm and smooth as if cut off with a knife. They are used in the same way as the common shears, and are very convenient in reducing the size of shrubs or bushes, and in clipping hedges of roses or other select plants. There are three very excellent instruments of this description (fig. 379. to 381.), all manufactured by Steers and Wilkinson, of



Sheffield. They are particularly adapted for lady gardeners, and will be found described at length in the *Gardener's Magazine*, vol. vi. p. 312. Fig. 382. may be used for pruning small branches, and also for gathering grapes and other fruits.

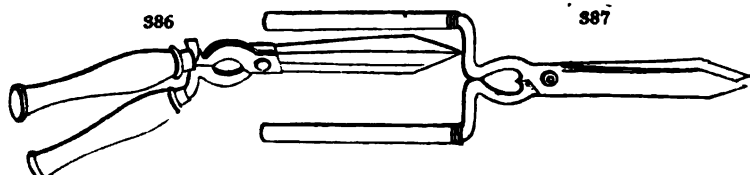
2156. The *ringing-shears* (fig. 384.) are used for ringing trees. A two-bladed knife, with both blades open at once, will give the best idea of the mode of operating with this instrument, for which, in fact, it forms a good substitute.

2157. The *French pruning-shears* (fig. 385.), by the curvature of the cutting blade,



cut in a sort of medium way between the common crushing and pruning shears. These shears form an expeditious implement for pruning the vine.

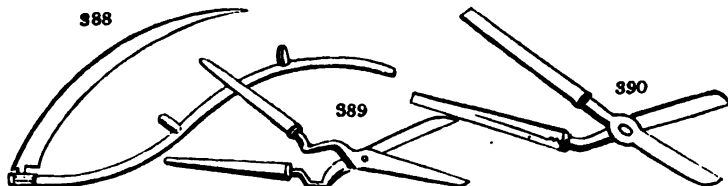
2158. *Hedge-shears* (figs. 386. and 387.) are composed of two blades, acting in unison



by means of a pivot, upon which they turn, on the principle of a lever of the second kind. They were formerly much used in gardening, for hedges, fanciful figures, bowers, and even fruit-shrubs, which were then shorn or trimmed into globes, cones, pyramids, &c. by shears. At present the taste is different. Shears, however, are still wanted for hedges of privet and yew; but where the twigs or shoots are stronger, as in the holly, thorn, and beech, the hedgebill or pruning-shears are preferable, as producing wounds more easily cicatrised, and as not thickening the outer surface of the hedge; which should always be avoided, as it often occasions the interior shoots to rot for want of air, especially in thorn and other deciduous hedges.

2159. *Verge shears* (fig. 390.) are a species in which the blades are joined to the handles by kneed shanks, to lessen the necessity for stooping by the operator. They are chiefly used for trimming the sides of box-edgings and grass-verges. A variety has a small wheel appended, which in cutting grass-edgings is a great improvement.

2160. *Turf-shears* (fig. 389.) are another variety, for cutting the tops of box-edgings

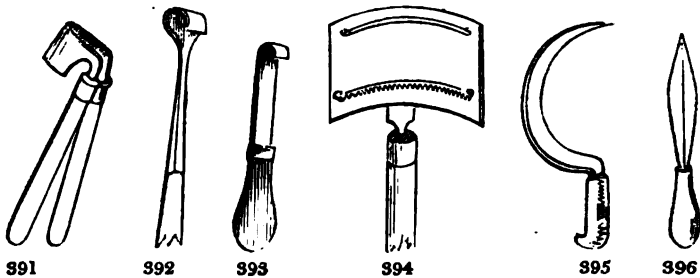


and the tufts of grass at the roots of shrubs not easily got at by the scythe. Some of these have also a wheel, or even two wheels, on an axle fixed to the shears on the principle of the table castor.

2161. The *scythes* (fig. 388.) is a sharp blade of steel attached to the end of a crooked wooden handle. It varies somewhat, both in size and in the angle made by the plate or knife, which is so contrived as to be regulated at the pleasure of the operator; and, in mowing very short thick grass, is generally placed so that the plane of the blade may be parallel to the plane of the surface to be mown.

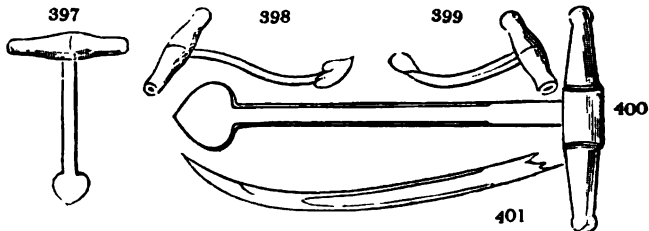
2162. Of the *garden-scarifiers*, or *bark-scalers*, there are several sorts. They are generally hooked edge-tools or blunt knives, used for removing the already scaling off external epidermis of the stem and branches of fruit trees of some age. They vary in size and strength, in order to suit different sorts of trees, and different parts of the same tree.

The two-handed instrument (*fig. 391.*) is for removing the bark from the axillæ of the branches, or other angular parts, difficult to be got at. The small hook (*fig. 392.*) is for lateral branches of one and two inches in diameter; and the knife-hook (*fig. 393.*) for the trunks of the largest trees. This operation should be performed in the middle of winter; and, to guard against accidents, the whole of a tree should seldom be done in one season.



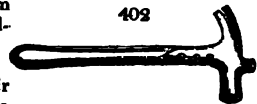
2163. The moss-scraper, for standards, is a sort of horse curry-comb (*fig. 394.*); and for wall trees, is a sickle-like instrument (*fig. 395.*). In either form, it is used to remove moss from the branches or woody parts of trees; the existence of which is a certain indication of the commencement of decay. It must be confessed, however, that such instruments seldom remove the moss completely; and that the scarifier, by removing a portion of the outer bark, does the business much more effectually, and is greatly to be preferred.

2164. The blunt knife (*fig. 396.*) has a lanceolate, double-edged blade, somewhat obtuse on the edges, and is used for the removal of decayed wood from hollow wounds in old neglected trees. It can never be wanted where there has been any thing like good management.



2165. Of forest barking-irons there are two species, and several varieties. They are used, not to scarify or remove the scaly decaying epidermis, but to remove the entire mass of cortical layers of the oak, for the purposes of the tanner. The first species includes four varieties: the smaller instruments (*figs. 397, 398, and 399.*) are for undergrowth, or copse bark, or small branches; the largest (*fig. 400.*) for the larger branches and trunks; the long blade (*fig. 401.*) is the second species, and is used for cross-cutting the bark into proper lengths, before it is removed by the scarifiers.

2166. The garden hammer consists of a head, with a flat face and forked claw, and is generally lighter than the carpenter's hammer. It is used chiefly by gardeners for driving in or drawing out the nails in dressing wall trees. An improved form (*fig. 402.*) has a stud protruding from the head, in the direction of the handle, to serve as a fulcrum in drawing nails from walls.

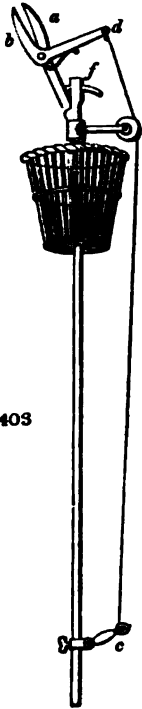


2167. Of fruit-gatherers there are several species.

2168. Saul's fruit-gatherer (*fig. 403.*) consists of a pair of cutters (*a* and *b*) attached to a long pole, which may be lengthened by screwed joints or otherwise. The operating lever (*c*) may be attached to any part of the pole; the lever of the moving blade (*d*) has a spring under it, to keep it open; and the communicating string passes over a pulley (*e*); the cutters (*a, b*) are so connected to the pole by a joint and arch (*f*), that they may be set at any angle required, for the purpose of getting at the fruit readily. Half the top of the basket may be covered, to prevent the fruit from falling out when a full basket is brought down.

2169. Lane's fruit-gatherer (*fig. 402.*) consists of a pole (*a*), with a pair of forceps

(b, c) at the end; one limb (b) being fixed, and the other (c) movable; a wire (d d) is attached to the moving limb which passes along a groove to the trigger (e). The pole being held by the left hand, the back of the right raises the trigger, and opens the forceps, which being applied to the fruit, the trigger is pressed, by which the fruit is secured. The forceps are formed of a ring of metal, covered with soft leather, and padded.



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2170. *The orange-gatherer* used in Spain (fig. 405.) consists of a rod, with a cup at the end, composed of six lingulate pieces of plate-iron or hoop, somewhat sharp at the edges. The instrument is made to enclose the fruit, the stalk being between the iron plates; a gentle twist is then given, when the fruit is detached and brought down in the cup.

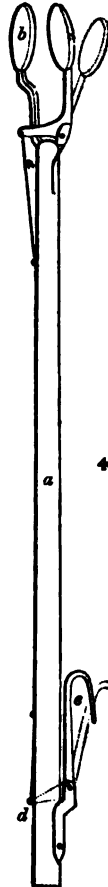
2171. *The Swiss fruit-gatherer* (fig. 407.) is a small basket, with the ends and edges of the ribs sharpened and protruding: it is used like, the orange-gatherer, in collecting apples, pears, and walnuts. (*Lasteyrie, Collect. de Mach., &c.*)

2172. *The orchardist's hook* (fig. 406.) consists of a rod, with an iron hook fixed at one extremity, and a sliding piece (a) at the other. The operator, being on the tree, seizes a branch with the hook, draws it towards him, and holds it in that position till he gathers the fruit, by hooking on the sliding cross-piece to another branch. This slider passes freely along the rod, but cannot drop off, on account of the pin (b) at the end.

2173. *Garden pincers* are of three species: those for drawing nails do not differ from those used by carpenters, consisting of two hooked levers of iron, acting as levers of the first kind; those for twisting wire, in repairing trellis or flower-baskets, &c., are the sort used by wire-workers, which operate both as pliers and pincers; and those for pulling out weeds are, when large (fig. 411.), formed of wood pointed with plate iron, and are used for pulling out weeds, particularly thistles and other large plants in hedges, or any bulky crops. They are also sometimes used for common weeding, to prevent stooping and treading on the beds and borders; but their chief use is to weed ponds, either reaching from the

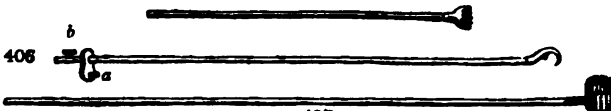
shores or from boats. A small sort, formed of iron, is sometimes used for weeding very hard gravel walks. Gloves, having the first finger and thumb-points cased with iron or steel, brought to a wedge-shape, are also used for the same purpose.

2174. *The grape-gatherer* (fig. 408) is a pair of scissors, combining also tweezers or pincers, attached to the end of a rod six or eight feet long, and worked by a cord. The bunch of grapes to be gathered from the roof of a lofty vinery, or the sprig of myrtle to be culled from the summit of a green-house stage, is not only clipped cleanly off the plant by the shears, but is held fast by that part of them which act as pincers till it is brought down to the operator.



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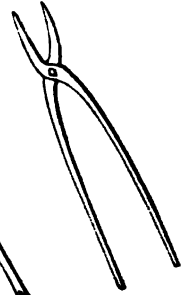
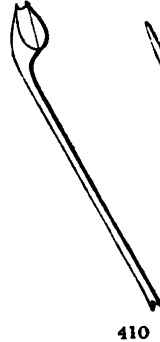
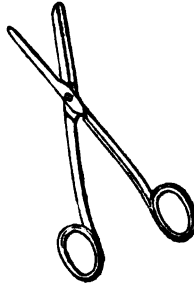
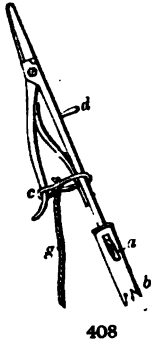
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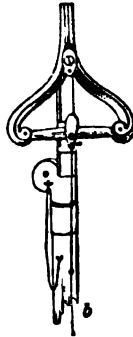
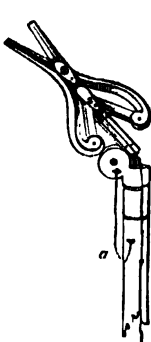
2175. *The peach-gatherer* (fig. 410.) consists of a tin funnel, or inverted hollow cone, fixed on the end of a rod or handle at an obtuse angle, the funnel is first introduced under each fruit, and then gently raised or moved sideways: if ripe, the fruit will fall into it. It is used for gathering the peach tribe, apricots, and plums.

2176. The pear-gatherer resembles the above, but the funnel is deeply notched or serrated, in order to aid in gently drawing off ripe fruit. It is used in gathering the finer sorts of pears and apples from walls. This and the last instrument are also sometimes used for gathering mulberries. Common pears and apples are often gathered by Lane's instrument (fig. 404.).



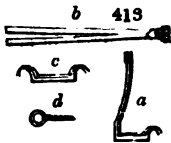
2177. The berry-gatherer (fig. 409.) is formed like the scissors and pincers above mentioned: it is worked by the hand like common scissors, and is used for gathering gooseberries, strawberries, raspberries, and such fruits as should be touched by no other hand than that which conveys them to the mouth. Some opulent proprietors have branches of fruit shrubs cut off and brought to table, as bouquets, in elegant china vases; or have their strawberries grown in pots, and thus served up to be gathered as used, &c.

Jerome Bonaparte, when king of Westphalia, passing through Warsaw, on his way to Moscow, in the campaign of 1812, had branches of cherry trees laden with fruit held upright by soldiers round his table like a sort of grove, from the branches of which, extending over their heads, he and his guests gathered their dessert.



2178. Flower-gatherers are of two sorts, the long-handled, and the small flower-gatherer. The latter may be the same implement as the berry-gatherer (fig. 409.). The long-handled flower-gatherer (fig. 412.), which is also an excellent grape-gatherer, cuts and holds on the same principle as the wireworker's pincers, or berry-gatherer. It is worked by means of two small cords; one (a) serves to vary the direction of the

cutting part or scissors, and the other (b) to effect the amputation and retention of a flower, twig, or bunch of fruit.



2179. The climbing-spur (fig. 413.) is of two sorts, one with, and the other without a stem. The first sort (a) is fastened to the upper part of the leg with a leather belt (b); the other sort (c) is tied to the feet. By means of these spurs, one on each foot, naked-stemmed trees may be ascended to any height, and when it is wished to stop a short time at any part, the screw of the ring (d) is entered in the trunk, and forms a firm point for one foot. (Lastyrie, *Coll. de Machines, &c.*)

2180. The essential operative instruments are the knife, saw, shears, scythe, and hammer.

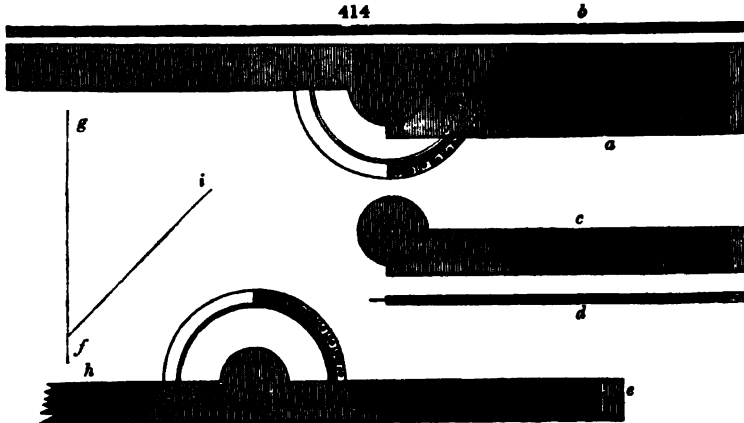
SUBJECT. 2. Instruments of Direction.

2181. The common characteristic of directive or preparatory instruments is, that they are used in actions preparatory to operations, rather than in operations themselves; and depend on scientific knowledge more than on practical dexterity: this remark will apply also to their construction, which is founded on the doctrines of quantities, gravitation, &c.

2182. The garden-line is composed of three parts: the frame, generally of iron; the cord which is wound upon the frame; and the pin, which terminates the cord. The common use of the line is perfectly understood from the name; though generally used for straight lines, yet it is also applied, by means of pegs or small stakes, to form curved lines.

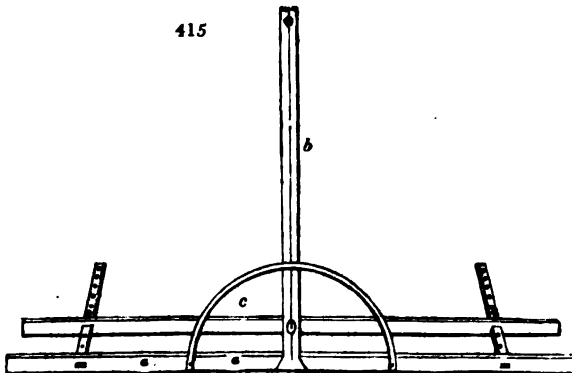
2183. *The ground-measure.* Of this there are at least three sorts used in gardening: a Gunter's chain of 100 links, or sixty-six feet: a rod of one twelfth, or any equal part of the chain, marked with links on one side, and feet on the other; and a common pocket-rule. To these may be added a pocket measuring-line; though it is not, from its contraction and expansion, to be much depended on. The chain is used to ascertain the contents of, or to lay out and subdivide considerable plots; the rod for the detail of such plots, or for marking out rows, &c.; and the pocket-rule for taking smaller dimensions.

2184. *Neave's instrument for transferring angles* (fig. 414.) is formed of a piece of deal about two feet long; *a* is the flat side of the instrument; *b* the edge; *c* the



short leg removed from the long leg; *d*, the edge of the short leg; *e*, part of the long leg, showing the quadrant; *g h i* form a diagram, showing the mode of using the instrument. Supposing it were required to draw an angle of forty-five degrees from the point *f* on the line *g h*: place the short leg parallel with the line, so that the long leg touches the given point, then draw the line *i f*. If you require a perfect triangle, turn the instrument over, draw a line along its side, and the triangle will be completed; each side of the instrument being alike in length, and perfectly flat. (*Gard. Mag.*, vol. viii. p. 32.)

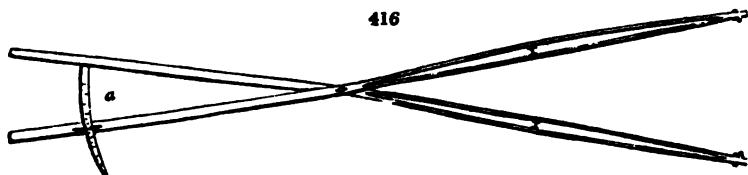
2185. *Godall's parallel rods* (fig. 415.) consist of two rods (*a* and *b*), six feet long, and two inches wide. Into *a* two strips, fourteen inches long, are firmly mortised, at



right angles, these pass through *b* and, by means of wooden pins; the rods are secured by them at the required distance apart; *c* is a handle fixed to the rod *a* at a right angle. When the bed is raked level, and edged, after leaving the necessary margin along the side, the rod *a* is placed where the outside row is to be planted; the instrument must then be pressed slightly with the foot, when it will leave two parallel impressions. The rods must afterwards be shifted on in a direct line, always placing their ends, as a

guide, about a foot along the previous marks, and then pressing them as before, till the operator arrives at the end of the bed. In returning, the rod *a* must be placed in the furrow, before made by *b*; and so on, till the whole bed is marked longitudinally. By applying the rods in a similar manner across the bed, it is formed into squares; and by this method a bed twenty feet, by four feet, may be accurately marked in five minutes. The instrument is also useful as a square; and may be employed as a level, by attaching a plummet line to the top of the handle. The rod *b* is divided into feet and inches, and is easily detached for sundry purposes. (*Gard. Mag.*, vol. viii. p. 669.)

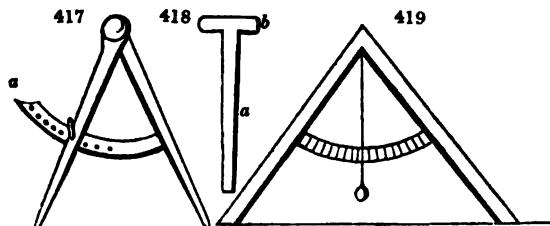
2186. *Of timber-measures and dendrometers* there are various kinds, and their use is for taking the dimensions of standing timber without climbing the tree. Broad's measurer (*fig. 416.*) is composed of two pieces of deal about thirteen feet long, with a brass



limb or index (*a*), on which are engraved figures denoting the quarter girth in feet and inches. Raising the instrument, the index end (*a*) is taken hold of, and the other applied to that part of the trunk where the girth is to be taken, opening it so wide as just to touch at the same time both sides of it, keeping the graduated index uppermost, on which the quarter girth will be shown, allowing one inch in thirteen for the bark. (*Trans. Soc. Arts*, vol. xxv. p. 20.) There are various other dendrometers, among which is a curious one by Monteath, which will be afterwards noticed. The above we consider as much the best.

2187. *For taking the height of a tree.* Rods of deal or bamboo, seven feet long, made so as to fit into ferrules at the end of each other, tapering as in a fishing-rod, may be used. Five of them with feet marked on them would enable a man quickly to measure the height of a trunk of more than forty feet, as he would reach above seven feet.

2188. *The ground-compasses* (*fig. 417.*) are generally made of hard wood, such as oak, shod with iron, and with an iron gauge or segment (*a*); their length may be six feet;

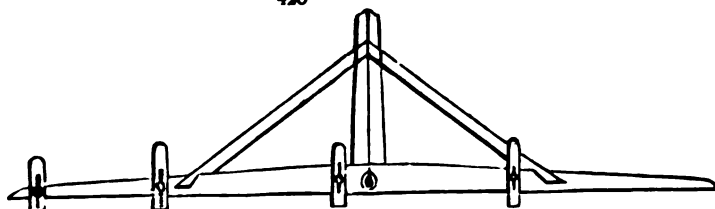


they are used chiefly for laying out parterres in the ancient manner; since, by a previous preparation of the soil, the curvilinear parts of such parterres can be described by them with perfect accuracy. The stationary foot is placed on a slip of board a few inches square, with a pin beneath to retain it in its place, and a lead cap above for the point of the foot.

2189. *The borning-piece* (*fig. 418.*) is composed of the body (*a*), commonly a thin slip of board, four inches wide, half an inch thick, and four feet two inches long; the head (*b*) of a similar slip of board placed across, but only eighteen inches long; and the foot is either of the same form as the head, or merely the squared end of the body (as in the figure). The upper and under edge of the head and foot must be perfectly straight, and form right angles with the edges of the body. Borning-pieces are used to prove, complete, and continue level lines, or lines on certain given slopes. One is placed at each end of a convenient length of the level or slope, and there held perpendicular to its surface, and, others being placed in the interval, and in the same line or vertical plane, the ground under the feet of the intermediate borning-pieces is raised or lowered till it is brought to the proper level or slope, when the upper edges of all the heads will range. Where box-edgings are to be planted with accuracy and beauty, the use of these implements cannot be dispensed with.

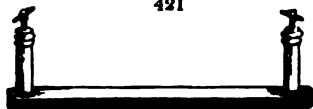
2190. *Of levels* (*figs. 419. and 420.*) there are a variety of sorts; but the most con-

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venient is half a square, with an iron index in the angle marked with ninety divisions or degrees. The use of these degrees is to facilitate the laying out of alopes: at a perfect level the plummet will hang at 45° ; and for a slope it may be any lesser number in ascending, or any greater number in descending from a fixed point. This level may also be used as a square to set off right angles, or indeed angles of any description.

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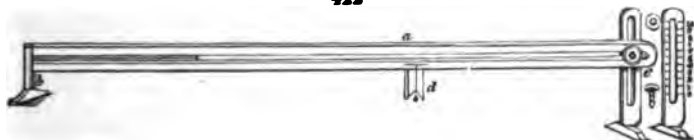


2191. *Parker's level* (fig. 421.) consists of two uprights for holding quicksilver, which communicate by a horizontal piece, which is fitted to a staff with three legs five feet high. This level is described at length in the *Encyc. of Agr.* § 2498, and may be used as a substitute for a spirit-level.

2192. *The adjusting horizontal level* (fig. 419.) is peculiarly useful in laying out roads, or regulating the slope of lawns or borders, as is also the following instrument.

2193. *Dalziel's level* (fig. 422.). This is an instrument of a very simple description, lately invented, for ascertaining the relative elevation of unequal surfaces. It consists of

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a wooden bar (*a*) with a foot at one end (*b*), and at the other another larger foot with a groove and scale (*c*), to which the bar is connected by a screw and nut. In using this instrument, two points of different altitude being chosen, the support of the bar (*b*) is to be placed on the higher, and (*c*) the foot of the scale on the lower; while the position of both is secured by a slight turn of the thumb-screw. The bar being brought parallel to the horizon with the plummet (*d*), will indicate that the upper part of the scale is to be advanced, or the reverse, keeping its foot on the point of support, until some one of the graduations coincides with, or is visibly parallel to, the upper edge of the bar. The difference of altitude sought is seen in figures, without calculation. Any person that understands the use of a level will see a variety of levelling operations on a small scale that this implement is calculated to simplify: for example, if it be required to construct an inclined plane, rising an inch in a foot, the inner edge of the scale is to be brought six feet from the foot end of the horizontal piece, and rendered perpendicular to it, by making the graduated line at six inches coincide with the horizontal edge of the bar. Being fixed immovably by the screw in that position, the surface of the ground is then to be worked until the plummet hangs perpendicularly. The first six feet of the inclined plane having been thus constructed, other portions are to be taken successively throughout the remainder. If a plane of a different inclination is required, as of half an inch in a foot, the scale is to be shifted to three inches, and so on. (*High. Soc. Trans.*, vol. v. p. 575.)

2194. *The spirit-level*, with a theodolite, compass, and telescope, is used for laying out extensive grounds. The most convenient are put together, and assume the form of a stout walking-stick. Smalcalder is at present the best London artist in this line.

2195. *The staff* is used in laying out straight lines. It may be a straight rod of six or eight feet long or upwards, and one inch in diameter; with the first six inches at the top painted white, the second black, and the third six inches red. Two points of the desired straight line being found or given, any greater number of points are found by placing other staffs or rods so as they shall range, and the first staff conceal from the eye placed behind it, all the rest in the line; the use of the three different colours is to render the ends distinctly visible when the ground is fresh dug, white or covered with snow, or green, as in pastures.

2196. *The straight edge*, for a garden, may also serve for a plumb-rule. It is merely a slip of board with straight parallel edges and sides, of any length from four to ten feet, with the addition of a plummet for occasional use as a plumb-rule. It is used to form and prove smaller levels, between points settled, by the boring-pieces; or to prove beds or borders of even or plane surfaces. As a plumb-rule, this implement is also used to place espalier rails, temporary walls of boards, and even standard trees, upright.

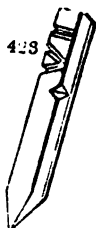
2197. *The stake* is any straight piece of wood of an inch or two in diameter, and from one to four feet in length. There are two sorts, the one short and thick, of one foot or eighteen inches in length, and used, by being driven into the ground in levelling, as resting-places for the level, or fixed indications of surface alterations; the other, comparatively slender and long, may either be covered with whitewash, or the lower half dipped in whitewash, and the upper half in a black wash, or they may be painted as the staffs. The last kind are used for tracing out lines of any description, or for indicating the situations of trees, or other objects. Twigs and bits of lath are commonly used as substitutes, but wherever correctness is any object, the trifling expense of two or three hundred of such stakes should not deter gardeners from procuring them.

SUBSECT. 3. Instruments of Designation.

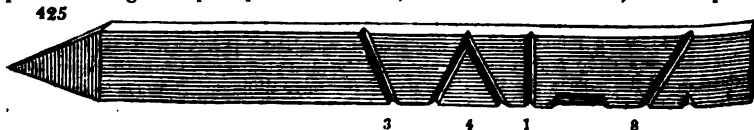
2198. *The object of designating instruments* is to record and render ascertainable the individuality of objects, and chiefly of plants; either as species, genera, or varieties. A tally or stake driven into the soil, and remaining fast, is, mechanically considered, a wedge held in equilibrium by the resistance of the earth. Wherever there is a variety of plants cultivated, it becomes necessary to be able to mark and distinguish them, as well when in a growing state, as when in a state of hybernation, or recent insertion in the soil. — In sending plants to any distance, the same thing is requisite. For both purposes the name is either written on some instrument, and attached to or placed beside the plant; or a number is made use of instead of the name, from which reference is made to a written list. Of both these a considerable variety is used in gardening.

2199. *The common tally* (*tailleur*, Fr.), or *number-stick* (fig. 423.), is a slip of lath, or deal, or a piece of a rod, nine or twelve inches long, sharpened at one end and squared at the other. The numbers, to nine inclusive, are cut on the face with a knife in Roman numerals (I, II, III, IV, V, VI, VII, VIII, IX.); reading always from the inserted or sharpened end. Ten is formed by a notch or tally on the near angle, and, placed behind the above numerals, extends the series from eleven to nineteen. Twenty is formed by two notches, thirty by three, and so on: the nine numerals above being placed after the notches, so as to form the intermediate terms of the series. Fifty, instead of five notches, is formed by a cross cut, or channel, like I, on the face, with a similar one on the right side joined to it. One hundred is formed by joining to these two cuts a similar cut on the other side, that is, a channel continued on three sides; and one hundred and fifty, by a cut or channel continued on the four sides of the stick. Ninety may be more readily formed by using the mark for one hundred, and placing a notch behind it, to signify 100 less 10, than by using the cuts for fifty, and adding four notches before. Other high numbers may be simplified in the same manner. A little reflection will show that this mode of numbering may be carried to almost any extent; and in some nurseries, particularly in Scotland, we have known it carried as far as five hundred, which is formed by only three rings for $150 + 3 = 450$, and a half ring for 50. Particular attention must always be had to read from the root or insertion end.

2200. *Seton's botanical tally* (figs. 424. and 425.) is a highly improved method of num-



bering, devised by Alexander and George, sons of the late Dr. Anderson. It proceeds upon the same general principles as that above, but with different marks, the ten ciphers



(fig. 494.) being denoted by as many single distinct cuts, of easy and expeditious execution; and any number, however high, requiring no more marks than it would require figures written with a pen. "The only way in which the memory is apt to misgive, in this scheme, is by confounding / & \, A & N, A & V, with each other (as a child would confound the figures 6 and 9); but this slight inconvenience will be remedied by the following key, which may be easily borne in the mind. Let us recollect that, in writing, we naturally draw a stroke from the right, at top, to the left, at bottom, thus /, and not in the opposite direction, thus \: now, in all the above numbers, which differ from each other in the direction of the diagonal line, that which is in the direction usual in writing precedes the other, thus / \ A N A A; the other two, A & V, will not be confounded, on recollecting that V is the usual numeral notation of five." As an example of application, suppose we take species 341, variety 8; the tally will be cut as in fig. 425. The long cut (—) between the number of the species and the number of the variety, is used merely as the sign of separation; by the use of which several numbers may be cut on one stick. It is a fixed rule, that the number shall always read from the root or sharpened end of the tally, because it is convenient for the operator to hold that end in his hand in cutting the marks.

2201. *An improvement on Seton's tally* has been made by a writer in the *Gardener's Magazine*. By this mode, which is shown in fig. 426., new signs are made by the

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addition of notches; and these signs, it is alleged, are equally simple and comprehensive as Seton's, equally easy to cut by the gardener, and not so apt to be confounded with each other. (See *Gard. Mag.*, vol. viii. p. 32.)

2202. *The Roman tally* (fig. 427.), is a suggestion of ours, founded on the principle that all signs, not in general use, are apt to be forgotten by those who use them, when

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they have been a very short time out of practice. For example, a nurseryman who should use Seton's mode of numbering for his fruit trees, must either attend to every thing connected with those numbers himself, or be dependent upon one or more individuals, who might suddenly leave him, or fall into bad health. For this reason, the names of things printed or written on tallies are best; and next best are Roman or Italian numerals. In the Roman tally the Roman numerals are employed, using the common notch, now universally employed by nurserymen, as a mark for 10; imitating the letter L for 50; making a mark, as nearly as practicable with a knife, on a stick, resembling C, for 100; a Greek D for 500; and M for 1000. The units are supplied by notches from 1 to 9, in the same manner as in the common tally (fig. 423.).

2203. *The written number-stick* varies in form, size, and materials. The simplest kind is a flat piece of lath, smoothed and pointed with the knife, and either painted, or more commonly rubbed on the face with white lead at the time of using, with numbers corresponding with those of genus, species, and varieties written on it. Sometimes types and printers' ink are used: when the paint is dry, common ink or black paint is also made use of; and, in some cases, the number is impressed by a cold type, or burnt in by one heated to redness. A little white lead rubbed on with the finger, and the name immediately written with a hard black lead pencil, will last as long as the wood, and is, on the whole, the best mode. Various sizes are used, from laths formed with the knife, three inches long and half an inch broad, to pieces sawed out of deal, two or three inches broad, and from eighteen inches to three feet long; the upper part painted white, and lower part pitched, charred, or coated with some preservative liquid, for durability. With respect to materials, fir deal is most commonly used; but oak boards, or old oak spokes, are occasionally made use of in botanic gardens. In the *Gardener's Magazine*, vol. vii. p. 282., Mr. Pringle has given figures of a variety of wooden tallies, of different shapes and sizes, for private gardens.

2204. *The stamped numbering-instrument* is formed in various ways; the simplest and most economical are triangular slips of lead, clipped or stamped from sheet-lead of four

pounds to a superficial foot, or slips of copper, as in *fig. 428*. : for plants in pots, they need not be longer than three inches, or broader at the head than half an inch. On these the number is stamped with a type, or the name at length may be stamped in the same manner. Such tallies are durable, unobtrusive, and not so readily driven out of pots as those of wood; for herbaceous plants they may be of double size and weight.



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2205. *Lead*en tallies are chiefly used for small plants in pots; and Mr. Archibald has shown (*Gard. Mag.*, vol. i. p. 258.) how every gardener may cast them for himself. The advantage of leaden tallies over iron ones is, that they retain the names painted on them a great deal longer; and their superiority to wooden ones consists in their being much more durable.

2206. A variety of ingenious tallies will be found figured and described in the *Gardener's Magazine*, vol. v. p. 146., vol. vi. p. 306. and 307., and vol. vii. p. 120. In vol. iv. p. 349. is shown a mode by which



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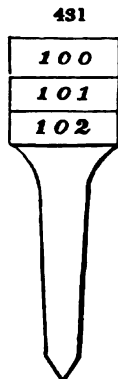
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one tally (*fig. 431*.) is made to serve for three plants; and on another (*fig. 432*.), by which one brick tally may serve for five or six plants.

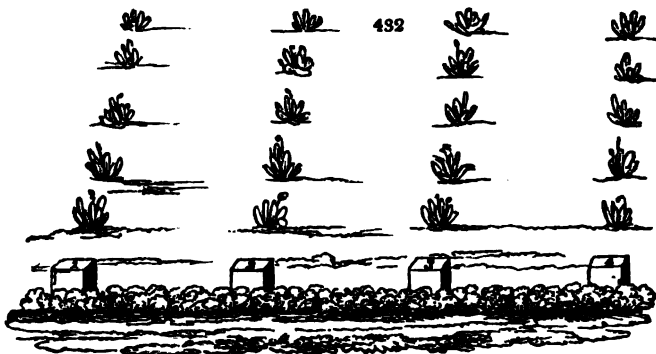
2207. *Cast-iron tallies* have been found by nurserymen to be the most economical. One of the simplest and cheapest kinds of these, for either numbers or names, is represented by *figs. 429. and 430*. These tallies are about six inches long; and it requires from 1600 to 1700 to weigh one cwt., which, in 1832, cost only thirty shillings.

2208. *Murray's named tally* (*fig. 433*.) is, in our opinion, preferable to all others for naming herbaceous plants. It has been long in use in the botanic garden at Glasgow, and we have had it in our garden at Bayswater since 1827. It consists of

a cast-metal standard, with a long square head, in the front of which is a hollow box, into which a ticket (*a*), with the name written on it, is put: a piece of glass, cut to the proper size, is then fitted in over the name, and fastened with putty, like the pane of a



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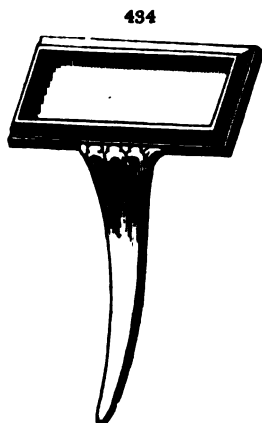
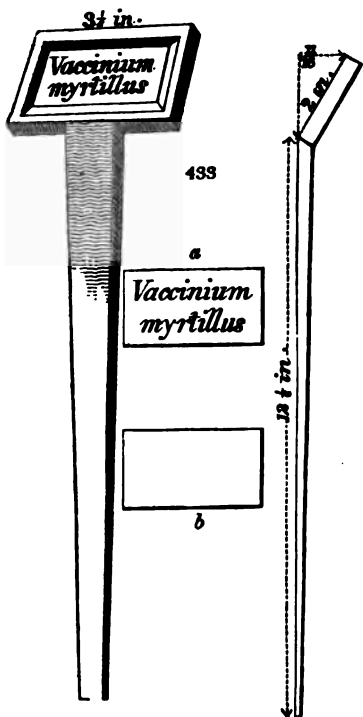
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window. The ticket on which the name is written may be of wood, tin, or earthenware; but wood is preferable, because it can be easily written upon by a carpenter's black lead pencil, and because it is not liable to rust. (*Gard. Mag.*, vol. iii. p. 29.) An imitation of this tally, on a small scale, for pots (*fig. 434*.), is being made by Mr. Peake, of Tunstall, of terro-metallic earth.

2209. A tally, the shank of which is of cast iron, and the plate for containing the name of white porcelain, has a very good effect; but it is more expensive, and much less durable, than Murray's tally: it is used in the Bristol Nursery, and in the arboretum at the Goldsworth Nursery: it will be found figured and described in the *Gard. Mag.*, vol. vii. p. 362.

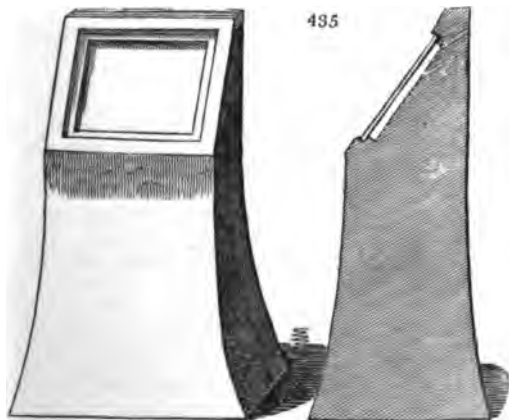
2210. The best tally for naming trees and shrubs in arboreta is formed of brick-earth,

with a panel similar to that in Mr. Murray's tally, for the insertion of a ticket inscribed



with the name and other particulars relating to the plant, to be glazed over, or simply fastened in with putty, and varnished. As, from the weight of tallies of this sort, they are apt to sink into the ground, they ought to be formed with broad bases, as in fig. 435. The price of these tallies is very little more than that of common bricks; and, if the duty were taken off, this, in Britain, would not exceed twenty shillings a thousand.

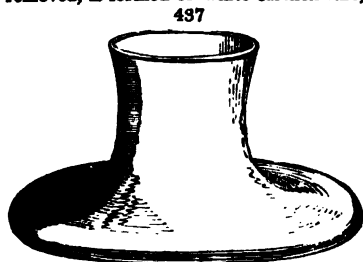
2211. *Number-bricks.* For plants in the open ground, bricks set endwise and rather obliquely in the soil, and the number painted on a black or white ground, answer well where they do not require to be often removed. This mode is extensively used in the herbaceous and tree arrangements in the nurseries of Messrs. Loddiges. A brick-earth number tally (fig. 436.) has been invented by Mr. Anderson, the curator of the Chelsea



garden, in which it has been generally substituted for those of wood. The cost, by the thousand, is about three halfpence each.

2212. *The name-stick* differs from the number-stick in having the name written or printed at length, instead of a number, figure, or sign, referring to some list or catalogue containing the name. Any of the written number-sticks will serve also for a name-stick ;

but, frequently, the upper end is broader, square, round, or oblong, and inclined to the stem, so that the name may meet the eye at a parallel angle for reading. A very neat sort of naming-instrument for plants in hot-houses, which do not require to be often removed, is formed of white earthenware, on which the name may be written with ink



or pencil, or printed. A variety of other devices for numbering and naming planted plants, by instruments inserted in the ground, might be mentioned. In the garden of the ducal Palace Pitti, at Florence, the name, &c. is printed on slips of paper, and placed inside a small glass bottle (*fig. 437.*), which is fixed on the end of an iron rod; a complex mode, and one which can only succeed in climates like that of Italy.

2213. *The plant-label* is distinguished from the number and naming sticks, in being hung or tied to the plant, or nailed, or other-

wise fixed to the wall or trellis against which it is trained. There are two species or varieties, the permanent and temporary.

2214. *The permanent label* is a slip or plate, an inch or more in width, and two or three inches long, of deal, metal, earthenware, leather, horn, bone, ivory, &c., on which the number or name is impressed or written; and it is then hung to trees, or nailed on the wall or espalier rail to which trees are trained. The difficulty in the case of hanging labels on trees, is to find a durable tie, or thread; and, for this purpose, untanned leathern thongs, or pieces of catgut, are preferred: silver or lead wire may also be used, the former for select plants, and the latter for commoner cases.

2215. *The temporary label* is a shred of paper or parchment, and sometimes of leather, with a string attached, or with a slit cut in it, as represented in *Gard. Mag.*, vol. iii. *fig. 169.*, and is used chiefly by nurserymen to designate plants sold.

2216. The mode of *naming or registering by series*, chiefly applies to fruit trees in kitchen-gardens or orchards, and is done by marking down the names in a book or on a plant, in the same order in which the trees or shrubs are planted in the garden. Thus, suppose the east side of an east wall is to be planted and registered without the use of naming-instruments or labels. Begin at the south corner, and write down under that title the sort of trees in the order in which they are planted, placing in the list a number against each name, in regular series. Suppose that, at any time afterwards, you wish to find which tree is the golden pippin; then, looking in the list, that name is found opposite No. 9; counting nine, therefore, from the south corner, will give you the tree, &c. This mode of registering by series is always a very good check to any other mode of numbering or naming. Sometimes it is done on a general plan of the garden; but the plan must then be on a large scale to admit of writing down all the numbers or names of the trees in the spots where they are planted.

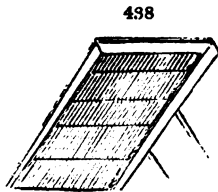
2217. *The essential instruments of direction and designation* are the line, rule, level, and common tally.

SECT. III. *Utensils.*

2218. *Utensils* may be characterised by their property of being adapted to hold, contain, or include some material or thing, either for the preparation of materials, the deportation of plants and garden productions, or their culture and protection.

SUBJECT. 1. *Utensils of Preparation and Deportation.*

2219. *Preparatory utensils* are the screen and sieve. Their construction and use embrace a variety of operations, mechanical and chemical.



2220. *Screens* are used in gardening for fining or sorting earths, gravel, or tanners' bark. The *mould-screen* (*fig. 438.*) is a wire frame with a jointed fulcrum, by which it can be placed sloping to any required degree: its use is to separate stones and coarser particles from mould, either in trenching over ground intended for bulbous or other tender and succulent roots, or in turning over compost-heaps. The soil must be well broken with the spade before it is thrown on the screen; and it is in vain attempting to use the utensil unless the earth is dry.

2221. In *gravel-screens* the wires are placed wider, according to the use to which the gravel is to be applied. In general, one quarter of an inch is the width for earth, and half an inch for garden gravel; but for gravel used in the highways, one inch is not

too wide for excluding small stuff; nor two inches too narrow for admitting the small stones to be used.

2222. *Garden-sieves* are of various kinds. The *mould-sieve* is a piece of cloth of wire firmly attached to a circular rim, the holes or interstices in which need not be above one fourth of an inch in diameter: it is used for sifting mould for small pots. Sieves are also required in gardening, for cleaning seeds; and wooden sieves of different kinds for airing or keeping fruit.

2223. *Utensils of deportation* are, the mould-scuttle, pot-carrier, basket, and packing-case.

2224. The *mould-scuttle* is a wooden box for carrying sifted earth in situations where the wheelbarrow cannot be brought into use. Sometimes it is made of iron, like the common coal-scuttle.

2225. The *pot-carrier* is an oblong board, with a hoop-handle in the middle: it is used for carrying pots of plants from one part of the garden to another. A wire sieve answers the same purpose; but it is an ill application of that utensil, and besides occupies both hands, and requires stooping.

2226. *Garden-baskets* are of several species and varieties, used for growing, carrying, measuring, or keeping vegetable productions. They are woven or worked of the spray, bark, or split woody fibre of trees, or of the young shoots of willow, hazel, and other shrubs.

2227. The *plant basket* is a vessel of wickerwork, shaped like a large pot, not less than eighteen inches wide by twenty inches deep, and is used by some nurserymen, particularly by the Dutch, to grow large peach trees, vines, &c. for deportation. By the means of these baskets, when new garden-walls or hot-houses are built, one, and often two years, may be saved in the fruit trees: the mode is at present a good deal out of use, but

439 deserves to be revived. The French have a training basket (*fig. 439.*) made of split wood.



2228. The *planters' basket* is a flat, rectangular utensil of wickerwork or boards, partitioned into three or more parts, for the purpose of carrying with the gardener when about to plant or remove plants. One division is for the plants taken up; another for the plants to be planted; and a third for the tools to be made use of, and for any decayed parts

of plants, stones, weeds, or other refuse. By using such a basket the young gardener may proceed in his operations with order, accuracy, and neatness.

2229. The *mould-basket* is a strong reticulated utensil of unpeeled willows or hazel, used for carrying earth, gravel, or tanners' bark.

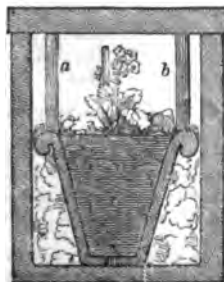
2230. *Carrying-baskets and package-baskets* are of various sizes, shapes, and qualities of material and workmanship. Such as are large, coarse, and without handles are called hampers, and about London, boats, barges, and other local names.

2231. *Measuring-baskets* are chiefly in use by market-gardeners: the largest are bushels and half-bushels, formed of unpeeled or peeled willow shoots or withies; pecks, half-pecks, and sieves are formed of peeled withies; and punnets, pottles, and thumbs, for the more rare culinary vegetables and fruits, are formed from shavings of deal or willow wood.

2232. *Plant packing-cases* are of various kinds, according as plants in a growing state, plants in a state of rest, and with or without leaves, cuttings, bulbs, or other roots, or seeds, are to be packed. Each of these kinds varies also according to the distance to which it is to be sent, climate, season of the year, and mode of conveyance. In sending plants in leaf from this country to the Continent, and the contrary, a close-bottomed box hooped over (*fig. 441.*), is generally used; the cover of the upper part being either netting, or, if matting, very frequently removed.

2233. The *glazed packing-case* is the most suitable for importing plants from distant countries. One of this kind employed by Sir R. Farquhar, in sending plants from the

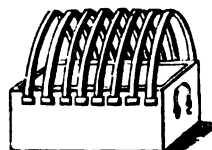
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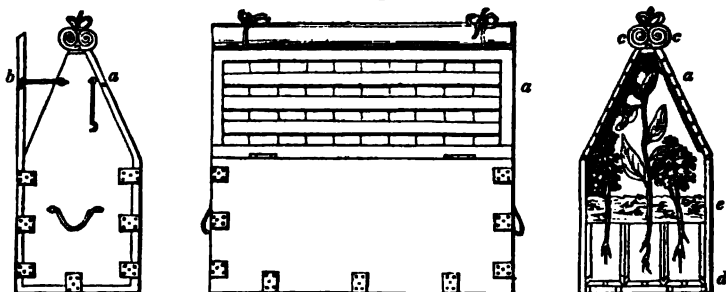


Mauritius to the Horticultural Society (*fig. 442.*), was made of larch boards, three feet long, four feet wide, and twenty inches deep. The sloping roof consisted of two glazed shutters (*a a*), which opened to admit air (*b*), and could be covered at pleasure with two rolls of tarpauling (*c c*); the trees were planted in wooden boxes just large enough to contain a single plant, and perforated in their sides and bottom (*d*), and their surface was carefully covered with moss (*e*), tied down with cord.

2234. A *packing-box for florists' flowers* (*fig. 440.*)

441





may be formed of boards of any convenient size, and two round pieces of wood, *a*, *b*, nailed to the lid, to keep the pot in its place. In unpacking there is no difficulty, as the round pieces come up with the lid.

SUBJECT. 2. *Utensils of Culture.*

2235. *The utensils used in growing plants* are the pot, water-saucer, box, tub, watering-pot, and syringe.

2236. *Of flower-pots* there are several species and many varieties.

The common flower-pot is a cylindrical tapering vessel of burnt clay, with a perforated bottom, and of which there are ten British sorts, distinguished by their sizes, thus : the

					In. In. dia. deep.						In. In. dia. deep.
1st size has	2	to the cast, and are called two, being			18 12	7th size has	94	to the cast, and are called twenty-four, being			5 6
2d	4	.. ..	..	..	12 10	8th	52	.. ..	..	thirty-two	4 5
3d	6	.. ..	..	..	9 8	9th	48	.. ..	..	thirty-eight	3 4
4th	8	.. ..	..	..	8 7	10th	60	.. ..	..	sixteen	2 2 1/2
5th	12	.. ..	..	..	7 6	11th	80	.. ..	..	thirteen, or eighteen	1 1/2
6th	16	.. ..	..	..	6 7						

Common flower-pots are sold by the cast, and the price is generally the same for all the 10 sorts; two pots or a cast of No. 1, costing the same price as eighty pots, or a cast of No. 11.

The store-pot is a broad flat-bottomed pot, used for striking cuttings, or raising seedlings.

The pot for bulbous roots is narrower and deeper than usual.

The pot for aquatics should have no holes in the bottom or sides.

The pot for marsh-plants should have three or four small holes in the sides about one third of the depth from its bottom. This third being filled with gravel, and the remainder with soil, a successful imitation of a marsh will be produced.

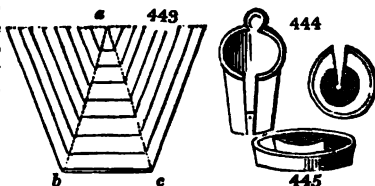
The stoneware pot may be of any of the above shapes; but, being made of clay, mixed with powdered stone of a certain quality, it is much more durable.

The glazed pot is chiefly used for ornament: pots of this description are generally glazed green, but, for superior occasions, are sculptured and painted, or incrustated, &c.

2237. *The propagation-pot* (fig. 444.) has a slit in the side, from the rim to the hole in the bottom, the use of which is to admit a shoot of a tree for propagation by ringing, in the Chinese manner. Opposite to the slit is an ear, or round appendage, with a hole for hanging the pot to a branch. To those who practise the mode of rooting shoots without laying them down to the ground, such pots will prove very convenient. In France and Italy they are formed in a similar manner, and for the same purposes, of tinned iron.

Square pots are preferred by some for the three smallest sizes of pots, as containing more earth in a given surface of shelf or basis; but as they are more expensive at first, less convenient for shifting, and not admitting of such perfection of form as the circle, they do not, in our opinion, merit adoption. They are used in different parts of Lombardy and at Paris.

The classic pot is the common material formed into vases, or particular shapes, for aloes and other plants which seldom require shifting, and which are destined to occupy



particular spots in gardens or conservatories, or on the terraces and parapets of mansions in the summer season.

The *Chinese pot* is generally glazed, and wide in proportion to its depth; but some are widest below, with the saucer attached to the bottom of the pot, and the slits on the side of the pot for the exit or absorption of the water. Some ornamental Chinese pots are square at top and bottom, and bellied out in the middle.

The *French pot*, instead of one hole in the centre of the bottom to admit water, has several small holes about one eighth of an inch in diameter, by which worms are excluded. The French have also flower-pots, the under sides of the bottoms of which are concave (*fig. 446.*); by which means the water is never retained between the pot and the surface on which it stands, as is frequently the case with flat-bottomed pots. A grooved-bottom pot (*fig. 447.*) is used for the same purpose.



446



447

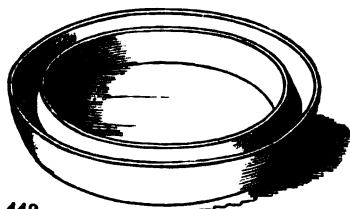
2238. *Flower-pot gauge* (*fig. 443.*). In order to form pots of different sizes of a regular ratio to each other, Knight has suggested a plan, of which this may be considered the substance. Assume as a convenient proportion as to width at top, bottom, and height, 8, 5, and 6; lay down the vertical section of a pot of this proportion on a board or large paper; from its centre (*a*) draw two lines (*b*) and (*c*) passing through the bottom of the sides, and equal distances measured on these lines will give equal accretions to smaller or larger sized pots. Knight considers 2 inches as forming a proper difference in diameter in the scale of sizes of pots, which is nearly double that in common use.

2239. The *flower-pot saucer* is a flat circular vessel, with a rim from one to two inches high, and is made somewhat larger than the bottoms of all the above sorts of pots. Its chief use is to prevent the water, which escapes by the bottom of the pot, from proving inconvenient on the shelves or stages in rooms or particular situations. In gardens it is seldom wanted. A species named the *carnation-saucer* (*figs. 445. and 448.*), is formed



448

as much larger than the pot to be placed in it as to admit of surrounding its base with water, in order to prevent creeping insects from getting at the pot. In the centre of the saucer is raised a basement on which to place the pot, in order to keep it dry, &c.



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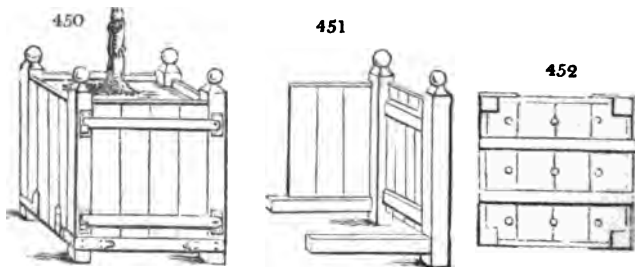
2240. The *annular saucer* (*fig. 449.*) is intended to defend plants placed in the centre against woodlice and slugs; the annular channel being filled with water.

2241. The *qualities and durability of pots and saucers* depend on the sort of clay and degree of burning, in which a knowledge can only be acquired by observation and experience. Pots too much burned crack and fall in pieces; and those which are not burned enough splinter or scale off with the frost and continued moisture. Porous earthenware is most congenial to the plants; but, by admitting transpiration by the sides, dries the earth within sooner. Pots made of washed clay are less porous than those of common earthenware, and, having the advantage of being more easily moulded, they



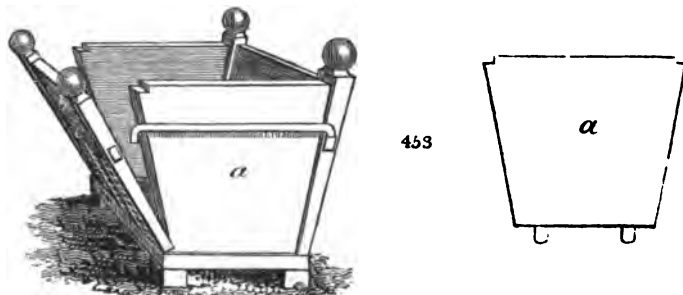
are consequently more beautiful in their forms, and more exact in their proportions. Glazed or stoneware pots are not congenial to plants, but they retain moisture a long time.

2242. *The plant-box* (figs. 450, 451, and 452.) is a substitute for a large pot: it is of a cubical figure, and generally formed of wood, though in some cases the frame is formed



of cast iron, and the sides of slates cut to fit, and movable at pleasure. Such boxes are chiefly used for orange trees. The construction of those of Versailles is generally approved. Two of the opposite sides are fixed, the other two are movable, but kept in their places by a couple of iron bars with hinges, which are fastened on one side, and on the other are hooks to catch in (fig. 450.). By using these boxes the state of the roots may be readily examined, the old earth taken out, and fresh put in at pleasure; another material advantage is, that the plants may be shifted by sliding them from one box into another without disturbing the roots.

2243. *McIntosh's orange-box* (fig. 453.) differs from that described above, in being tapered a little, which gives it a lighter appearance than those that are made square; it



has also all its sides movable. Two of them are attached to the bottom of the box by hinges, and are kept in their places by iron bars hooked at each end, which slip into hasps fixed to the sides. The other sides (*a*) are also movable, and lift out at pleasure. These boxes afford still greater facilities than the French orange-boxes for the gardener to take them to pieces, without disturbing the trees, whenever he wishes to examine or prune their roots, to see whether they are in a proper state as regards moisture, or to remove the old, and put in fresh mould. The inside of these boxes can also be painted, or covered with pitch, as often as may be judged necessary; which will, of course, make them much more durable; and the trees may be removed from one box to another with the greatest possible facility. (*Gard. Mag.*, vol. i. p. 140.)

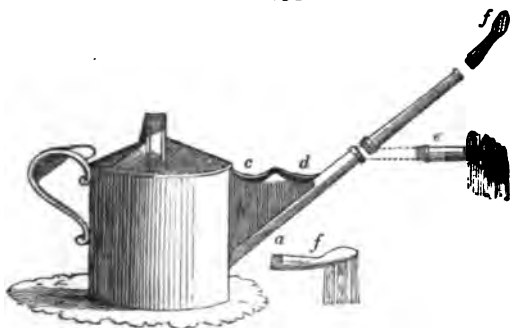
2244. *The plant-tub* (fig. 457.) is a circular utensil formed by the cooper for the same purpose as the plant-box. In shifting, the tub is unhooped, and when the old earth is removed it is refitted on the same or a new bottom by the cooper.

2245. *Garden watering-pots* are of different species. *The common watering-pot* is a tinned iron or copper vessel, used for conveying water to plants. There are several varieties; but the principal are, 1st, the common large pot, with two roses of different sizes, the one pierced with small and the other with large holes; 2d, the long-spouted pot, for watering plants in pots, at a small distance, either with or without a rose; and, 3d, the *shelf watering-pot*, which is a small cartouche-shaped pot for watering plants on shelves, or the back part of stoves, close under the glass, consequently above the eye of the gardener. A watering-pot with a pierced rose, and a kneed spout,

(fig. 455.), is said to have the advantage, while watering, of being able to stop instantly by a very slight elevation of the spout. The latter should be about two feet long, and of the same width throughout. The rose (a) should be of copper, and should screw on to the spout.

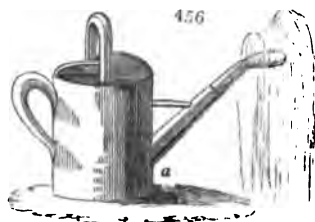
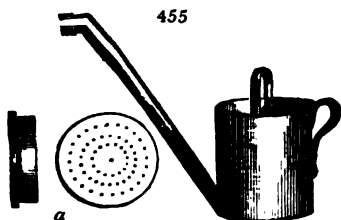
2246. *Money's inverted rose watering-pot* (fig. 454.)

454



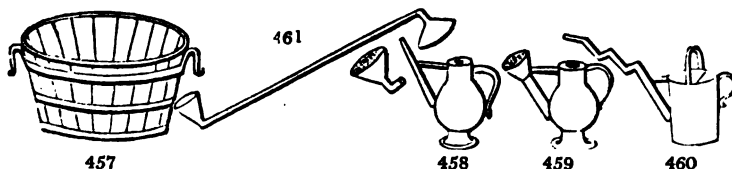
has the spout made in three distinct parts. The first (a) is fixed to the body of the pot, in such a manner as not to go easily out of repair. This is effected by filling up the angle between the spout and the pot by the hollow compartment (b), in the top of which are two openings (c) and (d); the larger (c) for holding, when not in use, the middle piece of the spout, or larger rose; and the other (d) for the smaller rose. The larger rose (e) is for using without the middle piece of the spout, and it delivers the water upwards, as in fig. 456.; the smaller

rose (f), which can only be used with the middle tube of the spout, delivers the water downwards, exactly over the object or space to be watered. The advantage of this rose, therefore, consists in the definitiveness of its action, as the advantage of the



larger rose consists in the gentleness of its action. An additional value is given to this part by the screw joints, which render the spout perfectly water-tight, and therefore, among other uses, it is peculiarly fit for lady gardeners. (*Gard. Mag.*, vol. vii. p. 87.)

2247. *The French watering-pots* (figs. 458, 459, and 460.) are generally formed of

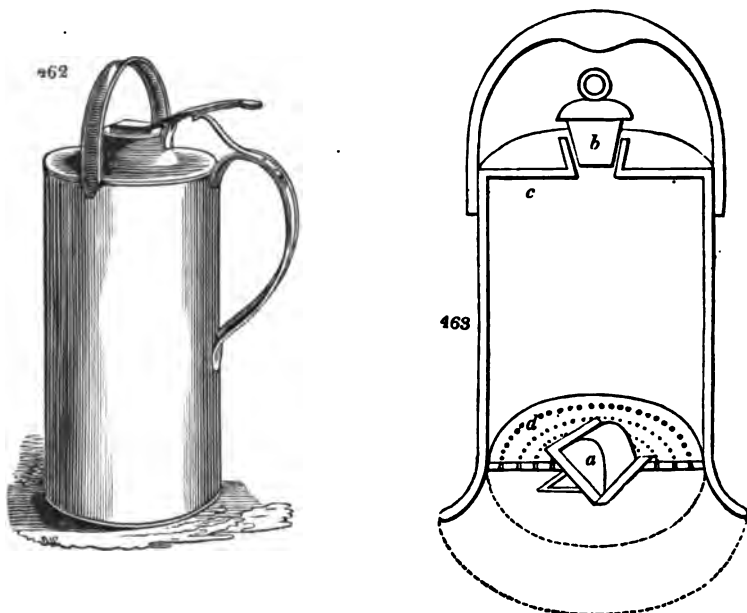


copper, and some (fig. 460.) have zig-zag spouts, to break the force of the water when pouring it on plants without the use of the rose.

2248. *The Italian watering-pot* is formed of earthenware, and its shape similar to the French ones.

2249. *Murray's aquarian, or waterer* (fig. 462.), is adapted for watering tender seedlings. It is filled by simply immersing it in water, first raising the lever (a) with the finger, and keeping it open till the vessel is full. After this, the water may be allowed to pass off through a pierced bottom at pleasure, by raising or lowering the lever. A similar utensil has long been in use in the neighbourhood of Avranches, in France, and is there called the soude. It will be found figured and described in the *Gardener's Magazine*, vol. v. p. 656.

2250. *Saul's watering-despatcher* (fig. 463.) has some advantages over both the soude

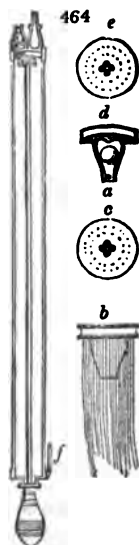


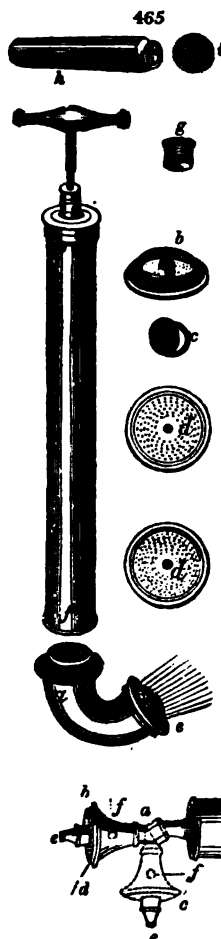
and the aquarian. In the bottom there is a lifting clack (*a*), the same as that used in the bucket of the common pump, which admits the water into the despatcher, and will close securely as soon as the vessel is filled. An upper valve (*b*) is raised up by the upward pressure of the air, as the water rushes in below at (*a*); and as soon as the water has risen to the height of the cover (*c*), the valve (*b*) falls, and enables the user to carry the water in the despatcher wherever he pleases. By raising the valve (*b*) with the finger, the air is admitted to act on the water, and any quantity required may be discharged through the small holes (*d*) at the bottom. These holes are of the same kind and dimensions as those in the rose of a common watering-pot. (*Gard. Mag.*, vol. vii. p. 654.)

2251. *The watering-tube* (fig. 461.) is a tin tube with a funnel joined to it at right angles at one end, and with or without a rose joined to it in an opposite direction at the other. It is used for watering pines, and other potted plants in pits or beds, not easily reached, and where it is desirable not to moisten the leaves.

2252. *Garden-syringes* are of different kinds: the common is made of tinned iron, copper, or brass; and is generally about two feet in length, and two inches in diameter.

2253. *Read's syringe* (fig. 464.) is by far the best implement of the kind. By means of a ball valve (*d*), which can never go out of repair, the water is drawn in through a large opening, and forced out either through a fine rose (*e*), a larger rose (*b*), or in one spout (*a*), each forming a separate cap, which screws off and on. In common syringes the air above the piston proves an obstacle to the operation of the syringe, and greatly increases the labour of the operator; but in Read's syringe there is a tube (*f*) by which this air escapes in the operation of drawing in water, and the space is as readily replaced with air through the same aperture in pressing the water out again. It is astonishing how much this lessens the power requisite either to fill the syringe or empty it. A child may do, with Read's engine, what requires a man with the common kind. This instrument may be considered as superseding not only the common hand-syringes, but even the barrow-engine, and other machines of this kind to which the same improvements are not applied.

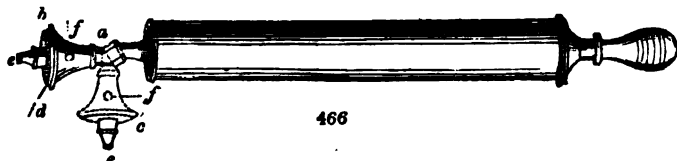




2254. *Macdougall's inverted garden syringe* (fig. 465.) is a very useful instrument for washing the under sides of the leaves of plants and shrubs, and especially those of trees trained against trellises in hot-houses. The different parts of this instrument, in addition to the cylinder or common syringe tube (*f*), are, a bent tube (*a*), which screws into the extremity of the straight tube; a convex rose for spreading the water, which screws on either to the bent tube or the straight tube (*g*); straight roses drilled with large and small holes (*d d*); a flap valve (*c*), which may be made either of leather or of metal, and beneath which there is a wire grating to exclude impurities, when the water is drawn in by the large opening in the centre of each kind of rose (*b*),—this is a subsequent improvement by Mr. Macdougall; a hollow screw for keeping in the valve and netting (*g*), and a punch (*A*), which are sent along with the syringe to enable every gardener to punch out his own leather valves. It will be obvious from the above, that this instrument may be either used as an inverted syringe, or be changed into a common or straight syringe, at pleasure. (*Gard. Mag.*, vol. vi. p. 305.)

2255. *Warner's syringe* is an imperfect substitute for Reid's and Macdougall's; but it has the advantage of being sold at little more than half their price. It is figured and described in *Gard. Mag.*, vol. viii. p. 353.

2256. *Siebs's universal garden syringe* (fig. 466.) has only one apparatus, but it can instantly, by turning a pin, be applied so as to serve the purpose of four different caps, or heads. Macdougall's inverted syringe is imitated by an universal joint (*a*), which enables the operator to turn the head in any direction, and to any angle, as at *c*. The pin by which these alterations are effected works in a groove (*d*), in the face of the rose; and by it a very fine shower, a coarse shower, or a single jet from one opening (*e*), may be sent forth at pleasure. The valve by which the water is admitted to the syringe is in the side of the rose (*f*). This is an elegant and useful instrument, more particularly for amateur gardeners, whether male or female.



SUMMARY. 3. *Utensils of Protection.*

2257. *Utensils of shade, shelter, and exclusion* are the cover, shade, blancher, hand-glass, and bell-glass.

2258. *Plant-covers* are of different species.

2259. *The portable cloth-cover* or shelter is of different species: it consists of a frame of wickerwork, of any size, from that of a hand-glass, to six or eight feet high, covered with gauze, oiled canvass, matting, and sometimes entirely with wickerwork. It is used for protecting half-hardy shrubs and plants in the winter season, and when recently transplanted.

2260. *The portable paper cover* or shelter is a small frame, like the skeleton of a hand-glass, covered with oil-paper, and is used for protecting cauliflower plants, striking cuttings, &c.

2261. *The shades* are of three species. *The plant-umbrella* (fig. 469.) resembles the domestic instrument of that name; but, instead of the ordinary handle, has a pointed rod, shod with iron, for insertion in the ground. It is used for shading tender plants from the sun, or sheltering them from the rain. For both purposes it is convenient to have a joint in the stem, so as to incline the cover according to the situation of the sun and the direction of the rain. It is much used in the Paris garden, and at Monza, in Lombardy.

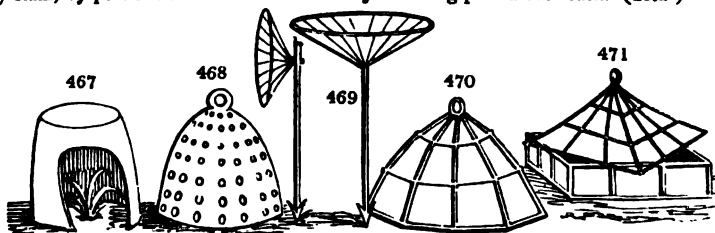
2262. *The portable wire shade* is a bottomless cage of wire or wickerwork, to place over tender plants, to protect them from excess of wind, sun, and rain. Wire shades

are a good deal used in the botanic gardens of the Continent, for moderating the direct influence of the sun on plants of cold climates.

2263. *The earthenware shade* (figs. 467. and 468.) is in the form of a flower-pot, but with a section cut from one side to admit the air and light. This open side, in the case of auriculas and alpine plants, is placed to the north, and in the case of tender plants to the south, or other points. These utensils are exceedingly useful in transplanting tender plants, and in cultivating alpine plants. One species (fig. 468.) is entirely perforated with holes, for shading ferns, mosses, and fungi. Common pots are often used for sheltering and shading newly transplanted articles with the greatest benefit.

2264. *Blanchers* are any close utensil that, when whelmed over a plant, will exclude the light. The most common is the *blanching-pot*, which is used to exclude light from sea-kale and rhubarb-stalks, and some other culinary vegetables, where the green colour is to be avoided. In the Pyrenees they are used for blanching celery.

2265. *The conic blanching-pot* is in the form of a sugar-loaf, and is used in France for blanching lettuce and endive. (*Lasteyrie.*) In Valencia, asparagus is blanched stalk by stalk, by portions of reed with a knot or joint being placed over each. (*Ibid.*)

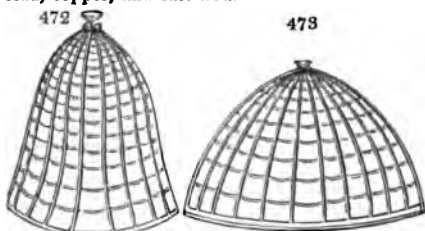


2266. *Hand-glasses* are of various species.

The leaden hand-glass is a small portable glazed case, formed by grooved strips of lead, and is either square or polygonal in the plan and roof. It is used for the protection of culinary and other plants, during the winter months; its first cost is less than that of any other hand-glass.

The copper hand-glass (fig. 470.) is a very light and elegant variety of hand-glass, in which the bars are formed of copper, and the sides bevelled; the top or roof sometimes projecting over the latter, with glass eaves. The lead hand-glass is the cheapest, but this is by far the most elegant.

The cast-iron hand-glass (fig. 471.) consists of two parts, the sides are either square or polygonal, and the top is of suitable shape. Each side is cast separate, with screws and nuts; the four sides are afterwards screwed together, and the top, which is always kept separable, is cast in one piece. When air is to be given to the plants enclosed, it is done by lifting up the top, and replacing it diagonally, by which means air is admitted in every direction; and one advantage of not being obliged to lift the bottom part is, that in severe weather, when it is frozen to the ground, air is admitted without danger of breaking the glass; and also that the leaves of large plants, as of cauliflower, are less liable to be injured in replacing it. A glass case may be composed from two or three of these hand-glasses, of any height, by placing two or three bottom frames one above the other. The relative prices, the size and shape being the same, are in the order of lead, copper, and cast-iron.

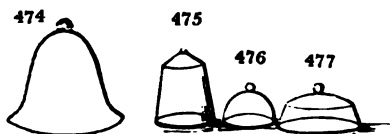


The wrought-iron hand-glass (figs. 472. and 473.) is composed of solid iron sash-bars, and may therefore be formed of any shape or height. It is particularly eligible for covering tender shrubs planted in the open air, as the tree peony, some half-hardy mimosa, &c.; and even pelargoniums and fuchsias in the south of England.

2267. *The bell-glass* differs from the hand-glass in being one entire piece of glass, and commonly bell-shaped, semi-globular, or cylindrical.

2268. *The common green glass bell* (fig. 474.) is formed of bottle-glass, and is commonly used in the open garden for protecting cauliflowers or other culinary plants, or for striking cuttings, or for retaining a moist atmosphere about seeds, &c.

2269. *The crystal bell, or receiver* (figs. 475, 476. and 477.), used in gardening,



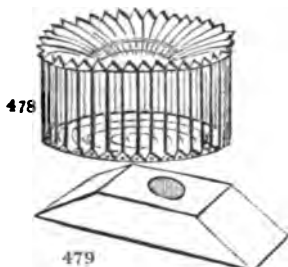
sieve, flower-pot, watering-pot, and hand-glass.

is generally from three to eight inches in diameter, and from four inches to one foot in height. These glasses are employed in striking tender cuttings in the exotic departments, especially heaths.

2270. The essential utensils are the

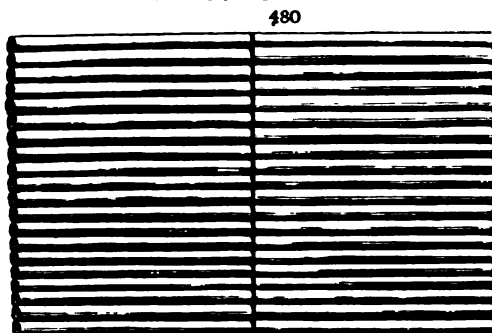
SUMMARY. 4. Utensils for entrapping or destroying Vermin.

2271. The bird-trap cage (fig. 478.) is a wicker utensil with a funnel, through which the bird, having descended in quest of the bait placed within, cannot ascend. It is successfully employed to catch young sparrows.



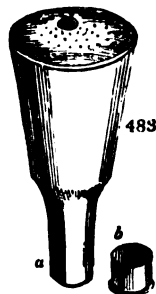
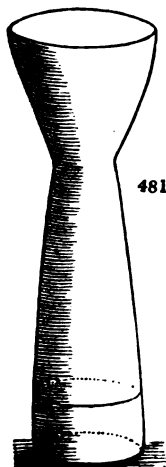
2272. The earwig and beetle trap (fig. 479.) is often only a hollow cylinder; but from this, if not taken up regularly at certain seasons, the insects escape. A close box, with an inverted truncated cone of glass in the centre, as a hopper, is better; because, when earwigs, beetles, woodlice, or such insects enter, they cannot escape, and may be drowned or scalded, or suffered to die there. The common bait is crumbs of bread. An earwig-trap, formed of a number of small tubes of tinned iron soldered together (fig. 480.), is sometimes used by those gardeners to whom expense is not an object.

2273. The wasp and fly-trap is merely a bottle half full of water, honied at the mouth,



to entice their entrance. Some assert that the plant *Hôys carnôes*, while in bloom, will attract wasps and all other insects from the fruit in the house in which it grows (Maher, in *Hort. Trans.*, vol. i. p. 197.); and others, that boiled carrots will have the same effect. There is a long wasp-glass (fig. 481.), and also a heart-shaped one (fig. 482.), in common use in fruit-gardens. These glasses are filled about half full with sugar and water, or water and honey.

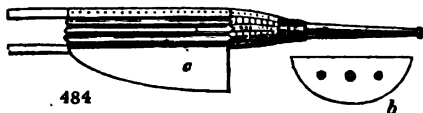
2274. The lime-duster (fig. 483.) is made of tinned iron, and is twelve inches long,



and seven inches wide at its broadest part. The handle (a) is five inches and a half long, and to the top of it is fitted a cap (b), which is put on when the lime is to be thrown on low trees; but, when high trees are to be operated upon, the cap is to be removed, and a pole, of sufficient length to reach the height required, is inserted into the handle. The time for dusting trees with powdered lime is in the dew of the morning. The caustic quality of the lime will not injure the most delicate, freshly expanded foliage. (*Gard. Mag.*, vol. i. p. 415.)

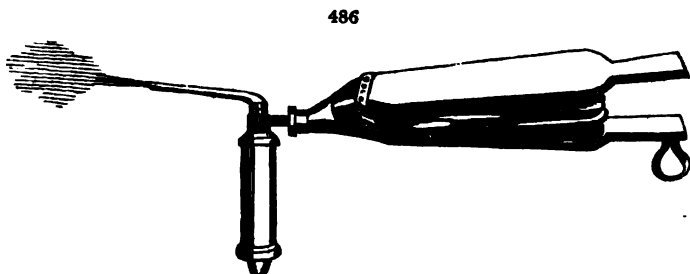
2275. A pair of dusting bellows, for scattering powdered lime, powdered tobacco leaves, or any other powder over plants (fig. 484.), is described in vol. iii. of the *Gardener's Magazine*. This utensil consists of a pair of common bellows, having, in-

stead of the lower board and valve, a piece of tinned iron (*a*), in the flat end of which (*b*), are two small valves, one fourth of an inch in diameter, with an opening between them for the introduction of the dust, to which a cap is afterwards screwed on.

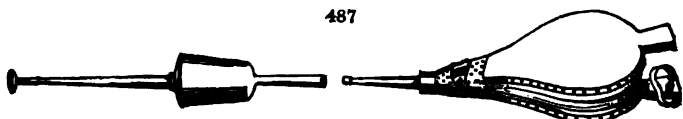


2276. *The fumigating bellows* (fig. 485.) differ from the common domestic bellows in having a receptacle (*a*) for leaves of damaged foreign or of home-grown tobacco; which being ignited, and the blast sent through it, a powerful issue of smoke is produced by the rose (*b*), which can either be directed against insects on particular plants, or used to fill the atmosphere of a hand-glass, frame, or hot-house.

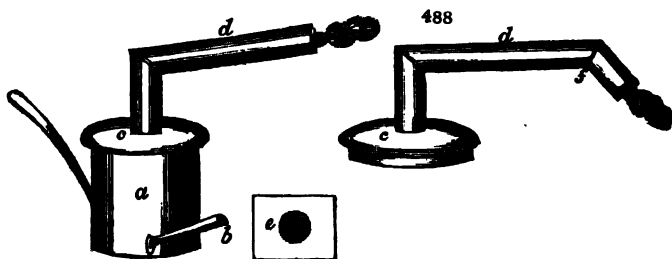
2277. *Read's fumigating apparatus* (fig. 486.) consists only of a cylindrical box added to a common pair of bellows. It may be used either as a fumigator, or for throwing out dust.



2278. *A detached fumigator* (fig. 487.), which may also be added to a common pair of bellows, may be had at any of the braziers' shops.



2279. *The fumigating pot* (fig. 488.) is made of sheet iron, and the bellows it is worked with are double-bladed. It holds about three pounds of tobacco, and acts on the outside of the house. In the figure, *a* is the pot, and *b* the blow-hole, with a grate at the inner end: *c* is the lid, in which is fixed the tube (*d*) to convey the smoke into the house through an aperture made in the square of tin (*e*). Squares of tin,



similar to this, are to be fixed in the upright sashes in the front of the house (one in every third or fourth sash), instead of panes of glass, in order that the pipe may be introduced in different places. The holes are fitted with plugs or covers, so as to exclude the air when the pipe is not in use. If there should be no upright sashes to the

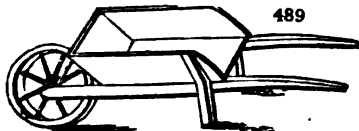
house, the tube will require another angle, and must be introduced through squares of tin fixed in the roof. This fumigating pot may be made at a trifling expense, and, with care, will last many years. (*Gard. Mag.*, vol. vi. p. 553.)

SECT. IV. *Machines.*

2280. *Machines are agents for abridging manual labour.* All the operations of gardening might be performed by the simple tools, instruments, or utensils already mentioned; but, in practice, some labours would be insufferably tedious, and others inconveniently cumbersome; and, in many operations, the ordinary force of man could not be conveniently brought into action. Rollers, as opposed to the turf-beetle, are illustrative of the first case; the German devil, and Bramah's hydrostatic press, as opposed to a number of men with ropes or levers, of the second; and the boat-scythe, as performing the operations of the pincers or common scythe, of the third case. But the machines of gardening are very few, and consist chiefly of artificial contrivances for the defence of gardens, or of scientific machines for measurement or designation of temperature. In contriving either of these, simplicity ought to be attended to; for a complicated machine is not only more expensive, and more apt to be out of order, but there is also a greater degree of friction, according to the number of rubbing parts.

SUBJECT. 1. *Machines of Labour.*

2281. *The more cumbrous machines of gardening are the barrow, roller, watering-engine, boat-scythe, ladder engine, and transplanter.*



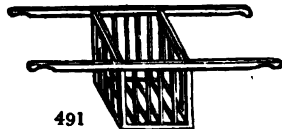
2282. *Garden wheelbarrows are of several species. The common garden wheelbarrow (fig. 489.) is a box, open at top, placed on two levers, terminating in a wheel and axle at one end, and in two handles at the other. It is commonly made of wood, the levers*

of ash or elm, and the sides and bottom of any soft wood. The wheel is either wholly of cast iron, or of wood shod with wrought iron. Excellent garden wheelbarrows are now made of wrought iron; but wooden ones are better for new ground work. They are used for conveying dung, weeds, garden soils, litter, &c.

2283. *The separating barrow is, in appearance, the same as the above; but the body, being kept in its place by two iron bolts at opposite angles of the bottom, may be lifted off by two men; and thus, tan, dung, and other articles are readily carried into hot-houses, where the wheel and levers could not be pushed along.*

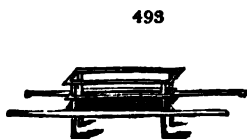
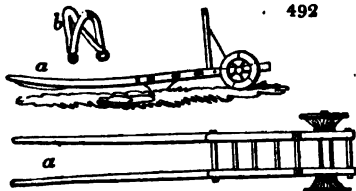
2284. *The new ground work barrow (fig. 490.) differs from the first in having the sides and back very low, and a front of the same height. It is made much stronger, and is used chiefly for wheeling earth, clay, or gravel, in extensive excavations or removals of these materials.*

2285. *The haum barrow (fig. 491.) is an open box or case, of wicker or other work, placed on, or suspended from, a pair of handles, with or without a wheel, and is useful for carrying litter, leaves, haum, spray, prunings of hedges, &c.*



2286. *The Normandy wheelbarrow (fig. 492.) has two handles or trams (a a) nearly fifteen feet in length, by which, when loaded, nearly all the weight is thrown on the axle; so that the operator, who commonly wears a shoulder-strap (b), has scarcely any thing to carry; he has only to push.*

2287. *The flower-pot barrow is a flat surface and wheel, on which plants, pots, or leaves are placed either directly, or, when small, in one or more shallow baskets. Fig. 493 is a form in general use in the Paris gardens.*



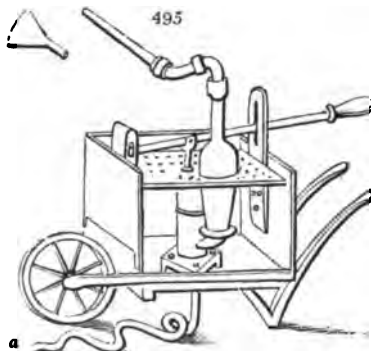
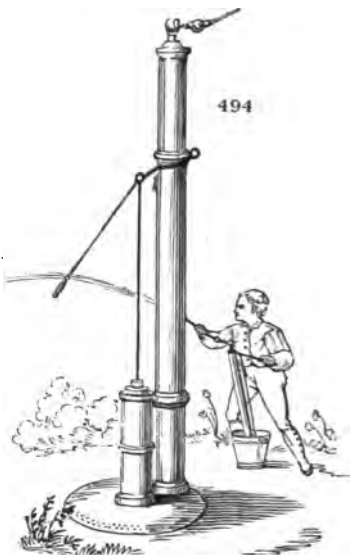
2288. *The water-barrow*, instead of a box, contains a barrel, tub, or cistern, in which fluid manure, or mere water, is conveyed to different parts of the garden.

2289. *The hand-barrow* is a frame of wood carried by two levers, which form four handles; and is used, in gardening, for removing large pots or tubs of trees, in blossom or in fruit, which wheeling might shake, and otherwise injure.

2290. *Watering-engines* are of several species.

2291. *The pump-syringe, or hand forcing-pump* (fig. 494.) consists of a barrel-piston and directing tube. The water is drawn up through a perforated base; and the advantage of this engine is, that it may be placed in any common watering-pot or bucket, and thus much room and some trouble and expense may be saved in small gardens.

2292. *The barrow watering-engine* (fig. 495.) is a portable forcing-pump, so arranged as to throw the water forty or fifty feet distance, either in the form of a spout or of a fine shower. The cistern commonly contains from twenty to thirty gallons of water; and, the frame which holds it being fitted up as a wheelbarrow, it may be wheeled round the garden; and the walks, borders, or even the compartments, to the extent of forty-five feet from the walk, may be watered

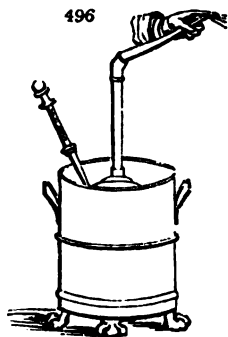


completely. The most desirable variety of this machine is that which is furnished with a sucking-pipe (a), like the fire-engine, by means of which, if there be ponds or regular supplies by pipes or wells in a garden, the labour of carrying the water is avoided. A new machine, of this description, is in progress by Mr. Read, which bids fair to surpass any hitherto invented; but it is not sufficiently advanced for distinct description.

2293. *The curved-barrel engine* (fig. 496.) has the barrel and piston-rods curved so as to form part of a circle, &c. By this construction, the bore of the barrels may be formed in the lathe, and consequently made perfectly true: the piston-rods move exactly in the direction of the axis of the barrels, and therefore

operate with the least possible friction. For a portable engine this is one of the best. Both these engines would receive great additional power, by adopting the improvements on the syringe by Read (2253.).

2294. *The self-acting green-house engine* is a small vessel of cast iron, one part of which is filled with air, highly condensed by a piston, and the other with water, which, by turning the cock, is let out by a spout either as a shower or stream. The machine may be held in the hand, and the stream or shower directed against any particular plant. Instead of water, if tobacco-smoke be introduced, the smoke will be driven with great force to a considerable distance. This machine will throw the water from thirty to fifty feet, but its chief use is in green-houses, for the purposes of fumigation, as a plant on the upper part of a stage may thus be fumigated without the operator being nearer it than the path. On the whole, it is more an instrument for the amateur than the practical gardener.

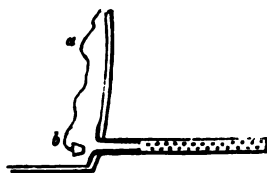


2295. *The carriage water-barrel* is used for watering lawns the first season after their formation, when the weather is dry ; or for watering borders or other cultivated surfaces near a broad wall. In the former case, the water is delivered by a horizontal tube six or eight feet long, perforated at the lower angle so as to produce a series of horizontal jets ; in the latter, a long leathern tube, terminating in a rose, is made use of. The barrel in the first case is drawn slowly along by a horse ; in the latter it is nearly stationary, and a man waters on each side as far as may be deemed advisable, or as the leathern tube admits.

2296. *The water wheelbarrow* (fig. 497.) has a barrel fixed upright on a frame, with a perforated cylinder projecting about two feet from one side. A plug (b) prevents the



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escape of the water till the barrel is wheeled to the proper spot. This plug has a cord (a) attached to it, with a bit of wood (c), which hangs down on the outside of the barrel ; the moment the waterer has got the barrel between the rows, he pulls the string, and as he wheels along the water rapidly escapes over two rows at a time. (*Gard. Mag.*, vol. ii. p. 364.)

2297. *The roller water-engine* (fig. 498.) consists of a horse, frame, and wheels, on which is placed a water-barrel, and under it an iron roller. It is an excellent machine



498

for lawns and roads, as they may be watered and rolled by the same operation ; the person who directs the water irrigating the space to be rolled, not that which has undergone the operation.

2298. *The garden-roller* is formed either of wood, stone, or cast iron. The first requires to be loaded ; the second, from the smallness of its diameter, is heavy to draw ; and therefore the third, which may be formed of any diameter, weight, or breadth, is generally preferred for garden-walks. The cylinder need not be above four feet wide, which will cover most walks at two or three breadths. For extensive lawns the horse-roller will be preferred.

2299. *Garden-ladders* are of three species.

2300. *The common wall-tree ladder* differs from those used in other arts in having two pieces of ten or twelve inches in length, projecting at right angles from the upper end, the use of which is to avoid injuring the trees, by keeping the top of the ladder at a small distance from the wall, and thus admitting of the operation of nailing, as well there as elsewhere.

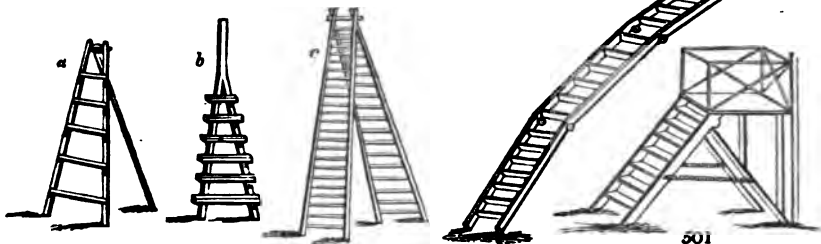
2301. *The orchard-ladder* consists of a frame on low wheels, as a basis for several ladders which fit into each other, and are capable of being hoisted up by machinery, so that a person near the extremity of the ladder may have access to any part of a tree with convenience, either to prune it or gather the fruit.

2302. *The three-styled, forked, and double ladders* (fig. 499. a, b, c) are also well adapted for the ordinary purposes of gathering fruit or pruning.

2303. *The rule-joint ladder* (fig. 500.) is used for working on curvilinear roofs either of glass, or domes of lead, stone, &c. which require panes renewed or trees nailed. Each step or foot-board has what is called a stop, to prevent the feet from breaking the glass, and at every joint is a movable foot to project in the case of training trees on such

499

500



surfaces, in order that their leaves, &c. may not be injured. Such ladders are particularly useful for repairing curvilinear hot-house roofs.

2304. *The step-ladder* instead of round rods on which to place the feet, has steps or boards; an improvement essentially necessary, where much work is to be done, because less fatiguing to the feet. Such ladders have generally a back or fulcrum by which they stand independently of any other object, and which is removable at pleasure by drawing out an iron bolt.

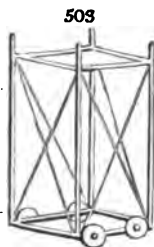
2305. *The portable wheelbarrow-ladder* (fig. 502.) combines a wheelbarrow and a ladder. Half the ladder (a) may either remain on the barrow frame (b), where it will serve, by its pressure, to keep down any light bulky matters, such as pea haulms; or it may be removed altogether by withdrawing the bolt (c c). A man standing on the third step, and holding with one hand by what forms the tram of the barrow, may

easily gather fruit or flowers at the height of ten or twelve feet from the ground. (*Gard. Mag.*, vol. ii. p. 66.)

2306. *Platforms* are of two species.

2307. *The portable platform* (fig. 501.) combines a step-ladder and a platform, which in part comes to pieces, and in part folds together, so as readily to be carried from place to place, and to occupy little room in a tool-house.

2308. *The wheel-platform* (fig. 503.) is a flat surface of boards, generally five or six feet square, elevated by a frame with wheels: it can thus be moved along lawns or walks, and is used chiefly in clipping lofty hedges. A variety of this, used in some places, has folding steps or boards on two sides, supported by brackets, by which three men at different heights, and one on the ground, can proceed with dressing the whole side of a hedge at once. Such a machine is used in shearing the magnificent hornbeam hedges in the imperial gardens at Schönbrunn, and those of spruce fir at Petrowsky, near Moscow.



2309. *The boat-scythe*, for mowing weeds in ponds, is a machine invented by General Bétancourt, of Petersburg, consisting of a boat with a system of wheels and pinions placed in the head, which gives motion to a vertical shaft, on the lower end (which passes through the bottom of the boat into the water), on which are fixed three scythes: two men work the machinery, and one man rows the boat; the upright shafts, on which the scythes are placed, can be raised or lowered according to the depth of the weeds, &c. This machine has been improved by General Bétancourt, but is capable of being further simplified.

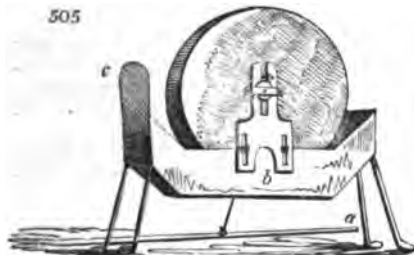
2310. *Budding's moving machine* (fig. 501.) is an admirable contrivance for cropping, or shearing lawns, grass-plots, or indeed any kind of short grass. In the operation of pushing forward the machine, the cylinder (a) rolls upon the ground like the wheel of a wheelbarrow; and, by the wheels and pinions connected with it, causes the revolving cutters to act rapidly, by their smooth outer edges, against the edge of the fixed rectangular steel plate (c), so as to crop or shear the grass or vegetable surface. The smaller cylinder (b) serves effectually to regulate the height, and to ensure the steadiness of the rectangular fixed cutter (c), against which the revolving cutters act. To keep the small roller (b) sufficiently free from any adhering substances, there is a horizontal box which serves as an axis for a thin iron scraper, which is curved so as to form a portion of a cylinder, having its lower edge bearing on the surface of the roller. There is a



box (d) in which all the grass cut by the machine is collected, thus saving the expense of sweeping. The machine may be easily rolled from one place to another without cutting, by merely lowering the handles, so as to lift the gauge-roller from the ground. (*Gard. Mag.*, vol. viii. p. 35.)

2311. *The garden sharpening-engines* are of several sorts.

2312. *The grindstone* (fig. 506.), as well as *whetstone*, *scythesstone*, *hone for penknives* (the last used in making cuttings of heath and such like plants), are necessary in every garden. Blunt spades, hoes, or knives should never be used, as they cannot operate properly in the hands of the most expert gardener.

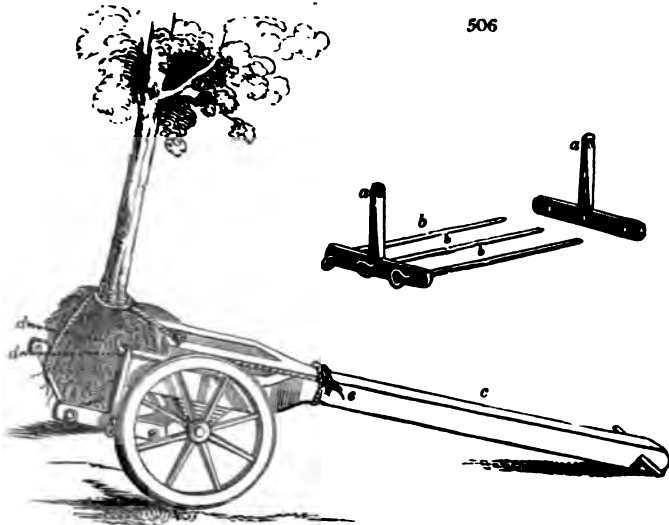


2313. *Tree-transplanting machines* of two or more species have been invented. The pole and wheel-machine is, for general purposes, one of the best, and is, indeed, the foundation of all the others. It consists of a long beam or pole, attached to an

axle and wheels. The tree being prepared for removal, and the pole placed in a vertical position against it, the stem or trunk is attached to it by ropes; thus attached, the tree and pole are brought into a horizontal position, by men or horses, with the ball of earth attached to the tree. Horses may then be yoked to the axle at the opposite end of the pole, or root end of the tree, with or without the aid of another axle, and the tree drawn to any distance, and planted. Figures and descriptions will be given of some under Arboriculture.

2314. *The German devil* is a frame of timber, with a cylinder moved by a combination of wheels, and a winch similar to that used in raising clay or earth from pits or mines by manual labour. But instead of the bucket of clay, three hooks are attached to the end of the lifting rope, and these are fastened to the roots of the tree. (See *Hunter's Evelyn's Sylva*.)

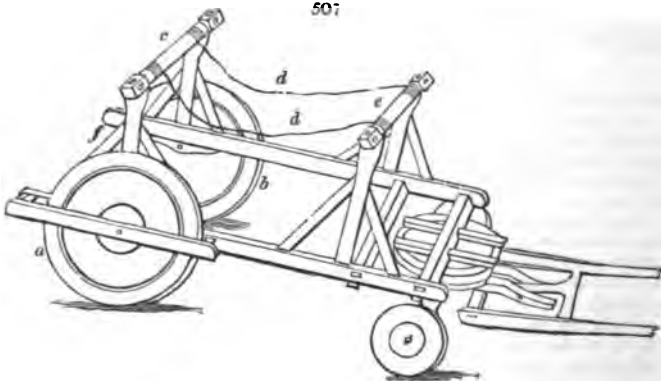
2315. *Saul's machine* for transplanting large trees or shrubs (fig. 506.) consists of a pole fixed on wheels with two irons of a particular description. A trench having been dug round the tree to be removed, one of the irons (a a) is placed on one side of its ball, and then the three rods (b b b) are passed through the iron, and into the holes in the iron in the opposite side of the ball. A plank is then laid across the trench, to support the wheels of the draught-pole (c), until the hooks (d) catch into the holes in the top of a. This being done, and the draught-pole (c) drawn down, the tree with its ball is raised out of the pit, and, when secured by a rope, may be conveyed with ease to the place of replanting. The rope is fastened to the end of the lines over the axle-tree, passed round the ball of the tree under the machine, secured to the cross-piece (e), and thence, if necessary, extended up to the stem of the tree: great steadiness is thus produced. When the tree is brought to the hole prepared for it, the rope is removed, and the draught-beam, or lever, is raised until the iron frame (formed by a a, b b b) rests on the bottom of the hole; the machine is then disengaged from the irons (a a), and driven



back; the iron rods (*b b*) with the irons (*a a*) being withdrawn. The filling in of the soil now completes the transplantation. (*Gard. Mag.*, vol. vii. p. 655.)

2316. The *hydrostatic press* may be applied to the same purpose as the *German devil*, with incomparably greater effect. The only difficulty is in finding a proper and convenient fulcrum; that done, this engine will root out the largest trees. It is successfully employed by engineers in drawing piles and gate-posts, and in raising stones, &c. (See *Nicholson's Arch. Dict.*, art. *Hydrostatic Press*.)

2317. The *orange-tree diable* (fig. 507.) was invented by M. Vallet, nurseryman, Rouen, in the time of Louis XIV. It has no axle-tree reaching across from the one hind



wheel (*a*) to the other (*b*). When the roller (*c*) and the bar (*f*) are removed, the machine can be set back, so as to include a box or tub in the central space between the four wheels; the roller (*c*) being replaced, the ropes (*d d*) are put under the hooks of, or by other means fastened to, the tub or box, which, by four handspikes, worked in the roller (*c c*) by four or more men, is raised six or eight inches from the ground, or as high as the axle, if necessary, and then carted to where it is to be set down. The bar behind (*f*) is movable, and is replaced and fastened by two iron pins after the carriage is charged. (*Gard. Mag.*, vol. v. p. 377.)

818. The *garden-seed separator* is a small portable threshing-machine, on Meikle's

principle, but fed, in Lee's manner, from a hopper, and with a winnowing-machine either under, or connected with it.

2319. *The essential machines of garden labour* may be considered the wheelbarrow, roller, and hand forcing-pump.

SUSSECT. 2. Machines for destroying Vermin, and for Defence against the Enemies of Gardens.

2320. *Of engines for entrapping or destroying vermin, and for the defence of gardens,* there are but a few. All of them, with their modes of operating, are referable to commonly understood mechanical and chemical principles, and to certain instincts and propensities of animated beings, which it is unnecessary to detail.

2321. *Engine-traps for man* are of two species, the common and the humane.

2322. *The common man-trap* is a rat-trap on a large scale, differing from it only in the mode of setting; the former being baited and left loose, and the latter not being baited, but fixed to the ground by a chain. This is a barbarous contrivance, though rendered absolutely necessary in the exposed gardens around great towns. Its defect is, that its severity defeats its own purpose; for though kept and exposed to view in many places in the daytime, yet few venture to set them at night; and hence intruders, calculating on this humanity, enter, and commit their depredations, in spite of these machines.

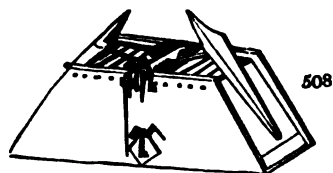
2323. *The humane man-trap*, instead of breaking the leg by crushing, and consequently by the worst of all descriptions of compound fractures, simply breaks the leg, and therefore is comparatively entitled to the appellation of humane. It is not unfrequently set in market-gardens near the metropolis.

2324. *Engine-traps for quadrupeds* are chiefly the mouse, rat, and mole traps.

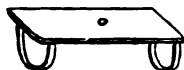
2325. *The garden mouse-trap* is generally composed of a slate and a brick, supported by a combination of three slips of wood, forming the figure 4, and baited by a pea or bean. A few cats domiciled in the back sheds of hot-houses will generally keep a walled garden clear of mice; but the above trap is good for open grounds.

2326. *The garden rat-trap* (fig. 505.) should generally be a box, or enticing engine, of some sort, rather than a toothed iron trap; because, unless there is a great scarcity of food, which is seldom the case as to the field rat, it will not be allured by the bait of the former; whereas a trap may be so disguised by straw, or moss, or leaves, and so scented by oil of anise, as not to be recognised by the rats till they are taken.

2327. *The mole-trap* (figs. 509. and 510.) is of various forms, and is either made of wood or iron, or of both materials. There are several varieties to be obtained in the shops; none of which appear superior to the original bow-trap, which any labourer may form for himself. Moles may be effectually destroyed by taking their nests in spring. A French mole-trap is figured in the *Gardener's Magazine*, vol. viii. p. 36., and a newly invented mole-trap in the same volume, p. 98. This trap (figs. 511. and 512.) consists of a



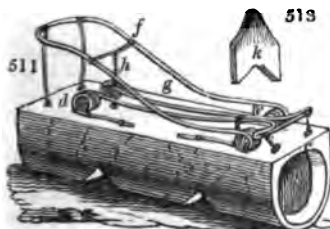
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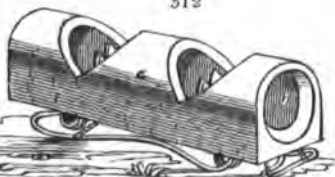
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block of wood (a) ten inches long, three inches broad, and three inches and a half deep; with a hole (b) two inches and a half in diameter, bored lengthwise through both ends. In the inside, half an inch from each extremity, is a groove for a wire loop to fit into, as in the common mole-traps, only that the grooves are here cut quite through, having a small nail or pin of wire driven in through the middle, to keep the wires from rising above the wood. In the upper side of the hole, close by the grooves, three blunt-pointed pikes of wire (c) are fixed, so as to stand a quarter of an inch out of the wood. The

holes for the triggers are bored in the centre of the upper side, three inches from each end: in the lower side, opposite each trigger hole, is a small piece cut out, as in the common trap. The springs are made of iron wire, of about one eighth of an inch in diameter (*d* and *e*); and are exactly of the same form as those of the common mouse-trap, having a cross wire fixed one inch and a half from the top of each spring (*f* and *g*); from which the catches, which are likewise made of wire, are suspended. These catches are retained by the plug or trigger (*i*), till it is displaced by the mole. Fig. 513. shows the trigger, of half the natural size. (*Gard. Mag.*, vol. viii. p. 299.)

2328. *Engines of destruction* are the spring-gun, musket, and fumigating bellows: the musket is essentially necessary, both as a destroyer and scare of birds.

2329. *Engines of alarm*, or scares, are the bell or gong alarm for man; and the rattle-engine driven by hand, or a small wind-engine, for birds.

2330. *The concealed alarm* is a system of wires spread over a garden or orchard, like those of the spring-gun, and terminating in a bell or gong alarm, which goes off when any of the wires are disturbed. This alarm may be in or near to the gardener's room, watchtower, or other suitable place, though at a considerable distance from the wires. This is, perhaps, on the whole, the best way of detecting intruders. In addition to setting off an alarm, the same wire may let loose a watchdog, drop a heavy body, or a fulminating glass bead, discharge a gun, &c.

2331. *Of living vermin-killers*, the ferret is useful for catching rabbits, squirrels, and ground rats; the cat for mice, rats, and birds; the terrier for eradicating foxes; and ducks and gulls eat snails, worms, frogs, &c.

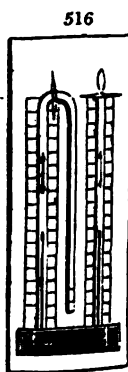
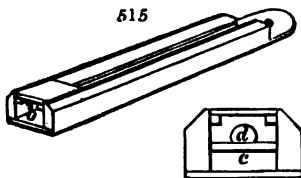
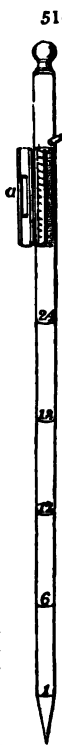
2332. *The essential vermin-engines* are the mole and mouse traps, fumigating bellows, and musket.

SUBJECT. 3. Meteorological Machines.

2333. *The garden-indicators of weather* differ from those in common use only in two instances, that of the registering thermometer and regulating thermometer. *The barometer, hygrometer, rain-gauge, and vane* or Eolian index, may all be usefully employed in gardening, and should be fitted up in and about the gardener's office. The rain-gauge and vane may be placed on the roof of his office, and should communicate

with the interior by means of tubes and machinery, the details of which are perfectly known to opticians, and such as fit up apparatus of this kind.

2334. *Bregazzi's hot-house thermometer* (fig. 515.) has

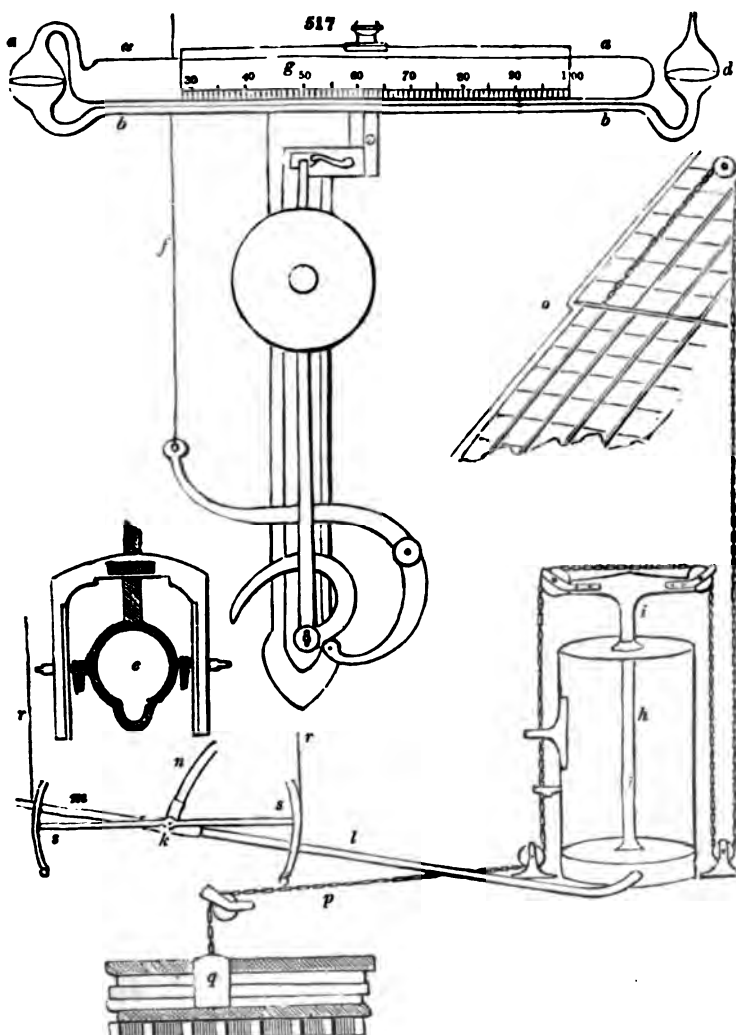


a double back (*b, c*); the advantage of which is, that, when hung from the roof of the hot-house, the heat of the sun is prevented from operating on the back of the bulb (*d*), by the current of air which passes between the backs. (*Gard. Mag.*, vol. iii. p. 215.)

2335. *Bregazzi's bark-bed thermometer* (fig. 514.) has the bulb enclosed in a painted glass tube, by inserting which in the bark bed, or in earth or water, the temperature will be indicated according to the depth of the insertion. The visible part of the glass tube is protected by a small door (*a*) near the upper end of the instrument. (*Ibid.*)

2336. *Six's registering thermometer* (fig. 516.) is so contrived as to indicate the extreme points to which it falls or rises in the course of the day or night, and is, therefore, particularly useful as a check upon the working gardeners, who have to attend to the fires, or steam, &c. of hot-houses in the winter time. In the open air it is also a very useful instrument, from its pointing out the extremes of temperature. (*Nich. Encyc.*, art. *Thermometer*.)

2337. *Kewley's alarum-thermometer* (fig. 517.) consists of a glass tube (*a a*), about ten inches in length, hermetically sealed at one end, and united at the other to a capillary tube (*b b*), with an intervening and also a terminating ball (*c* and *d*). Imagine this double tube placed in a horizontal position, the largest tube, and half the intervening ball, filled



with spirits of wine; and the smaller tube and half of both of the balls, with mercury. If the tube is now fixed by its centre in a brass frame (*e*), and nicely balanced, it is evident that every change in the temperature of the atmosphere will produce a change in the position of the centre of gravity of the tubes. One degree of heat, by expanding the spirit, will press on the mercury in the intervening ball (*c*), and drive part of it over to the terminating tube (*d*), which end will, in consequence, descend like the beam of a pair of scales or of a steam-engine. Hence a moving power of great nicety and certainty is obtained, the details for the application of which, to the ringing of a bell at any distance, communicating by a wire (*f*), need not be here entered into. Suffice it to say, that, by means of a scale (*g*), it may be set to any required temperature, and will give the alarm at a difference of even the fourth of a degree either of depression or elevation. It may be occasionally used, in gardening, to convey some idea of the changes taking place in the temperature of particular hot-houses, to the head-gardener's room, in the night-time; but its most important uses are in domestic economy, hospitals, &c. This balance-thermometer, as it may be called, has been also applied, by its ingenious inventor, to the opening and shutting of windows or sashes, valves of chimneys, or flues, and steam-cocks, and either to all of these purposes at once, or to any of them.

2338. *Kewley's regulating thermometer, or automaton gardener* (fig. 517.), consists of a particular application of the alarum-thermometer just described. For this purpose, the thermometer is made from two to three feet in length, and the same principle may be extended to any length, as ten or twelve feet, with a proportionate increase in the diameter. The apparatus which Kewley applies to the thermometer, and which enables him to get the power requisite for opening the sashes or windows of hot-houses or buildings of any magnitude, is a metal cylinder (*k*), generally of rolled copper, as being cheapest, from seven to fourteen inches in diameter, and from eighteen inches to two feet in length, with an accurately fitted piston (*i*). This cylinder is placed either within or without the hot-house or room in any convenient situation, and a cistern, or a barrel of ordinary dimensions, filled with water, is placed on an elevated situation, say on a level with the chimney-tops. The deeper the cylinder is sunk, the less the cistern requires to be raised above the level of the floor of the house. If, as is often the case, a pipe of water is conducted through the house from a distant reservoir of ordinary elevation, then nothing more is necessary than attaching a branch-pipe. It is requisite that this pipe pass directly to the point where the thermometer is placed, and at any convenient distance under it, not higher than the bottom of the cylinder. Here it is joined to a tripartite cock (*k*), whence proceed two other pipes, one (*l*) to the cylinder, and the other (*m*) to a waste drain. The stopper to this cock turns only to the extent of about one fifth of a circle; and when turned to this extent to the right, it opens a communication between the supply-pipe (*n*) and the cylinder (*k*), when the pressure of the water in the reservoir, whether a barrel on the top of a house, or a distant cistern, raises the piston, and by a communication of cords and pulleys with the sashes (*o*) they will be raised or opened; and by another chain (*p*), the fire or steam damper (*q*) will be opened also. When the cock is turned to the left, this communication is stopped, and one opened between the cylinder and waste-pipe (*m*), by which the water escaping, the piston descends, and the sashes and dampers are shut. The equilibrium of the balance-thermometer restored by the temperature, being reduced or elevated to the proper degree, the plug is neither turned to the right nor left, and every communication is closed. The cock is worked by two wires (*r r*), fastened to two short levers, fixed on each side of the thermometer-frame, and the other ends of the cross or handle of the cock (*s s*). To set the machine at work, it is only necessary to place the scale to a degree at which it is desirable air should be given, taking care that the cistern is not without water. A small cask of water regularly supplied, will answer as well as a large cistern, as the power is not as the body of water, but as its height. As a hot-house seldom remains many minutes at the same degree of heat in the daytime, it is evident that the sashes would be in almost continual motion, which, in houses where the sashes open outwards, and especially the *polyprosopic*, to be afterwards described, would have a singular and animated effect in a flower-garden, or on a lawn. Where light valves or ventilators are used, the balance-thermometer of this size has sufficient power to open them without the aid of machinery; and by lengthening the tube, sufficient power may be obtained to open balanced windows in dwelling-houses, churches, or hospitals. This machine was originally contrived for the use of the inventor in his own garden in Douglas (Isle of Man), and was successfully employed to give air to pits and frames there for two seasons. Having come to London, Mr. Kewley employed it with the addition of more machinery (see the patent, 1816) than he now uses, to ventilate a part of a house in the New Kent Road, from 1816 to 1817. In 1818 he greatly simplified it, and thus improved, it was in operation on a hot-house in Colvill's nursery, King's Road, during the summer of 1819. In both cases the success was perfect and undisputed. The price of the alarum-thermometer is from two to three guineas; and of the regulator, from six to ten pounds complete. These machines were exhibited to Sir Joseph Banks and to the Horticultural Society; but the president and other individuals of this body thought such a machine not wanted in gardening. We cannot but regret, however, that some mark of approbation was not bestowed on the author of so ingenious an attempt to render a service to our art, and who, like other inventors, had devoted a great part of his time, and the greater part of his fortune, to bringing the invention to its present state. We are glad to see that it has been noticed by the Caledonian Horticultural Society (*Mem.* vol. iii. p. 170.), and we trust the inventor may yet obtain, at least, credit for his genius in mechanics.

2339. *Other regulating thermometers* and contrivances for self-acting ventilators will be found described in the different volumes of the *Gardener's Magazine*: one of the latest is the thermostat of Dr. Ure; but there is also one now (1833) in embryo by A. M. Perkins, Esq., the inventor of the mode of circulating hot water in hermetically sealed tubes, which we think will prove a valuable addition to his hot-water apparatus.

SECT. V. Various Articles used in Gardening Operations.

2340. *The objects used in gardening, which can neither be denominated implements nor machines, may be classed as adapted articles, manufactured articles, and prepared articles.*

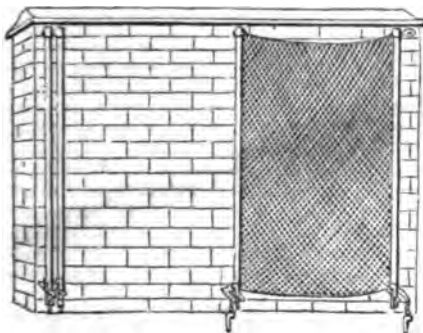
SUBJECT. 1. *Articles of Adaptation.*

2341. *Of articles fitted for particular situations or objects*, we shall notice the temporary coping, horizontal shelter, movable edgings, basket-edgings, and a few others.

2342. *The temporary coping* is commonly a board, or two or more boards joined, so as to form a breadth of eighteen inches or two feet. To these boards hinges are attached, which fit into irons on the front upper edge of the permanent coping of the wall; and thus, by means of a rod, or a cord and pulley, the board is either made to project over the front of the wall, or is laid flat on the top of the permanent coping.

2343. *The horizontal shelter* is a board of eighteen inches broad, and of any convenient length. By means of iron pins inserted in the wall, a number of these are placed horizontally, like shelves, about the middle and top of fruit-walls, to protect the blossom from perpendicular colds and frosts: they were first recommended by Lawrence, but are now seldom used.

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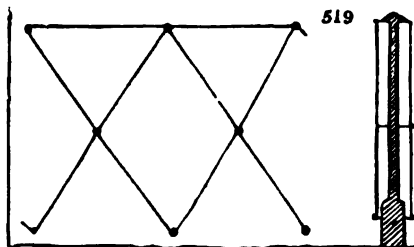


2344. *The netting screen* (fig. 518.) "consists of two deal poles, on which is nailed a common fishing-net, previously dipped in a tanner's bark-pit, to prevent its being mildewed when rolled up wet. At the top, the ends of the poles fit into double iron loops, projecting a few inches from the wall, immediately under the coping; and at the bottom they are fixed, by a hole at the end of each pole, upon a forked iron coupling, which projects about fourteen inches from the wall, thereby giving the screen a sufficient inclination to clear the branches. When it is wished to uncover the trees, one of the poles is disengaged and rolled back to the side of the other, where it is

fastened as before. The most violent winds have no injurious effects upon shades of this kind; a wall is very expeditiously covered and uncovered; and there is not any danger of damaging the blossoms in using them: they occupy very little space when rolled up; are not liable to be out of order; and, although rather expensive at first, seem to be very durable. From the facility with which the screen is put up, it may be beneficially used in the seasons when fruit ripens, to secure a succession, by retarding the crop of any particular tree. The lower ends of the poles are advantageously retained in their places by means of a small iron spring-key, attached to the coupling by a short chain." (*Hort. Trans.*, vol. iv.) Canvass, oilcloth, or gauze screens, may be similarly formed and fixed. A protecting frame, of a very complete description, the invention of Mr. Dick, and used, on an extensive scale, in the gardens under his care, will be found figured and described in the *Gardener's Magazine*, vol. v. p. 55.

2345. *The canvass screen* is a sheet of canvass in a movable frame, to be placed against blossoming wall-trees during nights, and removed during temperate weather. Bunting, or buntine, a kind of thin woollen cloth used for making flags, &c., when rendered more transparent by oiling, is considered by Nicol as preferable to canvass. Others recommend Osnaburgh or Scotch gauze. The screens should have hooks, to slip into projecting eyes at the top of the wall; from which, as well as at bottom, they should be kept distant one or two feet. "Canvass screens, in frames, may be fitted to move, in the manner of a common ash, between rafters, and may be double, as in a window, to go either up or down, in order to admit air. The rafters being made movable by being fixed with hooks to stretchers at top and bottom, the whole could easily be removed or replaced at pleasure. Thus a frame may be made of ten, fifteen, twenty, or more feet in length, to answer for one or more trees, as may be required; and, if the whole be packed and laid up in a dry loft, garret, or shed, each season after using, it may last for many years." (*Nicol*.) A very simple mode of fixing coping boards to a fruit-wall, and suspending from them a curtain made of old ships' flags, which may be bought by the hundred-weight, will be found described in the *Gardener's Magazine*, vol. iv. p. 356. The coping-boards are of sufficient width to project over the spars and branchlets of the trees; and the buntine should be nailed along the edge, and drawn up by cords six feet apart, running through rings. The curtain is kept from touching the trees by tarred cords, in the quincunx form (fig. 519.). A long nail may be driven in at the inter-

secting points of the cords, by which they may be fastened so as to be kept out from the wall. See the details in *Gard. Mag.*, vol. iv. p. 356.



2346. *The canvas curtain* is so arranged, by means of pulleys and weights, as to be drawn up over a wall, of a hundred feet in length, in a few seconds, and let down and spread out to dry in nearly as short a time. It is kept at a distance from the trees by cords stretched from the coping to the ground in a sloping direction: a fine example of this occurs at Dalmeny Park garden, near Edinburgh, erected under the

inspection of J. Hay, of Edinburgh, a meritorious designer of kitchen-gardens. "If screens be made in sheets," Nicol observes, "they are best to hoist up and lower with pulleys and cords (which pulleys may be fixed to the coping, as above mentioned, or to a beam or stretcher fixed at the top of the wall). They should be suspended over small rafters or spars, of an inch and a half to two inches square, according to their lengths, placed so closely as to prevent the canvass from dashing against the trees, as above hinted. Sheets of this kind may be of any convenient size, and made to cover one or more trees, as may be required. I have had one sheet 200 feet in length, which I could join or unjoin at two or three different places, and could unclew and hoist, or lower and clew up, in fifteen or twenty minutes. I first contrived it to clew at the top of the wall, but afterwards found it safer to do it at bottom, as a gust of wind had once nearly torn it away altogether. In the clew it was hung by loops to the bottom part of the upright spars (which were placed at four feet asunder), so as to be a few inches clear of the ground. These rafters were fastened with hooks and eyes to the coping at top; and at bottom to stakes driven fast into the earth, eighteen inches clear of the wall." (*Kalendar.*)

2347. *The oiled-paper frame* consists of a light frame of timber, with cross bars mortised into the sides, and intersected by packthread, forming meshes about nine inches square. Common printing paper is then pasted on; and, when quite dry, it is painted over with boiled linseed oil. These frames are then fitted to the wall, or subject of protection, according to circumstances.

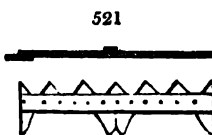
2348. *Garden hurdles* are of different species.

Wire hurdles are used as inconspicuous fences, and sometimes for training plants or young hedges.

Wattled hurdles, or such as are woven with shoots or spray, for shelter and shade.

Straw and reed hurdles are used for shelter, for shade, and for covering frames and other plant habitations, or for forming temporary cases around plants to exclude cold.

2349. *Movable edgings* to borders, beds, or patches of flowers, are of different species.



2350. *The basket-edging* (fig. 520.) is a rim or fret of iron-wire, or sometimes of laths, formed, when small, in entire pieces; and when large, in segments. Its use is to enclose dug spots on lawns; so that, when the flowers and shrubs cover the surface, they appear to grow from, or give some

allusion to, a basket. These articles are also formed in cast iron, and are used as edgings to beds and plots in plant-stoves and conservatories.

2351. *The earthenware border* (fig. 521.) is composed of long narrow plates of common tile-clay, with the upper edge cut into such shapes as may be deemed ornamental. They form neat and permanent edgings to parterres, and are used, more especially in Holland, as casings or borderings to beds of florists' flowers.

2352. *Edgings, of various sorts*, are formed of wire, basket-willows, laths, boards, plate iron, and cast iron; the last is much the best material.

2353. *Protecting bags*, for guarding ripening fruits from insects, are formed of gauze, oiled paper, or muslin paper: gauze is preferable, as it admits the air. They are used with advantage in the case of grapes and stone-fruit, on walls in the open air; and, in some cases, are required even in hot-houses.

2354. *The shoe-scraper* is a plate of iron, fastened vertically, either in a portable or fixed frame; and, to render it complete, it should always have a rigid brush and dust-box

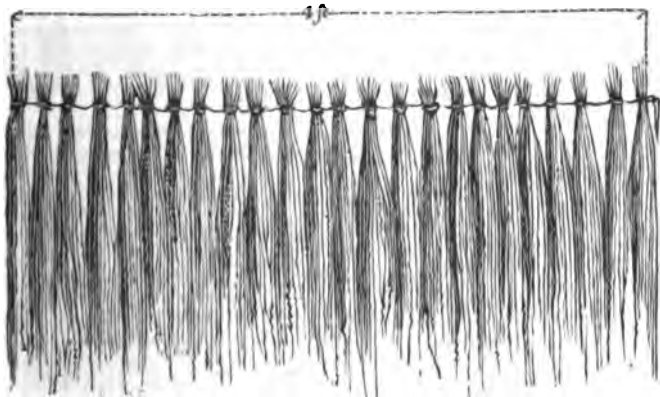
attached, both of which may be taken out and cleaned. The use of shoe-scrapers in gardening is considerable; portable ones being placed at the entrances to every description of garden building, and fixed ones at the exits from compartments to the main walks. They ought to abound, and their use to be effectually insisted on, wherever clean and pure gravel or turf walks are desired objects.

2355. *Garden or bast mats* are sheets of cloth, woven or matted from the *bast* (Rusa.) or inner bark of trees, generally of the lime. They are manufactured in the inland parts of Russia and Sweden, and even in some parts of Monmouthshire, of different sizes. They are used, in gardening, for a great variety of purposes; for protecting wall-trees, by being hung before them, and removed in mild weather; for protecting espaliers and standards, by being thrown over them; for protecting more delicate shrubs, by being thrown over an envelope of hay or straw, in which way most American trees and standard roses are protected in the neighbourhood of Petersburg; for protecting tender plants coming through the ground, by being spread on its surface, and such as are of a larger size, by being supported on hooped framing. They are used to cover hot-beds, hot-houses, hand-glasses, and every sort of glass-case; to shelter plants from wind, shade them from the sun, &c.

2356. *Prepared coverings* are double mats with a layer of hay or straw within, like mattresses; they are used for covering hot-beds in mid-winter, but are readily rendered injurious by heavy rains. A mode which would produce the same effect, is to use three thicknesses of mats, keeping them apart by small frames of lath or hollow rollers; the object being to preserve vacuities or strata of air between the glass and first mat, between the first and second mat, and between the second and third mat, which, if attended to, would resist any external cold whatever without cumbrous loads of hay, straw, &c. (See *Dr. Wells on Dew*, and *Remarks on Hot-houses*, &c.)

2357. *Straw coverings* are formed of straight long wheat or rye straw, tied in handfuls in the middle (so that each handful may be nearly of the length of two straws), and the handfuls connected together by packthread. They are thus formed into rolls, and were formerly much used, especially in the culture of early salading, and in covering glass cases. Melons were formerly protected by nothing more than loose wheat-straw, and this mode by rolls seems merely a more economical and neat mode of practice. Loose wheat-straw is used by the market-gardeners, to protect early crops of radishes and other saladings. A very simple mode of protecting the blossoms of fruit trees against walls is in use both in France and Germany. Small handfuls of straw, averaging not more than two or three dozens of straws each, are tied together at one end, and, being connected by a string (*fig. 522.*), are suspended in front of the trees at such distances from each other as to form a slight covering to the entire tree when in blossom.

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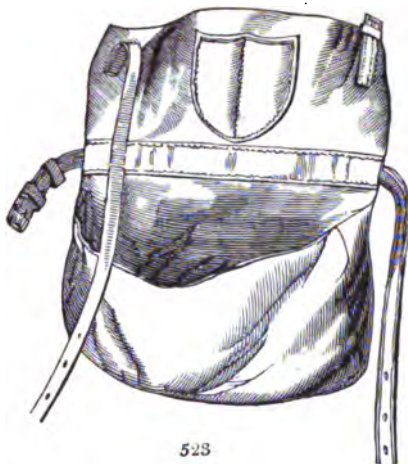
2358. *Reed coverings* are formed exactly like those of straw, and are used chiefly for protecting glass, or forming protecting cones round tender shrubs, or bee-hives of the common kind.

SUBJECT. 2. *Articles of Manufacture.*

2359. *The manufactured articles used in gardening* are chiefly canvass, gauze, netting, mats, and nails.

2360. *A leathern wallet* (*fig. 523.*) is used in nailing wall-trees, and is found a very

useful article wherever the walls are so high as to require the operator to stand on a



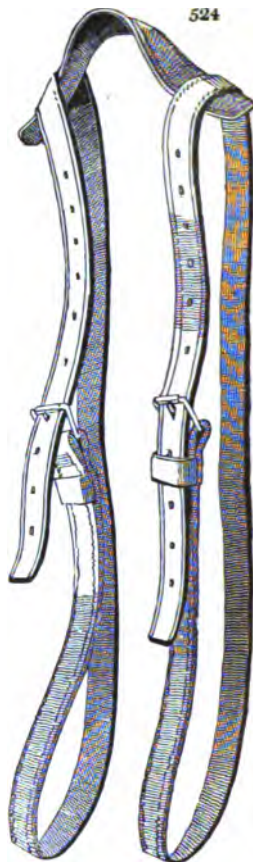
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ladder. In the figure there may be seen, besides the large pocket for the shreds and nails, two small pockets over it, for a knife and sharpening stone.

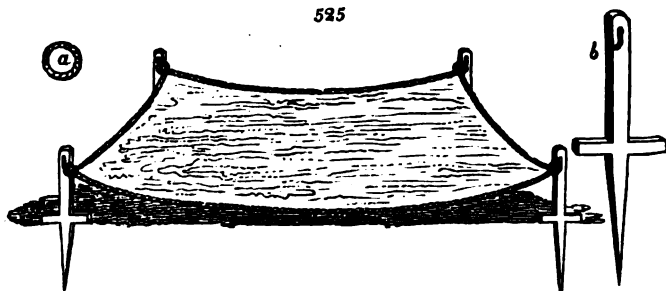
2361. *Leathern bearing-straps* (fig. 524.) are useful in bearing hand-barrows, or even in wheeling the common garden barrow: they are not much in use among professional gardeners; but in extensive operations on the ground, such as excavating for artificial lakes, ponds, &c., and making roads, they materially diminish labour.

2362. *A seed-cloth* for light seeds (fig. 525.) is a useful article for the seed-grower. The cloth may be of any size; but one three feet or four feet wide, and ten feet or twelve feet long, will be found most convenient, where there is a great number of different seeds to be dried. Sew the edges of the cloth to a cord on all the four sides, and in each angle introduce a loop or a ring (a). For every cloth have four pins (b), each having a hook near the top on which to hang the loop or ring; the pins are pointed at each end, that they may enter easily into the ground, and have a cross-piece about a foot from the top to prevent them from

going in too far, and from being drawn too much to one side by the tension of the cloth. (*Gard. Mag.*, vol. vii. p. 651.)



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2363. *Canvass*, either plain, oiled, tanned, or painted, is used for protecting the blossoms of wall-trees; excluding cold from plants or plant-structures, shading or sheltering plants, and for keeping off rain.

2364. *Coarse gauze and netting*, such as is used by fishers and bird-catchers, may be prepared similarly to canvass, and used for the same purposes as that article, except

excluding rain. Oiling or tanning is best adapted for gauze; as painting or tarring destroys its property of admitting light.

2365. A *netting of straw ropes* has been found efficacious in protecting trees from frost, either thrown over an entire standard-tree, or hung before fruit-walls. Nettings of this kind are used at Dalkeith gardens, near Edinburgh, and were formerly much resorted to in the Netherlands.

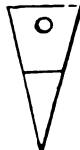
2366. *Wall-tree nails* are of several sorts; but the principal are, the small cast-iron nail, in most common use with lists; the flat-headed wrought-iron nail, used either with

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lists, loops of cord, or mat; and the eyed cast-iron nail (*fig. 526.*), used with small pieces of spray, dried willow-twigs, or mat ties, as in trellis-training. The chief advantage of this last is its not being so liable to lodge the larvæ of insects as the nails which are used with lists; and that being once driven, it never requires removal, or occasions the injury of the wall, as the branches may be loosened, or altered, by merely taking out the slips of spray, or cutting the mat-ties. (*Caled. Mem.*, vol. iii.) Some gardeners, instead of using nails, drive an iron stud (*fig. 527.*) into all the horizontal joints of the brickwork, at the distance of 10 feet from one another,

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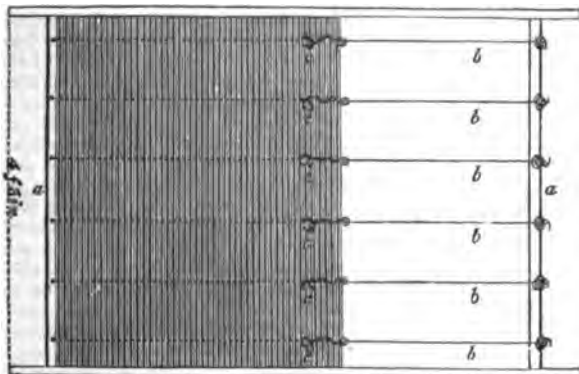
with the hole in the stud standing out half an inch from the face of the wall. Through these holes copper wires are tightly stretched from one end of the wall to the other, and to this wire the branches are tied with shreds of matting. (*Gard. Mag.*, vol. iv. p. 357.)

2367. *Wall-tree lists* are marginal ends or shreds of broadcloth cut into lengths of from two and a half to four inches, and from one half to one inch in breadth, according to the size of the shoots, &c. Their grand disadvantage is the harbouring of insects, for which some have substituted shreds of leather with advantage, and others recommend steeping the shreds in a mixture of sulphur and soap-suds; or better, in that of corrosive sublimate, recommended for preserving dried specimens of plants. The colours of black, scarlet, and reddish-brown are the best for lists, as contrasting well with vegetation.

2368. *Wickerwork covers* of various kinds are used for the protection of plants. Hurdles, or panels, may be arranged so as to form sides and a roof; hurdles may be placed against walls; or covers may be worked of particular shapes to fit a bed or group. (*See Gard. Mag.*, vol. v. *fig. 165.*)

2369. *Straw mats*, or mats formed from reeds, are very generally used as a protecting cover on the Continent, and found there much cheaper than bast mats. In general, they are formed by gardeners for themselves in the following manner: — An oblong square is formed by four laths, along the two ends of which (*fig. 528. a a*) are driven as many

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— 528 —

nails as it is wished to have binding cords (*b*); six of these cords are generally used in a mat four inches wide. The cords are of tarred rope yarn, and the straws or reeds are laid on them in handfuls, and are bound to the longitudinal cords by other small cords, also of tarred rope yarn. For greater convenience, the cords used for tying are made up in little balls (*c*). Mats of this kind are made more conveniently by two men than by one man; and by placing the frame on a raised bank or bench, than by placing it on the ground, and obliging the man to stoop. Wheat straw is best, and next that of rye. (*Gard. Mag.*, vol. v. p. 416.)

SUBJECT. 3. *Articles of Preparation.*

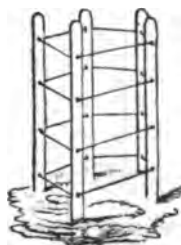
2370. *The prepared materials used in gardening* are numerous: we shall merely enumerate props, ties, covering materials, gravel, sand, cinders, lime, and straw.

2371. *Props for plants* are of two kinds, rods or poles, and spray.

Rods vary from six inches to six feet or upwards in length, tapering to a point, and thick in proportion. For small plants in pots, and for delicate bulbous roots, as hyacinths, small splinters of lath, dressed with a knife or small plane, are the best; and for hyacinths and florists' flowers in general, they should be painted green: for botanical plants, however, this may, in some cases, appear too formal. For hardy plants and climbing shrubs, young shoots or poles of hazel or ash from copsewoods are the most suitable: they should, in general, be straight, and tapering to a point; and as delicate as the weight of the plant, and the exposure of the situation, will admit. The side shoots of these props should, in most cases, be cut off; but in others, as in propping the georgina, &c., it is desirable to have some lateral studs, from three to eight inches long, near the top, so as to spread out the head. In lieu of this, several props are sometimes used, placed in form of an inverted pyramid or cone, or of a regular prism. One prop, however, judiciously managed, will generally be found sufficient. In no case should the bark be removed, because its natural tint is less glaring, and therefore preferable to that of peeled wood, and also because it preserves better the texture of the wood. In order that they may last several years, they should be cut in mid-winter, and the thick end pointed and charred by burning, or dipped in boiling pitch. The elegant propping of plants deserves the particular attention of the young gardener, as it is frequently done in so slovenly a manner as greatly to detract from the order and neatness which ought to reign in most descriptions of gardens. In pleasure-grounds or picturesque scenes, trees and shrubs should, in general, prop themselves, or each other; but in flower and botanic gardens, flower-borders, green-houses, &c. the greatest degree of art and high-keeping, and a sort of *drilled polish*, easier felt than described, ought always to prevail. In all that respects this part of gardening, the French and Germans greatly excel the English, who are herein too apt to look at the end, without regarding the means.

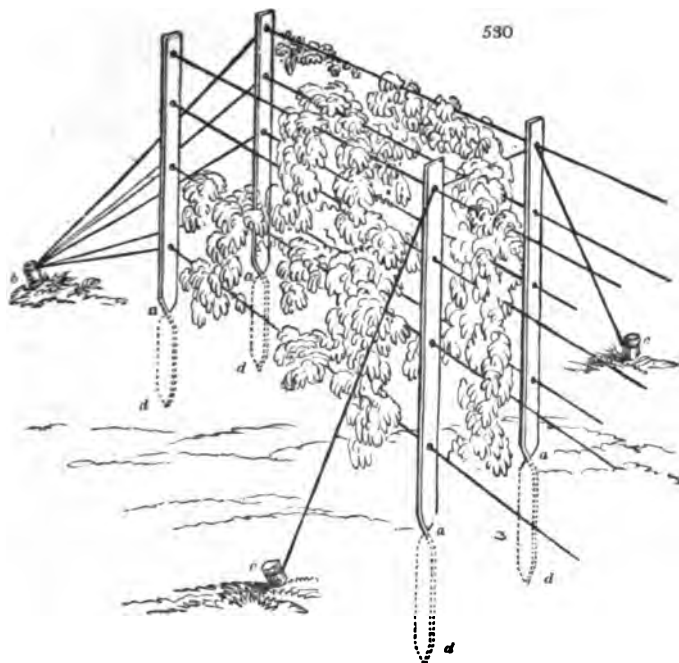
2372. *Of iron stakes* there are a great variety both of cast and malleable metal. The stake fig. 533. is 7 ft. long, and weighs 1 cwt. 8 lbs. per dozen. Fig. 534. is 5 ft. 2 in. in length, and weighs 2 qrs. 13 lbs. per dozen. Fig. 535. is 3 ft. 8 in. in height, and weighs 3 qrs. 9 lbs. per dozen. Fig. 536. shows the four sizes of cast-iron stakes, manufactured by Messrs. Cottam and Hallen. The height of the first (a) is 7 ft., its weight per dozen 2 cwt. 1 qr., and the price per dozen 25s.; (b) is 6 ft. high, weighs 1 cwt. 2 qrs. 22 lbs. per dozen, and costs 18s. 6d.; (c) is 5 ft. high, weighs 1 cwt. 1 qr. 16 lbs. per dozen, and costs 16s. 6d.; and (d) is 4 ft. high, weighs 40 lbs. per dozen, and costs 10s. 6d. Fig. 537. shows the different sizes of wrought-iron rods let into cast-iron sockets at bottom. The height of the first (e) is 6 ft. 6 in., and the price is 10s. 6d. per dozen; of the second (f), 5 ft. 6 in., the price is 9s. 6d. per dozen; of the third (g), 5 ft., the price is 8s. 6d.; of the fourth (h), 4 ft. 6 in., the price is 8s.; of the fifth (i), the height is 4 ft., and the price 7s.; of the sixth (k) the height is 3 ft. 6 in., and the price per dozen 6s. 6d.; of the seventh (l) the height is 3 ft., and the price 6s.; of the eighth (m) the height is 2 ft. 6 in., and the price 5s. 6d.; and the ninth (n) is 2 ft. in height, and the price per dozen is 5s. Figs. 529. and 530. show the application of flat wrought-iron stakes and wires to the support of peas or other annual plants. Each stake is twisted cold at the point (a) just above the surface of the ground to an angle of 90°, by which means it opposes its flat face to the earth in which it is stuck (aa), and that in the proper position to resist any motion in the hedge sidewise. The connecting cords may be either of wire or twine: when they are for sweet-peas, to be sown every season, they may be permanent, and of wire; but when they are to be removed they should be of twine, boiled, previously to being strained, in a solution of Indian rubber in pyroligneous ether (a product of the pyroligneous acid-makers, and known on the Continent by the name of pyroxylic spirit). The expense of this is trifling: 1½ oz. of Indian rubber, and ½ pint of the ether will saturate 10 lbs. of twine. The twine need never be varnished again, and will last many seasons; is perfectly impervious to wet, and is not affected by hygrometric changes in the atmosphere; so that, when once strained tight by the stakes at b, it will remain so. (*Gard. Mag.*, vol. viii. p. 555.)

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the atmosphere; so that, when once strained tight by the stakes at b, it will remain so. (*Gard. Mag.*, vol. viii. p. 555.)

2373. *Iron stakes for roses* are sometimes formed with expanding heads, as in figs. 531. and 532. When fixed in the ground, these stakes should stand an inch or two higher than the stock on which the rose is grafted. The branches of the graft may then be trained



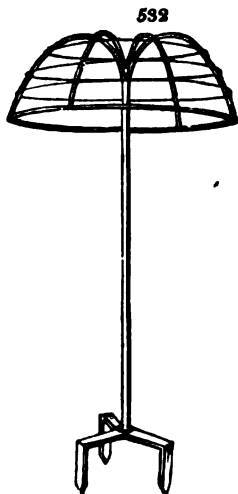
regularly to the spreading head of the stake. A beautiful exemplification of this mode of training roses may be seen in the *Gardener's Magazine*, vol. viii. p. 680.

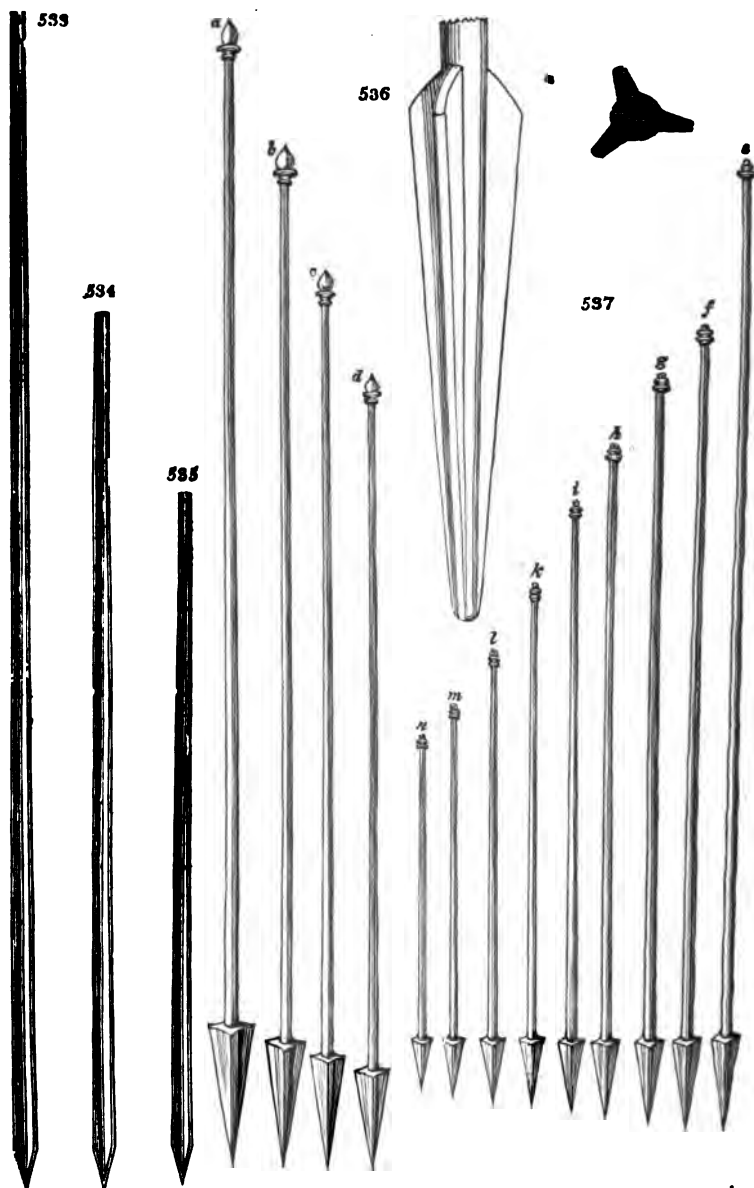
2374. *Spray* or branches are used as props for plants furnished with tendrils, as the common pea, and many of the leguminous tribe. Spreading, frond-like, and yet thin spray, such as that of the beech, hazel, or Scotch elm, is generally preferable; but for early crops the spray of the resinous tribe, and especially of the spruce and silver firs, is valuable, as producing warmth and shelter, by its numerous chaffy leaves, which are non-conductors.

2375. *Ties* are various; the most general are the ligular threads of bast mats; for espaliers some use withs, or tarred cords or threads: on the continent, rushes (*Juncus effusus*) cut green and dried in the sun are used; and often wheat-straw. When mat, bark, rush, willow, or other spray or shoots, or straw, are used, they should be previously soaked a short time in water.

2376. *Covering materials* are straw, reeds, haum of any sort, spray, &c. They may either be used loose, which, when the weather is dry and calm, is the most effectual way of excluding cold; or drawn, that is, with the stalks or spray arranged in parallel lines in the manner of thatch, by which means the rain runs off, and then they exclude cold both in dry and wet weather. Sometimes straw and reeds are so prepared in frames, or rails suited to the size of beds in the manner of the reed, or spray, or wattled hurdle.

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(2348.) Sometimes they are covered with mats; but as the latter readily admit rain, this mode is much inferior to that of arranging the straw or reeds in the manner of thatch.

2377. *Boards and planks* are used in gardening, for wheeling up declivities, over steps and hollows, across borders, walks, &c. *The notched or bridge plank* is used to protect edgings, serving as a bridge across them. *Tressels* are used for raising planks in extensive operations on the soil, in forming pieces of water, new gardens, or garden-scenery.

2378. *Various prepared articles* might be mentioned as of frequent or occasional use. *Scoria* from a forge is used for forming a platform impervious to worms, on which to

place pots of plants. Soper's ashes or waste is used for the same purpose. The use of gravel and sand is very general; fine sand, uncontaminated with ferruginous matter, is particularly useful in propagating heaths and other delicate plants by cuttings. Oyster-shells are used as crocks or sherds for covering the bottom-holes of pots; quicklime in powder or infusions to destroy vermin, especially worms. Tobacco and other prepared matters are also used for the same purpose. Moss is used in packing and for other objects; tanner's bark for its heat and fermentation.

CHAP. II

Structures used in Gardening.

2379. *By garden-structures* we mean to designate a class of buildings which differ from all other architectural productions, in being applied to the culture, or used exclusively as the habitations of plants. As edifices, the principles of their construction belong to architecture; but as habitations for plants, their form, dimensions, exposure, and, in many respects, the materials of which they are composed, are, or ought to be, guided by the principles of culture, and therefore under the control of the gardener. They may be arranged into the *movable*, as the hot-bed frame; *fixed*, as the wall, trellis, &c.; and *permanent*, as the hot-house.

SECT. I. *Temporary or Movable Structures.*

2380. *Of these*, some are for protecting plants in fixed places, as against walls or trellises, and exemplified in the different methods of covering by frames of canvass, netting, or glass; others constitute habitations for plants, as the hot-bed frame, pit, &c.

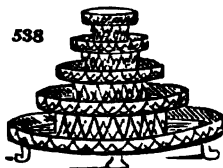
SUMMARY. 1. *Structures Portable, or entirely Movable.*

2381. *Portable structures* are the flower-stage, canvass or gauze frame or case, glass frame or case, glass tent, and glazed frame.

2382. *Of the flower-stage* there are two principal species; the stage for florists' flowers and the stage for decoration.

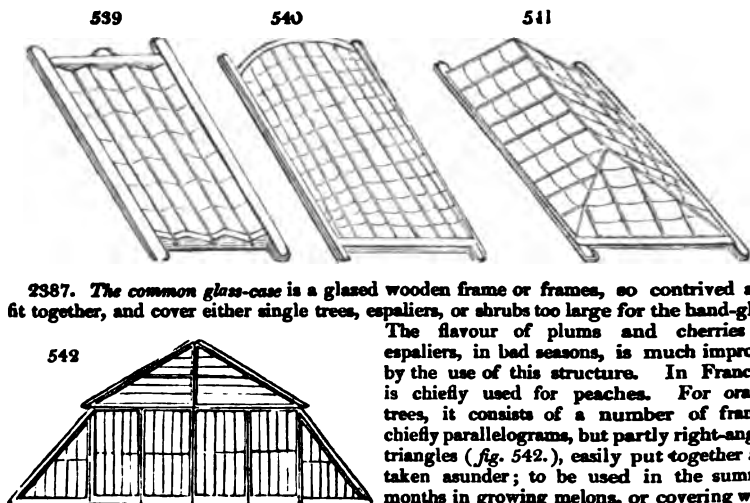
2383. *The stage for florists' flowers*, when portable, is commonly a series of narrow shelves rising in gradation one above the other, and supported by a frame and posts, so as to be 3 or 3½ feet from the ground at the lowest shelf. These shelves are enclosed, generally, on three sides by boards or canvass, and on the fourth side by glass doors. This stage, when in use, is placed so as the glazed side may front the morning sun, or the north, so as the colours of auriculas, carnations, &c. may not be impaired by him.

2384. *The decorative stage* consists of shelves, rising in gradation, in various forms, according to taste and particular situation. Those to be viewed on all sides are commonly conical (fig. 538.) or pyramidal: those to be seen only on one side, triangular. One, used by Mrs. Fox, widow of the late celebrated Charles James Fox, at St. Ann's Hill, Surrey, will be found figured and described in the *Gardener's Magazine*, vol. v. p. 274.



2385. *The opaque covering-frames* are borders of board, strengthened by cross or diagonal slips of wood or rods of iron, and covered with canvass, gauze, woollen, or common netting, or soiled paper. They are used for protecting plants from cold, or for sheltering from wind, or shading, either singly, supported by props, or connected so as to form roofs, cases, or enclosures.

2386. *The transparent covering, or glazed frame or sash*, consists of a boundary frame, composed of two side pieces called styles, and two end pieces called the top and bottom rails, with the interspace divided by rebated bars to contain the glass. It is used as the opaque covering frames, and has the advantage of them in admitting abundance of light. In general, the rebated bars are inserted in one plane, as in common hot-bed sashes; but, in some cases, the surface is in angular ridges, or ridge and furrow-work (fig. 539.); cuneiform (fig. 540.); or trigonal (fig. 541.); in order, in each of these cases, to admit more of the rays of the sun in the morning and afternoon, and to moderate it in the middle hours of the day. This ridge and furrow surface may also be adopted where very flat roofs are to be glazed, as it will carry off the water better than any other; every ridge delivering the water to its furrow; and the accumulation there being such as to force its way off by its own gravity. Such frames are used for placing over beds of hot dung, for growing cucumbers, forcing roots or flowers, and for a great variety of purposes. The materials of sashes are commonly timber; but iron, cast and wrought, and copper are also used.



2387. *The common glass-case* is a glazed wooden frame or frames, so contrived as to fit together, and cover either single trees, espaliers, or shrubs too large for the hand-glass.

The flavour of plums and cherries on espaliers, in bad seasons, is much improved by the use of this structure. In France it is chiefly used for peaches. For orange trees, it consists of a number of frames, chiefly parallelograms, but partly right-angled triangles (*fig. 542.*), easily put together and taken asunder; to be used in the summer months in growing melons, or covering walls or espalier-rails; and in winter, in protecting

orange trees in situations where they are planted in rows against walls, or in groves in the open air.

2388. *The hot-bed frame* is of three species, the common, the fixed-bottomed, and the movable-bottomed.

2389. *The common hot-bed frame* is a rectangular box of wood, bottomless, and highest at the side to be placed to the north, subdivided by cross-bars dovetailed into the outer frame, and each subdivision covered by a glazed sash. Knight, instead of having the north side of the frame highest, has all the four sides of equal height, but forms the basement of the dung-bed, and builds the dung-bed itself, of that slope which he thinks most suitable for the sashes of hot-beds.

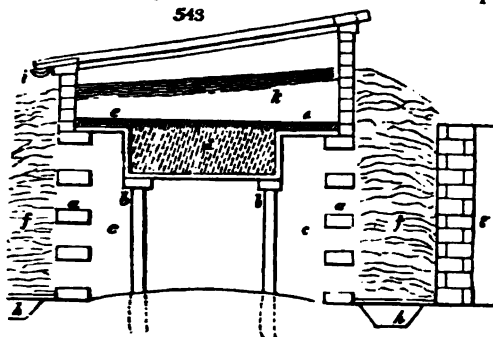
2390. *The fixed-bottomed frame* is the common hot-bed frame, with a boarded bottom for the retention of earth. In the boards are holes for the emission of water.

2391. *The adjusting-bottomed frame* has a box for the earth, of the size of the inside dimensions of the frame; and the frame, being deep or placed on walls, like those of a pit, the bottom and its earth and plants, or its pots and plants, may be raised or lowered by a machine composed of a pinion and screw, or any other equally convenient power. The bottom is composed of perforated boards, and it has boarded sides to keep in the earth. The object is to prevent plants from being burned when the dung is very hot, by raising them; also, to be able to raise them close to the glass when young, and to lower them in cold nights. The chief difficulty in managing this frame is, to keep the earth it contains of uniform moisture. Lawrence, in the last edition of his *Kalendar* (1715), suggests the idea of putting a bottom of wire to the frames of hot-beds, and of covering it with flat tiles, placing over these the earth, &c., so as to admit of the whole being lifted, and the dung below stirred or renewed at pleasure. He says he has not seen it done, but merely suggests it as a hint to the ingenious. A century afterwards, J. Weeks, of the Horticultural Manufactory, King's Road, London, invented his patent forcing-frame, which is that just described.

2392. *Separating frames.* The component parts of any of the above frames, instead of being mortised into one another, are fastened by keyed iron bolts, which easily admit of their being taken asunder and put under cover when not wanted for use; these frames may consequently be preserved longer from decay, and are also more portable, than the common sort.

2393. *A frame for early cucumbers*, which has been found to answer better than most others, consists of any common frame, supported on wooden posts about 3 ft. high, placed in two rows at the back and front. These posts are braced together, and a flooring of boards is placed over them for retaining the mould; while the dung, or other fermenting substance, is placed under and around the whole. The details, at length, will be found in the *Gardener's Magazine*, vol. iii. p. 21. Early cucumbers were grown by Mr. Mearns, in a pit (*fig. 543.*), the walls of which (a) are of open wickerwork. There is a cavity under the bed (c), into which the steam for the dung-lining is admitted. Posts of iron or stone (b) support this bed (d), which is made of slate, stones, or tiles;

while the cavity between it and the sides of the pit is closed below with slabs of stone (*e*). The pit is heated by dung-linings (*f*), enclosed by walls (*g*), and kept dry by drains (*h*), and by a gutter to the sashes (*i*). The plants are inserted in a hill (*k*), and gradually earthed up in the usual manner. This pit is much cheaper than M'Phail's, especially if the retaining walls (*g*) are omitted. (*Gard. Mag.*, vol. i. p. 171.)



2394. The essential portable structures are the common hot-bed frame with flat sashes; and next in order, the canvass curtain, or netting-screen.

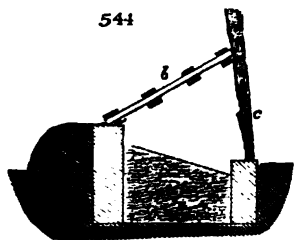
SUBJECT. 2. Structures partly Movable.

2395. Plant structures, partly movable, are pits and adapted frames. The characteristic of the pit is, that it is surrounded by a wall of earth or masonry, enclosing a pit or bed for containing dung or bark. The characteristic of the adapted frame is, as the name imports, a hot-bed frame, adapted to some structure of timber, masonry, or iron.

2396. Of the pit. The species are the earth, walled, flued, vaulted, and pillar-pit.

2397. The earth or primitive pit is in part sunk in the earth, and in part raised above it by walls of loam or turf. On these walls, glass frames are sometimes placed; and at other times, only mats or canvass frames. Such pits are used by nurserymen and market-gardeners, and answer perfectly, for the preservation of half-hardy plants.

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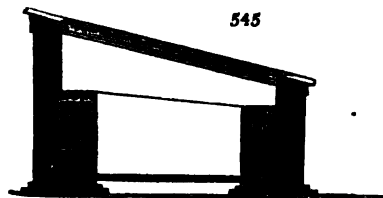
A pit of this kind, used at Valleyfield (*fig. 544.*), is a sunk walled excavation, 3½ ft. wide, 3 ft. deep at the back, and 1 ft. 9 in. in front. It is covered with thatched movable frames, which are tilted at pleasure by a notched prop. It is used as a kind of store-place for all culinary vegetables in leaf which are liable to be destroyed by frost, such as cauliflower, broccoli, lettuce, endive, &c. These, before the winter sets in, are taken up from the open ground, with balls of earth, and embedded on a bottom layer of rich soil, filling up the vacancies between and among the stems with old bark or decayed leaves. Air is given, on all occasions, when

it can be done with safety; and, in severe frosts, additional coverings of litter are put on.

2398. The walled pit is also partly sunk in the ground, and in part raised above it; but instead of earth or turf walls, they are formed of brick or stone, finished with a wooden coping the width of the wall, in which cross rafters are mortised to support the sashes.

2399. The flued pit (*fig. 545.*) is the same as the last described, with the addition of a flue, which either makes the circuit of the pit, or runs along and returns by its back wall.

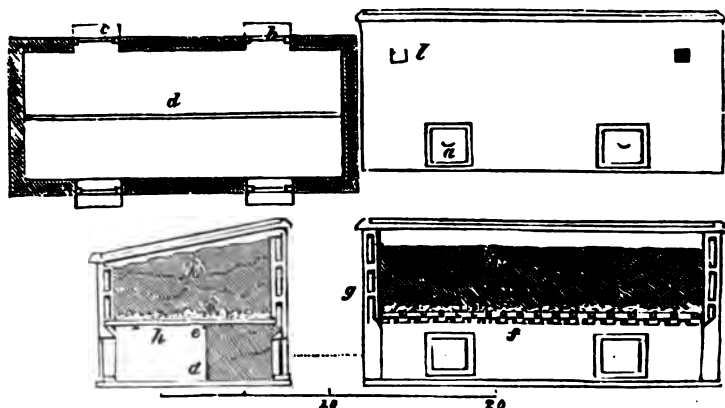
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2400. The vaulted pit, in its simplest form, is the walled pit, with an arch thrown from the front to the back wall. Under the arch the fire is made, or steam admitted; or, in some cases, fermenting litter thrown in. A great improvement on this species of pit has been made by J. West, of Castle Ashby, Northamptonshire. The principle of the improvement is the facilitating the passage of the heat from the vault to the bed of earth over it, by substituting a thin floor of boards or slates, or wattled burdle, for brickwork; the walls are also flued, and the heat supplied is that of fermenting dung, litter, weeds, &c.

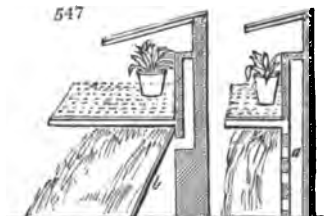
2401. In West's pit (*fig. 546.*), the dung is placed in a chamber (*e*) three feet and a half deep, being about eighteen inches below the surface-line: the walls (*g*) which surround it are nine-inch brickwork: both on the front and at the back of the chamber are two openings (*a*), about two feet six inches square each, with movable doors,

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through which the dung is introduced: the doors fit, at bottom, into grooves (*b*), and are fastened by a wooden pin and staple at top. In front of the doors is a small area (*c*) sunk in the ground, surrounded by a curb of wood, by which the introduction, or removal of the dung is facilitated. Along the centre of the chamber is a bar (*d*), which serves as a guide for packing the dung; and across the top, at intervals of twelve inches, are placed, on their edges, cast-iron bars (*h*), two inches wide, and three quarters of an inch thick, to support a layer of small wood, bushes, and leaves (*i*), over which is laid the soil for the plants (*k*). Just below the level of the bars, all round the dung-chamber, are holes (*f*), passing, in a sloping direction, through part of the wall, into a cavity (*g*) in the upper part of the wall, at the back-front and both ends of the pit. In the exterior part of the back wall are holes, with plugs (*l*), to let out the steam and heat at discretion. At the commencement of forcing, half the chamber is filled longitudinally with dung; and, if the doors are kept shut, this will afford sufficient heat from twelve to eighteen days.

2402. *As an improvement on the construction of this pit, we would suggest the per-*

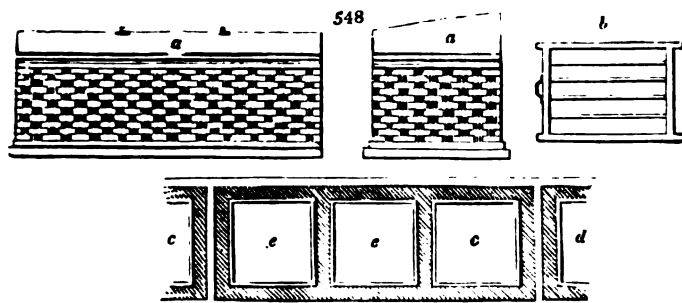


foration of the whole of the side walls (fig. 547. *a*), in order to admit the steam more readily than it can find admittance by a single range of openings adopted by West. Where pits, on West's plan, are already built, a substitute for this preparation in the side walls may be found in the application of a wattled hurdle against them (fig. 547. *b*), as was adopted, in 1822, in the Comte de Vandes's garden, at Bayswater. On wet soils, a hollow bottom is an obvious improvement.

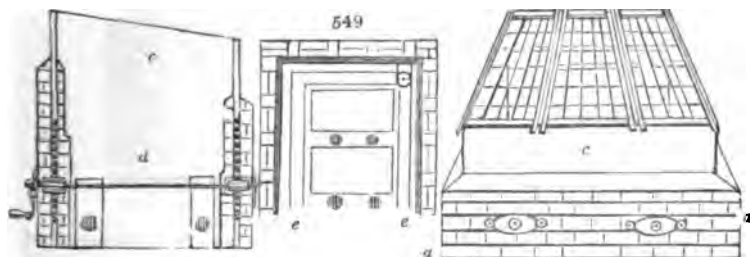
2403. *Of adapted frames, there are M'Phail's, the pit with a rising frame; and the frame with props.*

2404. *M'Phail's frame* (fig. 548.) consists of two parts, the frame (*a a*) and lights (*b*), which are of wood, and not different from those used for growing cucumbers, and the basement (*c, d*) on which the frame is placed; which is flues of brickwork, with the outer wall uniformly perforated. Against these perforated flues linings of dung are formed, the steam of which enters the flue, and heats the earth (*e e e*) in the centre of each light. The chief objections to this plan are the first cost and the greater consumption of dung, which some allege is required to keep up the proper heat. Its advantages are, that hot dung may be used without any preparation, by which much heat is gained; and, that in the winter months, when a powerful artificial heat is required, which (in the case of common hot-beds) is apt to burn the plants, they are here in the coldest part of the soil, and cannot possibly be injured by any degree of heat which can be communicated by dung.

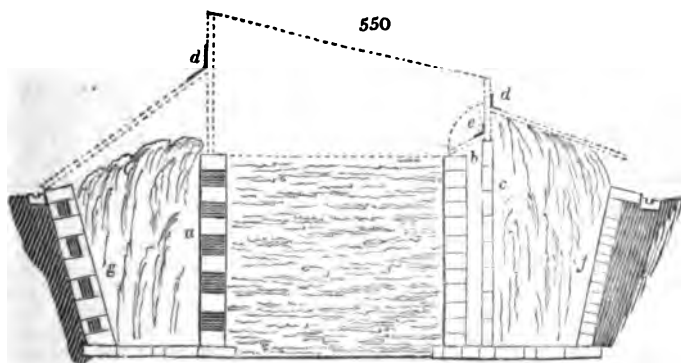
2405. *The pit with a rising frame* (fig. 549.) contains a basement-wall of brickwork, of the height of the dung or bark (*a, a*); and in this is a perpendicular vacuity (*b b*), in which a common frame (*c c*) is placed, and, by a spindle, pinion, &c. (*d*), may be raised or lowered at pleasure. Its object is the same as that of Weeks's frame, already



described; and which it attains with less risk to the plants, but at a great comparative expense. This variety of pit is the invention of John Nairn (*Hort. Trans.*, vol. iii.), who has had it executed, and heated by surrounding tubes (e e) filled with steam.



2406. *Atkinson's melon pits* (fig. 550.) are formed of brick, heated by dung, and consist of four external walls, of which the back and sides are four inches thick, and built

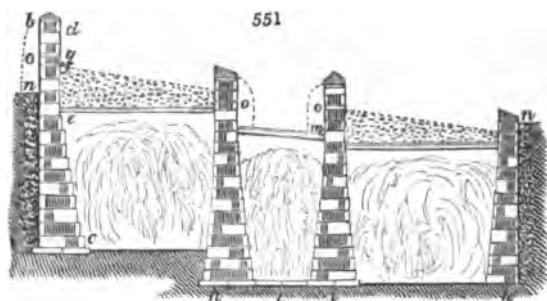


in the pigeon-hole manner (a). The front is a hollow fourteen-inch wall, open at top within (b), and externally formed with thin bricks set on edge in cement (c). Against these walls the dung is applied as usual; by which means dry heated air is communicated to the pit from the front, and the damp warmth from the steam of the dung penetrates the pit at the back and sides. This contrivance is simple, and free from the objectionable points in M' Phail's pits, especially in being much less expensive and more roomy. (*Gard. Mag.*, vol. ii.)

2407. *Haythorn's pits for cucumbers and melons* may be of any convenient length, according to the mode in which they are heated. On the supposition that smoke-flues are employed, the length may be from 30 to 40 ft., and the breadth 13 ft., including the brick path. Each pit has one fire and a flue, which makes three courses, two under the pit, and one along the pathway, to heat the air of the house. Over this last flue is

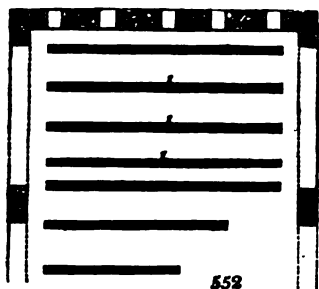
a narrow pit or box, in the way of border, for holding the earth for the cucumbers or small melons, which are trained to wires suspended from the roof. The soil in this border may be increased by laying one or more courses of bricks along its outer curb. Steam may be produced by pouring water over the cover of the flue; and also, if desirable, under the bed of earth, by introducing water through a pipe with a funnel; all the flues being furnished with a course of bricks along the outer edges of the cover, so as to form a trough between them. The mushroom-house is a vault between the two pits; and, by means of small openings, to be closed at pleasure by bricks, may receive heat from either or both of the pits; but, except in the most severe weather, the warmth incident to its situation will be sufficient for the growth of mushrooms. It may be fitted up with shelves in the usual way; and may also be used for forcing succory, rhubarb, sea kale, winter potatoes, &c. An engraving of this pit, with a detailed description, will be found in the *Gardener's Magazine*, vol. ii. p. 280.

2408. *Kendall's double pit* (fig. 551.) has hollow walls, 12 in. thick at the base (α)

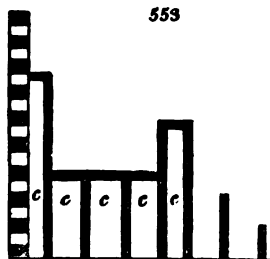


and 7 ft. high: the back of the wall is built perpendicular (ab), with common bricks; and the inner part (cd) is built of what are called flooring-bricks, which are only about 2 in. thick. The cross partitions which connect the two walls together are also built of these flooring-bricks, set on edge. The inner part of the wall bevels, or approaches to the outer part of the wall, from the base to the height of 4 ft. (e), where it is reduced to 9 in. in thickness, at which width it is continued to the top. Immediately above the intended depth of the soil of the pit (f), a course of bricks on edge is left out, both in the back and front walls of the pit; and the walls are covered, from one end to the other, by a course of slates or tiles, 9 in. wide (g). Above this the wall is continued hollow to the top, where it is furnished with a stone or wooden coping, in the usual way. The mould of the pit is supported by cross-bars of cast iron, let into the back and front walls, on which may be laid old boards, branches of fir and straw, pea-sticks, or turves, as may be most convenient. The front wall of the one pit (h), and the back wall of the other (i), are built bevelling on both sides. The front wall of the second pit (j) requires no description; but it is necessary to observe, that this second pit should be a foot lower in the soil than the back one, in order that the latter may not be shaded by it. The space between the pits (l) is for the purpose of applying a lining to heat both pits; it is covered with boards, which incline to one side, and form a gutter at their lower angle (m) for carrying off the rain. In very severe weather, linings of litter (e) may be used to protect those parts of the walls which are above ground. These pits are intended to be heated by dung or any other fermenting substance, introduced into the vault from doors at one or both ends. While this fermenting substance supplies a moist heat to the earth over it, it will also supply a dry heat to the hollow side walls; which heat will enter the atmosphere round the plants by the openings (fg) under the course of tiles or slates (g). The moist heat, if desirable, might easily be admitted by direct communications through the soil to the vault, made by a few bricks, a chimney-pot, or a whelmed flower-pot. Ventilators may be formed in the doors in the ends for supplying manure, in case of too great a heat in the vault; and plugs or wooden blocks, with rings for convenient handling, may be placed in one or two places in the back and front walls, to admit, through the hot vacuity, fresh air to the plants in very severe weather. As the outer surface of the end walls will be fully exposed to the weather, they should not communicate with the side walls, but should form distinct hollow walls of themselves; and, in order to prevent the escape of heat from the outer surface of the back and front walls, a space, of a foot or more, between them and the soil in which they are sunk, should be filled up with loose stones or brickbats (n). (*Gard. Mag.*, vol. iv. p. 229.)

2409. *Thompson's forcing-pits* (figs. 552. 553. and 554.) differ from those of M^r Phail

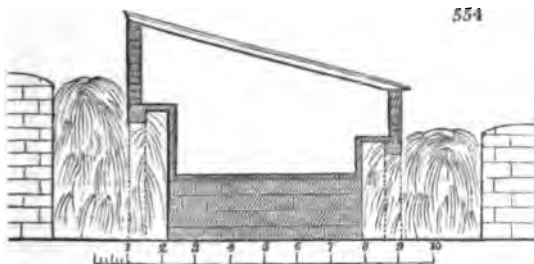


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by substituting stone lints in place of pigeon-holes to the outside walls. The suspended insulated position of the pits admits a circulation of warm air, both under and

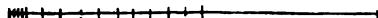
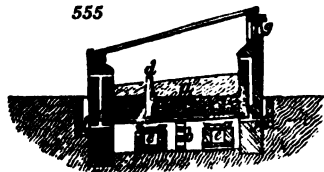


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all around the pit of each light, whereby a greater degree of surface temperature is obtained in the absence of solar rays, in the early forcing season. Fig. 552.: in the ground-plan, *a a a* show the open-work end and the support for the north and south lints; and *b b b* are bricks on edge, to support the bottom of the pits and the surface hot-air flues round each. Fig. 553. is the longitudinal section: *c c c c c* are hot-air flues round and under the bottom of the pit, which are covered with a single tile. When the bottom of the pit is laid, the brick on edge is continued up to a convenient height for the surface hot-air flues, which are also covered with a single tile, laid the reverse way to those at the bottom of the pit. Fig. 554. is the transverse section, showing the pits and the position of the lints, which admit the fermenting body of manure to act under the north and south flues. The internal part of the pits is covered with a thin coat of hair mortar, made rough by finishing it with a wood float and brush; and the tiles are the flat draining ones, without knobs. These pits are generally from 5 ft. to 6 ft. 10 in. wide.

2410. *Forman's pit* (fig. 555.) has the floor for the tan or leaves (*a*) supported by oak joists resting on the side walls, and on a middle wall of open brickwork (*b*).

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The joists are 3 in. deep, $1\frac{1}{2}$ in. thick, and 3 in. apart. Instead of being covered with boards or tiles, a course of turf is laid over them, which is found to answer perfectly. The heated air is conveyed from the chamber below into the atmosphere of the plants by means of small apertures (*c*) formed in the back and front walls, at $4\frac{1}{2}$ in. apart; and also

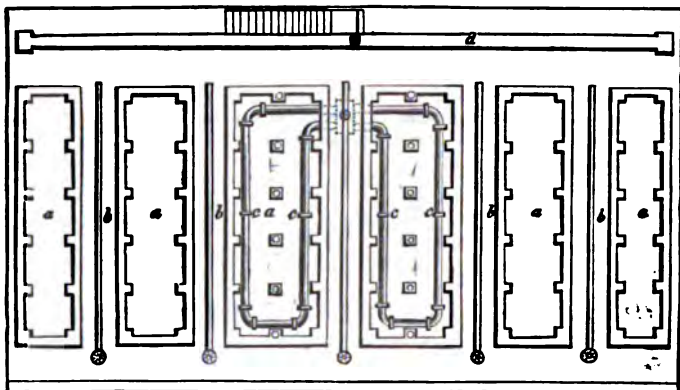
through tubes of iron, or chimney-pots (*d*), resting on the joists directly over the flue. Through the same pipes or pots water may be poured on the covers of the flues, which are formed (*e*) so as to generate steam at pleasure. Ventilation is effected by air-holes communicating with the pit, and by sliding shutters in the back wall (*g*).

2411. *Dutch forcing-pits* are of various kinds, all characterised by the most economical application of material, conservation of heat, and saving of labour. The leading features of these pits are the substitution of dung for fire-heat, and the complete covering

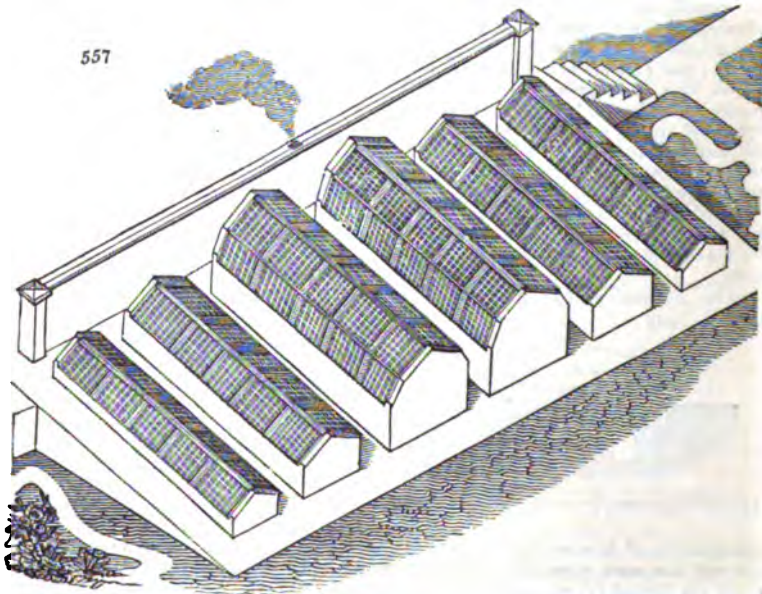
of the sides of the pit, up to the edge, with dung or litter. The coverings put over the glass during night are also much thicker than those in general use in this country. The plants are kept very close to the glass; and the glass is in very large panes, with very slight astragals. The great object is to prevent the escape of heat, and at the same time to admit all the light possible. All the details of the mode of constructing and managing these pits will be found in the *Gardener's Magazine*, vol. iii. p. 385.

2412. *Neve's meridian pits* (Figs. 556, 557, and 558.) are considered as an improvement on the usual forms, in point of elegance of appearance, and may therefore be adopted in situations where the proprietor is desirous of examining the progress of

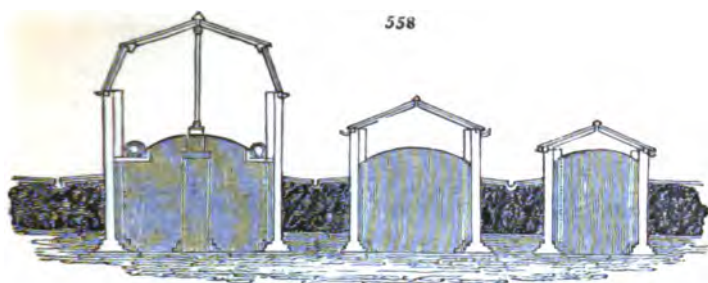
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vegetation in his pits and frames, without being annoyed by the unsightly appearance which, under a slovenly gardener, this part of the garden frequently presents. Fig. 556. (a a) represents plans for six pits; the spaces between each, being filled with dung to



a given height, may then be covered with planks, the centre of which should have a small cast-iron channel (b b) to take off the rain and drip from the pits, by which means the walks may be kept perfectly dry. To make it more complete, the planks should be covered with gravel, which would not only give them a natural appearance, but also



would prevent the heat escaping, except into the pits; and the dung would retain its heat much longer by being excluded from the external atmosphere: *cc* are pipes for hot water, to assist the heating of the two pine pits. The position of the boiler is shown by the dotted lines: *d* is a wall to shelter the pits from the north wind, &c. The entrance to the furnace should be at the back of this wall, by which means gardeners may attend the fire without coming in contact with any company who may be examining the plants, &c. The two centre pits may be used for growing pines, and the others for melons and cucumbers, or for forcing flowers. Fig. 557. is an isometrical projection of the pits, showing the inclination of them. The steps are to be at each end, to enable persons to ascend the upper or terrace walk without passing between the pits. Fig. 558. is a section of half the range.

SECT. II. Fixed Structures.

2413. *Fixed structures* consist chiefly of erections for the purpose of improving the climate of plants by shelter, by supplying heat, and by exposing them to the influence of the sun. The genera are walls and espalier rails, of each of which the species are numerous.

2414. *Garden-walls* are formed either of brick, wood, stone, or earth, or brick and stone together; and they are either solid, flued, or cellular, upright or sloping, straight or angular.

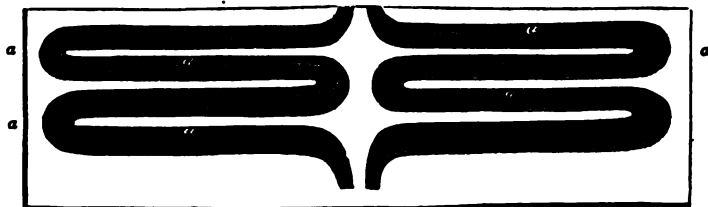
2415. *Brick, stone, or mud walls* consist of three parts; the foundation, the body of the wall, and the coping. The foundation should be somewhat broader than the body of the wall, and of depth proportionate to the quality of the subsoil or intended plan of culture. In some cases, where it is intended that the roots should have free access to both sides of the wall, it should be placed on arches or piers, with plank-stones, the soffit of the stone or under crown of the arch being within six inches or one foot of the surface; and the openings smaller or larger, according to the power of the materials to resist the pressure of the wall. The arch should be a segment of a circle, or an ellipsis; and the piers proportioned to the qualities of the foundation and the superstructure.

2416. *The brick and stone wall* is a stone wall faced with four inches of brickwork, or what is called *brick and bed*, on the side most exposed to the sun, as on the south sides of east and west walls; and on the insides, for the sake of appearance, of the two end or north and south walls of enclosed gardens.

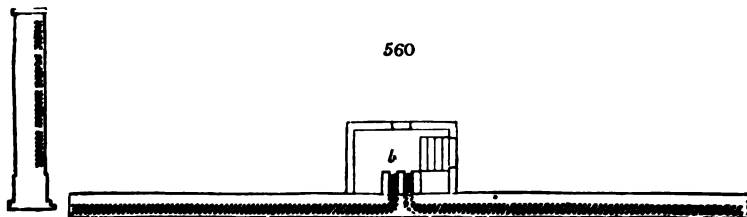
2417. *The solid brick wall* is the simplest of all garden walls; and, where the height does not exceed 6 ft., 9 in. in thickness will suffice; when above that, to 13 ft., 14 in.; and when from 13 ft. to 20 ft., 18 in. in width are requisite.

2418. *The flued wall, or hot wall* (figs. 559. and 560.), is generally built entirely of

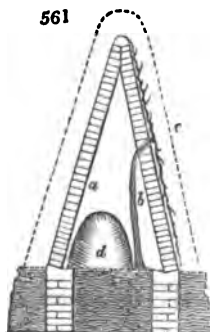
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brick; though, where stone is abundant and more economical, the back or north side may be of that material. A flued wall may be termed a hollow wall, in which the



vacuity is thrown into compartments (a a a) to facilitate the circulation of smoke and heat, from the base or surface of the ground to within one or two feet of the coping. They are generally arranged with hooks inserted under the coping, to admit of fastening some description of protecting covers (2369.), and sometimes for temporary glass frames. A length of 40 ft., and from 10 to 15 ft. high, may be heated by one fire, the furnace of which (b), being placed 1 or 2 ft. below the surface of the ground, the first course or flue (c) will commence 1 ft. above it, and be 2 ft. 6 in. or 3 ft. high; and the second, third, and fourth courses (d, e, f) narrower as they ascend. The thickness of that side of the flue next the south or preferable side should, for the first course, be 4 in., or brick and bed; and, for the other courses, it were desirable to have bricks cast in a smaller mould; say, for the second course, 3 in.; for the third, 2½ in.; and for the fourth, 2¼ in. in breadth. This will give an opportunity of bevelling the wall; and the bricks, being all of the same thickness, though of different widths, the external appearance will be every where the same. Sometimes a vacuity is formed between the flue and the south or valuable side of the wall (*Hort. Trans.*, vol. iv. p. 139.); but this, we think, may be considered an extravagant refinement. It cannot be carried into execution without employing a great quantity of materials and much labour. A wooden or wire trellis is also occasionally placed before flued walls; but both modes suppose a degree of forcing which does not appear advisable, unless the wall is kept constantly covered with glass; in which case, without this precaution, constant fires might injure, by occasioning the partial growth of the trees, or even burning those parts of them immediately opposite the furnace. To prevent accidents of this kind, the furnace must always be placed at some distance, say from eighteen inches to three feet from the back of the wall. An improvement has been made in flued walls by Mr. Shiells, of Erskine

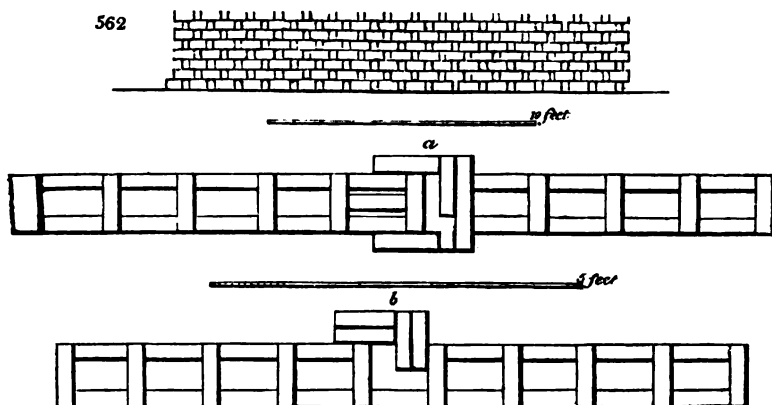


House, Renfrewshire, by the introduction of a register to admit, at pleasure, a part of the smoke and heat from the fire directly into the second course of flues. Where the mode of heating by hot water or steam, however, is properly understood, one tube along the bottom of the wall, conveying either of these fluids, will be found far preferable to the best smoke-flue. (*Gard. Mag.*, vol. viii. p. 670.)

2419. A wide-bottomed hollow wall (fig. 561.) has been suggested by a writer in the *Gardener's Magazine*. It consists of two 4-inch brick walls (a, b), worked in cement, 12 ft. high, 5 ft. apart at the bottom, and gradually approaching to the top, where it terminates in the width of a brick. The trees are planted inside, and their stems are taken through small openings at about half the height of the wall. There are iron rods (c) for covering the whole with a curtain during the blossoming season; and heaps of stable dung, or any other fermenting substance (d), may be laid down for supplying heat. (*Gard. Mag.*, vol. ii. p. 7.)

2420. The cellular wall (fig. 562.) differs from the flued wall, in having the wall built hollow, or at least with communicating vacuities equally distributed from the surface of the ground to the coping. (*Hort. Trans.*, vol. iv.) If the height does not exceed 10 or 12 feet, these walls may be formed of bricks set on edge, each course or layer consisting of an alternate series of two bricks set edgewise, and one set across, forming a thickness of nine inches, and a series of cells, nine inches in the length of the wall, by three inches broad. The second course is laid in the same way, but the bricks alternate or break joint with the first. The advantages of this wall are obviously considerable in the saving of material, and in the simple and efficacious mode of heating; but the bricks and mortar must be of the best quality. This wall has been tried in several places near Chichester, and at Twickenham, by F. G. Carmichael: it is found to succeed perfectly as a hot-wall, and at 10 feet high to be sufficiently strong as a common garden-wall, with a saving of one brick in three. As a whole, indeed, it is stronger than a solid nine-inch

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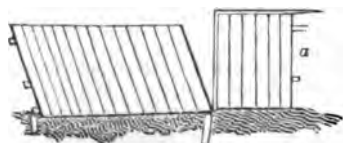
wall, on the same principle that a hollow tube is less flexible than a solid one. It is evident, that the same general plan might be adopted in forming cellular walls of greater height, by increasing their width. A very high wall might have two systems of cells divided vertically, one or both of which might be heated at pleasure. The same idea may be advantageously applied to flues for heating hot-houses by steam, and for other purposes. Piers may be formed either on both sides of the wall (a), or on one side by bricks on edge (b), so as to bond in with the rest of the work.

2421. *Hollow walls* may also be formed by using English instead of Flemish bond; that is, laying one course of bricks along each face of the wall on edge, and then bonding them by a course laid across and flat. Such a mode has been practised and described by Dearn, an architect in Kent.

2422. *Where wall-fruit is an object of consideration*, the whole of the walls should be flued or cellular, in order that in any wet or cold autumn, the fruit and wood may be ripened by the application of gentle fires, night and day, in the month of September. It is an error to light the fires of hot-walls only in the evenings, the effect of heat in the process of maturation being much greater when accompanied by light. In all hot-walls one precaution must not be neglected, the building in, on the inferior or outer side, small cast-iron doors, or framed stones, which may be opened at pleasure, in order to withdraw the soot. They must be made perfectly air-tight, which is readily accomplished by having double cast-iron doors, in what is called Count Rumford's manner.

2423. *The mud or earth-wall* is formed of clay, or better of brick earth in a state between moist and dry, compactly rammed and pressed together between two movable boarded sides retained in their position by a frame of timber, which form between them the section of the wall; these boarded sides are placed inclining to each other so as to form a wall tapering as it ascends. One layer of the length of twelve or twenty feet being completed, another layer is formed on that, and so on, till the wall attains the given height, which in the Netherlands, and some parts of Germany, where these walls prevail, is seldom above ten feet. A succinct account of the mode of forming these walls in Devonshire will be found in our *Encyc. of Cottage, Farm, and Villa Architecture*, § 839.

2424. *Boarded or wooden walls* (fig. 563. a) are variously constructed. One general rule is, that the boards of which they are



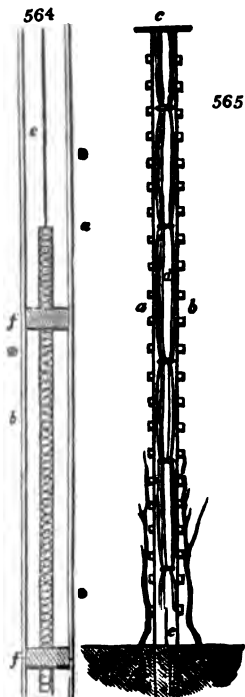
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composed should either be imbricated or close-jointed, in order to prevent a current of air from passing through the seams; and in either case they should be well nailed to the battens behind, in order to prevent them from warping from the sun. When well tarred and afterwards pitched, such walls may last many years. They must be

set on stone posts, or the main parts or supports formed of cast iron. Nicol informs us (*Kalendar*, p. 149.) that he has "constructed many hundred lineal feet of wooden walls, which recline considerably towards the north (fig. 563. b), presenting a surface at a better angle with the sun than if they were upright. They are placed on sloping ground, and range in five ranges or lines, due east and west, at the distance of seven yards from each other, the southmost being five feet high, and the northmost seven, composed of imbricated boards, pitched over to give them durability; the supports are

set on (not in) blocks of stone, which are sunk in the earth, and firmly laid on solid foundations, three feet under the ground level."

2425. *Temporary walls and screens* may be formed of reeds, rushes, or straw. What is called a reed wall (fig. 564 and 565.) may be described as 10 ft. high, and consisting of a double trellis (a, b), composed of horizontal lathes about 8 in. apart, and a coping board (c) 9 in. broad; the reeds are placed endwise within the trellis (d), and supported about a foot from the ground, to keep them from rotting; this interval of a foot being filled up with slates, placed on edge (e). The trellis rods are nailed to posts (fig. 565.), and, by taking off a few of these rods on one side, the reed mats can be removed and renewed. Russian mats would, no doubt, answer very well, and last a long time, and they might be taken out with still less trouble. Straw mats would also do, where reeds could not be got; and heath, as being of a dark colour and very durable, would make the best of all structures of this kind. Peaches, grapes, and other fruits, ripen just as well on these structures as on brick walls.

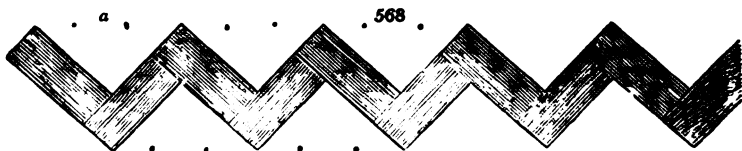


2426. *Inclined fruit-walls* seem to have been first suggested about the beginning of the eighteenth century, by N. F. De Douillier, F. R. S., an able mathematician, author of a work entitled *Fruit-walls improved by inclining them to the Horizon*, &c. Some walls were formed at Belvoir Castle on this plan, which Switzer informs us he went to see, but found them damp, and the trees liable to be injured by perpendicular frosts. De Douillier's work, as being the production of a speculative theorist (he was tutor to the Marquis of Tavistock), appears to have been rejected by Miller, Switzer, Lawrence, and the designers of gardens of that day, but it is replete with ingenuity and mathematical demonstration, and well illustrates the importance of sloping walls where they are to be protected by glass or gauze. In a communication to the Horticultural Society (vol. iv. p. 140.), by Stoffels, gardener at Mechlin, he states, "that he had an opportunity of comparing the effect of a sloping and perpendicular wall in the same garden, for the growth of peach trees, and that the result was greatly in favour of the former."

2427. *The wavy or serpentine wall* (fig. 566.) has two avowed objects; first, the saving of bricks, as a wall in which the centres of the segments composing the line are fifteen feet apart, may be safely carried fifteen feet high, and only nine inches in thickness from the foundations; and a four-inch wall may be built seven feet high on the same plan. The next proposed advantage is shelter from all winds in the direction of the wall; but this advantage seems generally denied by practical men.



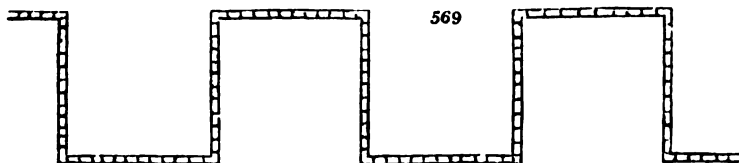
2428. *The angular wall* (fig. 567.) is recommended on the same general principles of shelter and economy as above.



2429. *The zig-zag wall* (fig. 568.) is an angular wall in which the angles are all right angles, and the length of their external sides one brick, or nine inches. This wall is built

on a solid foundation, one foot six inches high, and fourteen inches wide. It is then commenced in zig-zag, and may be carried up to the height of fifteen or sixteen feet of one brick in thickness, and additional height may be given by adding three or four feet of brick on edge. The limits to the height of this wall are exactly that of a solid wall of fourteen inches thick; that being the width of the space traversed by the angles or zig-zag.

2430. *The square fret wall (fig. 569.)* is a four-inch wall like the former, and the ground-plan is formed by joining a series of half-squares, the sides of which are each of the proper length for training one tree during two or three years.

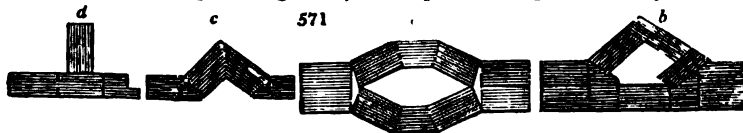


2431. *The nurseryman's, or self-supported four-inch wall (fig. 570.),* is formed in lengths of from five to eight feet, and of one brick in breadth, in alternate planes, so that the points of junction form in effect piers nine inches by four inches and a half.

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2432. *The pierced wall (fig. 571.)* may be of any thickness, with piers generally of double that thickness, placed at regular distances, and seldom exceeding the wall in height, unless for ornament. These piers are generally made square in the plan; but they have been



found to be less obstructive to the training of trees, when rounded at the angles (*a*); or angular (*b*), and either hollow, or effected by deviation (*c*). The same remark will apply to piers formed partly to support the wall, but principally, as in the gardens laid out by London and Wise, Bridgman, &c., for sheltering the fruit trees. Where training is not a leading object, a thin deep projection (*d*) is much stronger as a whole, than the clumsy square piers generally formed by routine practitioners.

2433. *Sheltering piers* were formerly, in some cases, made of such a width and depth as to contain a niche for training a vine, and, in that case, they were frequently raised above the coping of the wall. Examples of such piers exist in the walls of the kitchen-garden at Claremont, built from the designs of Brown, and at Hatton, in Scotland, built after a design by London and Wise.

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2434. *Arched, niched, or recessed walls (fig. 572.)* were contrived for the same purpose by Switzer, and, at least, had a massive imposing effect to the eye. Such walls were generally heated by flues, and formed in fact the intermediate link in the progress of improvement between hot walls and forcing-houses.

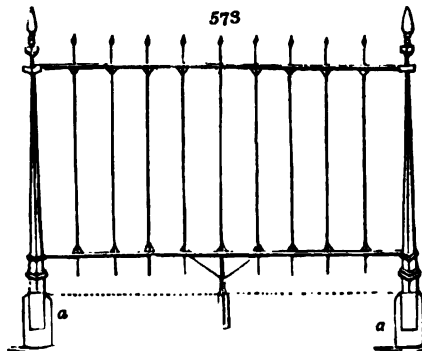
2435. *Trellised walls* are sometimes formed when the material of the wall is soft, as in mud walls; rough, as in rubble-stone walls, or when it is desired not to injure the face of neatly finished brickwork. Wooden trellises have been adopted in several places, especially when the walls are fluted; and wire has also been used.

2436. *Espalier rails* are substitutes for walls, and which they so far resemble that trees are regularly spread and trained along them, are fully exposed to the light, and, having their branches fixed, are less liable to be injured by high winds. They are formed of wood, cast iron, or wire and wood.

2437. *The wooden espalier*, of the simplest kind, is merely a straight row of stakes driven in the ground at six or eight inches asunder, and four or five feet high, and joined and kept in a line at top by a rail of wood, or iron hoop, through which one nail is driven into the heart of each stake.

2438. *The framed wooden espalier rail* is composed of frames fitted with vertical bars at six or eight inches asunder, which are nailed on in preference to mortising, in order to preserve entire the strength of the upper and lower rails.

2439. *The cast-iron espalier rail* (fig. 573.) resembles a common street railing, but it is made lighter. The columns or styles may either be fixed in oak or stone (a a); or, when this mode is not adopted, to form their base in the shape of a reversed J, setting them on a foundation of four-inch brickwork.



2440. *Double espalier rails*, of various kinds, have been adopted, and found economical, from their giving a double surface for branches. They are generally from eighteen inches to two or three feet wide, on the ground-line; four or five feet high, and meeting in a point at top, so that the section of one of these espalier rails is that of an acute-angled triangle.

2441. *Of fixed structures*, the brick wall, both as a fence, and retainer of heat, may be reckoned essential to every kitchen-garden; and in many cases the mode of building them hollow may be advantageously adopted.

SECT. III. Permanent Horticultural Structures.

2442. *Buildings with glass roofs*, or artificial habitations for plants, constitute by far the most important part of garden structures, whether we regard the expense of their first erection, the skill required to manage them, or the interesting nature of their products.

2443. *Green-houses were known in this country in the seventeenth century*, and appear to have been first constructed by Solomon Caus at Heidelberg, in the year 1619. (See § 599.) They were then, and continued to be, in all probability, till the beginning of the eighteenth century, mere chambers, distinguished by more glass windows in front than were usual in dwelling-rooms. Such was the green-house in the apothecaries' garden at Chelsea, mentioned by Ray, in 1684 (*Letters*, p. 174.), as being heated by hot embers put in a hole in the floor; a practice still extant in some parts of Normandy, and to which, as is well known, the curfew, or *couvre-feu* bell refers. The same general form of house, with the addition of a furnace or oven, is given by Evelyn in the different editions of his *Kalendarium*.

2444. *The first era of improvement* may be dated 1717, when Switzer published a plan for a forcing-house, suggested by the Duke of Rutland's graperies at Belvoir Castle. Miller, Bradley, and others, now published designs, in which glass roofs were introduced; and between the middle and the end of the last century, Speechly and Abercrombie in England, and Kyle and Nicol in Scotland, made various improvements in forcing-houses, as to general form, internal arrangements, and mode of heating. The largest plant-stoves were the joint productions of the late W. Aiton, and Sir W. Chambers at Kew, and the largest pineries were erected at Welbeck by Speechly.

2445. *A second era of improvement* may be dated from the time when Dr. Anderson published a treatise on his patent hot-house, and from the publication of Knight's papers in the *Horticultural Society's Transactions*, both of which happened about 1809. Not that the scheme of Dr. Anderson ever succeeded, or is at all likely to answer to the extent imagined by its inventor; but the philosophical discussion connected with its description and uses excited the attention of some gardeners, as did the remarks of Knight on the proper slope of glass roofs (*Hort. Trans.*, vol. i.); and both contributed, there can be no

doubt, to produce the patent hot-houses of Stewart and Jorden, and other less known improvements. These, though they may now be considered as reduced *au mérite historique*, yet were really beneficial in their day. Knight's improvements chiefly respected the angle of the glass roof; a subject first taken up by Boerhaave about a century before, adopted by Linnæus (*Amœn. Acad.*, i. 44.), and subsequently enlarged on by Faccio in 1699, Adanson (*Familles des Plantes*, tom. i.) in 1763, Miller in 1768, Speechly in 1789, John Williams of New York (*Tr. Agr. Soc. New York*, 2d edit.) in 1801, Knight in 1806, and by some intermediate authors whom it is needless to name.

2446. *The last and most important era* is marked by the fortunate discovery of Sir G. Mackenzie, in 1815, "that the form of glass roofs best calculated for the admission of the sun's rays is a hemispherical figure." This may be considered as the ultimatum in regard to the principle and perfection of form; and has already given rise to many beautiful curvilinear structures.

2447. *The application of steam to the heating of hot-houses* appears first to have been attempted by Wakefield of Liverpool, in 1788, and afterwards effectually applied in the vault of a cucumber-house at Knowle, in that neighbourhood, by Butler, gardener to the Earl of Derby, in 1792. It made little progress till about 1816, since which it has extended rapidly; and wherever an extensive range of hot-houses are to be heated, it will be found a saving of fuel and labour, attended with less risk of over-heating or contamination by bad air.

2448. *The application of hot water to the heating of hot-houses* was first made by Bonnemain to the hot-houses in the *Jardin des Plantes*, about the time of the first French revolution, and in Britain, by Count Chabannes, at Mr. Scott's at Bromley, in 1816. It has been subsequently applied by Bacon and Atkinson at Elton and other places; but unquestionably the first application of hot water as a medium of heating both dwelling-houses and hot-houses in Britain was made by the Count Chabannes. (See *Gard. Mag.*, vol. iii.)

2449. *The grand cause of the improvements which have been made in hot-houses* may be traced to their being no longer, as formerly, under the control of mansion architects. To civil architecture, as far as respects mechanical and chemical principles, or the laws of the strength and durability of materials, they are certainly subject, in common with every description of edifice; but, in respect to the principles of design or beauty, the foundation of which we consider, in works of utility at least, to be "fitness for the end in view," they are no more subject to the rules of civil architecture than is a ship or a fortress; for those forms and combinations of forms, and that composition of solids and openings which are very fitting and beautiful in a habitation for man or domestic animals, are by no means fitting, and consequently not beautiful, in a habitation for plants. Such, however, is the force of habit and professional bias, that it is not easy to convince architects of this truth; for structures for plants are considered by them no further beautiful than as displaying not only something of architectural forms, but even of opaque materials. Fitness for the end in view, we repeat, is the basis of all beauty in works of use, and, therefore, the taste of architects, so applied, may safely be pronounced as radically wrong. — We shall consider the subject of hot-houses as to the principles of construction, external forms, and interior details.

SUBJECT. 1. *Of the Principles of Design in Hot-houses.*

2450. *To ascertain the principles of action*, it is always necessary to begin by considering the end in view. The object or end of hot-houses is to form habitations for vegetables, and either for such exotic plants as will not grow in the open air of the country where the habitation is to be erected; or for such indigenous or acclimated plants as it is desired to force or excite into a state of vegetation, or accelerate their maturation at extraordinary seasons. The former description are generally denominated green-houses or botanic stoves, in which the object is to imitate the native climate and soil of the plants cultivated; the latter comprehend forcing-houses and culinary stoves, in which the object is, in the first case, to form an exciting climate and soil, on general principles; and in the second, to imitate particular climates. The chief agents of vegetable life and growth are heat, light, air, soil, and water; and the merit of artificial climates consists in the perfection with which these are supplied.

2451. *Such heat as is required in addition to that of the sun is most generally produced* by the ignition of carbonaceous materials, which heat the air of the house, either directly when hot embers of wood are left in a furnace or stove, placed within the house, as in Sweden and Russia; mediately, as when smoke and heated air, from or passing through ignited fuel, is made to circulate in flues; or indirectly, when ignited fuel is applied to boil water, and the hot vapour, or the water itself, is impelled through tubes of metal or other conductors, either to heat the air of the house at once, as in most cases, or to heat masses of brickwork, sand, gravel, rubble, or earth, tan, or even water (*Hort. Trans.*, vol. iii.) which materials may afterwards give out the heat so acquired slowly to

the atmosphere of the house. But heat is also occasionally supplied from fermenting vegetable substances, as dung, tan, leaves, weeds, &c. applied either beneath or around the whole or a part of the house, or placed in a body within it.

2452. *In particular situations heat may be obtained from anomalous sources*, as in Iceland, Töplitz, and Matlock, from hot springs; and perhaps in some cases, especially in coal districts, from a basement composed of certain compounds of sulphur and iron, &c. Dr. Anderson (*Treatise on the Patent Hot-house*) proposed to preserve the superfluous heat generated by the sun in clear days, and to retain it in reservoirs placed under, above, or at one side of the house, re-admitting it as wanted to keep up the temperature; but the plan, though ingenious and philosophical, required too much nicety of execution, and the clear days in this country are too few to admit of adopting it as a substitute for heating by ignition. Heat must not only be produced in hot-houses, but its waste avoided, by forming as large a portion of the cover as possible of materials through which it escapes with difficulty, as far as this is consistent with other objects. Hence, in certain classes of houses, the side to the north is formed of opaque and non-conducting materials.

2453. *Light is admitted by constructing the roof, or cover, of transparent matter*, as oiled paper, talc, or glass (the last being found much the best material), joined to as small a proportion of opaque substances, as timber or metal, as is found consistent with the strength requisite to bear the weight of the glass, resist the accidents of weather, &c. All plants require perpendicular light, but some, as many succulents and others, which throw out, or are allowed to radiate their branches, require the direct influence of light on all sides; others naturally, as creepers or climbers, or artificially, when rendered creepers or climbers by the art of training on walls or trellises, require direct light on one side only; and hence it is, that, for certain purposes of culture, hot-houses answer perfectly well when the transparent covering forms only a segment of their transverse section, provided that segment meets the sun's rays at a large angle the greater portion of the growing season. This, of course, is subject to limitations and variations according to circumstances, and has given rise to a great variety in the external forms of hot-houses, and the angles of their roofs. It decides, however, the necessity of placing all houses whose envelope is not entirely transparent, with their glazed side to the south.

2454. *The introduction and management of light is the most important point to attend to in the construction of hot-houses.* Every gardener knows, that plants will not only not thrive without abundance of light, but will not thrive unless they receive its direct influence by being placed near to, or at no great distance from, the glass. The cause of this last fact has never been satisfactorily explained. (*Sowerby on Light and Colours*, 1816.) It seems probable that the glass, acting in some degree like the triangular prism, partially decomposes or deranges the order of the rays. It is an important fact, also, that light in nature is always accompanied by heat; and, therefore, it should not only be an object to admit the sun's direct rays in clear weather, when he is visible, but even when the rays are refracted and deranged by clouds and vapours, when he is invisible.

2455. *The theory of the transmission of light through transparent bodies is derived from a well known law in optics*, that the influence of the sun's rays on any surface, both in respect to light and heat, is directly as the sine of the sun's altitude; or, in other words, directly as his perpendicularity to that surface. If the surface is transparent, the number of rays which pass through the substance is governed by the same laws. Thus, if 1000 rays fall perpendicularly upon a surface of the best crown glass, the whole will pass through, except about a fortieth part, which the impurities of even the finest crystal, according to Bouguer, will exclude; but if these rays fall at an incidental angle of 75°, 299 rays, according to the same author, will be reflected. The incidental angle, it will be recollected, is that contained between the plane of the falling or impinging ray, and a perpendicular to the surface on which it falls.

2456. *The benefit derived from the sun's influence on the roofs of hot-houses depends, as far as respects form of surface, entirely on this principle.* Boerhaave applied it to houses for preserving plants through the winter, and of course required that the glass surface should be perpendicular to the sun's rays at the shortest day, when most heat and light were required. Miller (*Dict. art. Sax*) applied it to plant-stoves, and prefers two angles in the roof; one, as the upright glass, to meet the winter's sun nearly at right angles, and the other, as the sloping glass, to meet him at an angle of 45° for summer use, and "the better to admit the sun's rays in spring and autumn." Williamson (*Hort. Trans.*, vol. i. p. 161.) prefers this angle (45°) in all houses, as do most gardeners, probably from habit; but Knight prefers, in forcing-houses at least, such a slope of roof as shall be at right angles to the sun's rays, at whatever season it is intended to ripen the fruit. In one of the examples given (*Hort. Trans.*, vol. i. p. 99.), his object was to produce a large and highly flavoured crop, rather than a very early crop of grapes; and he accordingly fixed upon such a slope of roof as that the sun's rays might be perpen-

dicular to it about the beginning of July, the period about which he wished the crop to ripen. The slope required to effect this purpose in latitude 52° , he found to form an angle of 34° with the plane of the horizon. In the application of the same principle to the peach-house (*Hort. Trans.*, vol. i. p. 206.), in order to ripen the fruit about mid-summer, the roof was made to form an angle with the horizon of 28° . Both these houses, Knight assures us, produced abundant crops perfectly ripened.

2457. *As data to determine the angles of glass roofs*, the following are laid down by Wilkinson. The angle contained between the back wall of the forcing-house, and the inclined plane of the glass roof, always equals the sun's altitude, when his rays fall perpendicularly on that plane, provided that the inclination of the plane to the horizon be at an angle not less than $28^{\circ} 2'$, nor greater than 75° . Within the above limits, the sun's rays are perpendicular twice in the year, once in going to, and once in returning from, the tropic. Hence, then, having determined in what season we wish to have the most powerful effects from the sun, we may construct our houses accordingly, by the following rule:— Make the angle contained between the back wall of the house and its roof equal to the complement of latitude of the place, less or more the sun's declination for that day on which we wish his rays to fall perpendicularly. From the vernal to the autumnal equinox, the declination is to be added, and the contrary. Thus, to apply these principles to the slope of roof recommended by Knight, for ripening grapes in July; say at London we have

Latitude of London	-	-	$51^{\circ} 29'$
Sun's declination on the 21st July	-	-	$17^{\circ} 31'$

$33^{\circ} 58'$, or 34° nearly.

Wilkinson adds, that "as we want the genial warmth of the sun most in spring, therefore, for general purposes, that construction would perhaps be best which gives us the greatest quantity of perpendicular rays then. If the inclination were 45° , the sun's rays would be perpendicular about April 6th and September 4th. And as the rays would vary very little from the perpendicular for several days before and after the 6th of April and September 4th, the loss of rays arising from reflexion would, as appears from the annexed table, be nearly a minimum. Even at the winter solstice, the loss by the obliquity of the angle of incidence would be only two in 1000 more than when the rays fall perpendicularly, as appears by Bouguer's Table of Rays reflected from Glass.

Of 1000 incidental rays when the angle of incidence is

$87^{\circ} 30'$	584 are reflected.	75°	299 are reflected.	40°	34 are reflected.
85	543	70	223	30	27
82 30	474	65	157	20	25
80	412	60	113	10	25
77 30	356	50	57	1	25"

Hort. Trans., vol. ii. p. 227.

When, in addition to this, it is considered, that the slope of 45° is the least that will effectually drain the water from the intervals between the lapping over of the panes of glass, that angle appears to us, as Williamson suggests, decidedly the best slope for general purposes.

2458. *Air* is supplied by the portion of the atmosphere enclosed in the structure. This air may be raised in temperature, charged with vapours, or renewed, at the will of the operator. It might also be put in motion by art, for the sake of obtaining strength of stem in ramose or tree-like plants; but the motion communicated to plants, by opening the cover, and exposing them to the direct influence of the air in fine weather, is deemed sufficient, either for this purpose, or for giving flavour to fruits when advancing to maturity.

2459. *Soil*, it must be obvious, is perfectly within the control of art, which, in fact, can far surpass nature, when increased dimensions of the parts of plants and improved quality of fruit are objects.

2460. *Water* is equally at our command with soil: it may be made to pass through the house in a surface-rill; or under the soil in subterraneous channels; may be retained in a cistern or basin; or introduced in tubes, either to throw up innumerable jets from the floor, or pour them down from the roof to serve as rain. It may be supplied directly to the roots of plants, without wetting their leaves, in the manner of irrigation; be stagnated round them, as in natural marishes, or made to ascend as vapour from steam-pipes, by pouring it on flues or hot bodies, or even watering the floor or interior surface of the house. Having ascended, and filled the air, it parts with its caloric, and is precipitated on the plants in the form of dew.

SUBJECT. 2. *Forms of Hot-house Roofs.*

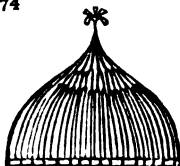
2461. *The general form and appearance of the roofs of hot-houses was, till very lately, that of a glazed shed or lean-to; differing only in the display of lighter or heavier framework or sashes. But Sir George Mackenzie's paper on this subject, and his plan and elevation of a semi-dome (Hort. Trans., vol. ii. p. 175.), have materially altered the opinion of scientific gardeners. Knight made the first observations on this figure. Sir George Mackenzie's plan for forcing-houses, he observes, is extremely interesting; but contains "some defects which cannot be obviated without deviating from the spherical to the spheroidal form, which Sir George states to be objectionable, on account of the great nicety requisite in the workmanship. On making a few trials, to ascertain the varieties of forms which might be given to forcing-houses, by taking different segments of a sphere, Mr. Knight soon became perfectly satisfied that forcing-houses, of excellent forms, for almost every purpose, and of any convenient extent, might be constructed without deviating from the spherical form.*

2462. *Some forms of hot-houses on the spheroidal curvilinear principle shall now be submitted, and afterwards some specimens of the forms in common use; for common forms, it is to be observed, are not recommended to be laid aside in cases where ordinary objects are to be attained in the easiest manner; and they are, besides, the forms of the most convenient roofs for pits, frames, and glass tents, as already exemplified in treating of these structures.*

2463. *The acuminate semi-globe (fig. 574.).*



574

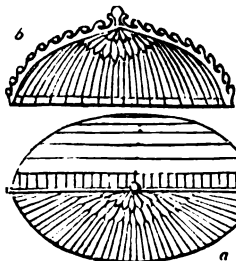


The most perfect form of a hot-house is indisputably that of a glazed semi-globe. Here plants, as far as respects light, would be nearly in the same situation as if in the open air; and art, as already observed (§ 2451.), can add heat, and all the other agents of vegetation, nearly to perfection. But in respect to excluding the rain, the semi-globe is too flat at top, and requires to be acuminate; and in

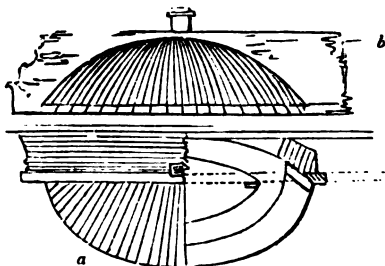
regard to economy, the first cost and expense of maintaining an artificial heat against its constant abduccion through a thin medium, exposed to the north winds, would, for most purposes, be a great objection.

2464. *An acuminate semi-dome, or a vertical section of the last figure, placed against a wall built in a direction from east to west, removes a great part of the objection as to heat, and will still admit an adequate supply of light to plants kept constantly in the same position, or turned very frequently. This, therefore, may be reckoned the second best form for a plant-habitation for general purposes, and without reference to particular modes of culture.*

2465. *The semi-ellipse (fig. 575.) is a figure which, in the plan (a a), displays half an ellipsis, or oval, and in the superstructure (b b) one fourth part of the solid figure. Its advantage over a semi-dome is, that, whether the trees are to be trained on a trellis parallel*

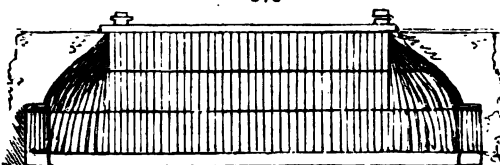
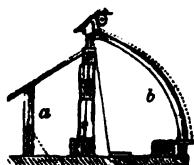


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to the glass, or against the back wall, a greater surface for training is obtained in proportion to the volume of cubic air to be heated. On the other hand, its glass surface is less perfect in respect to perpendicularity to the sun's rays; though in this respect the difference is not of great consequence. Houses of this sort, Adanson informs us, are of Dutch invention. As the sun retired from them in the afternoon, the eastern parts of the ellipse, as they fell successively into shade, were covered with reeds or mats; and, in like manner, in the morning the east end was uncovered first, and the west end only as the sun came round on it. (*Familles des Plantes*, vol. i. pref.)

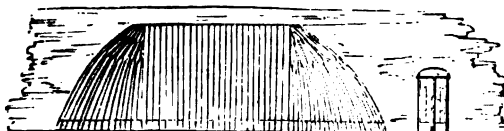
2466. *The parallelogram with curved roof and ends (fig. 576.) is one of the most con-*



venient forms of curvilinear roofs for the common purposes of culture, as it admits of more regular figures of beds, paths, trellises, &c. within, and of every variety of dimension. In regard to light, heat, and beauty, they do not differ materially from the semi-ellipses. Of this form, a considerable number of forcing-houses, and some green-houses, have been erected. Among the latter may be noticed one for Messrs. Loddiges, and another for the Horticultural Society.

2467. *The ridge and furrow roof* may be effected either in curvilinear or right-lined hot-houses; and consists in placing the bars in the rebates of which the glass is put, in such a manner as that the section of the roof may always be a zigzag line, in which the space traversed by each side or zig may either contain several bars, or merely one pane of glass.

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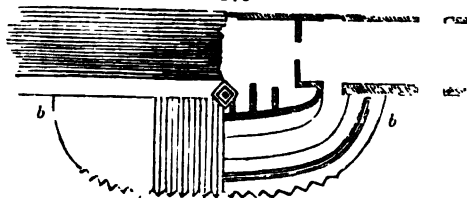


glazing in these parts of the roof, unless with a view to resist a weight of snow. While the parallelogram part of the roof, therefore, is ridged (fig. 578. *a a*), the ends will present a smooth surface

2468. *The general form and appearance of a ridge and furrow house* (fig. 577.) is not materially different from that of others. Where the curved end is adopted, it will not be necessary to deviate from the common mode of

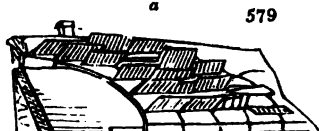
(fig. 578. *b b*). 2469. *The polyprosopic hot-house* (fig. 579.) resembles a curvilinear house, but differs in having the surface thrown into a number of faces; the chief advantages of which are, 1. That by hinging all the different faces at their upper angles, and by having rods connect-

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necting the lower outside corners of the faces terminating in chains which go over pulleys in the top or above the back wall, the whole roof, including the ends, may be opened or raised sympathetically, like Venetian blinds (fig. 579. *a*), either so as each sash or face

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may be placed in the plane of the angle of the sun's rays at the time, or to the perpendicular, to admit a shower of rain. In consequence of this arrangement, the plants in a polyprosopic house may, at any time, and in a few minutes, be placed in effect, or as far as respects light, air, wind, rain, dew, &c., in the open air; and, being so placed, may, whenever desired, be as speedily restored again to their proper climate. The arrangement by which this is effected, and which is perfectly simple, is applicable to every form of hot-house, whether of glass on all sides, on two, or on three sides; or whether the roof is formed of curved or straight lines. We consider it, indeed, to be the *as plus ultra* of improvement, as far as air and light are concerned. One objection to all curvilinear forms in this respect is, that the roof, unless a considerable expense be incurred, must be fixed, and air admitted by horizontal wooden or glazed shutters in the parapets, or between the props, and allowed to escape by skylights or shutters at the top of the back

wall; but here the air is equally admitted in every part of the house, in the most natural manner, without the creation of currents or eddies, and without excluding any more sun than will be obstructed by the thickness or edge of the sashes or sashes. In like manner, a great objection to straight-lined roofs with sliding sashes is, that air can only be partially admitted, and that, while this is being done, one glazed frame being slid over the other in all those parts where there is a double portion of glass, a double portion of light must be excluded; and, as opticians are aware, the light so transmitted will be doubly decomposed, by passing through two surfaces of glass.

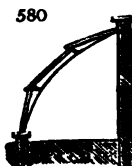
2470. *This roof, with respect to the sun's rays*, may be considered as exactly equivalent to a curvilinear figure whose curve lines shall touch all the angles of the faces, so that the sun in general would be nearly perpendicular to some one face every hour in the day, and every day in the year.

2471. *Lean-to glass roofs* are of various sorts. The simplest and most economical hot-house of this description may be compared to a large pit. The back and front walls and ends being of masonry, and a sloping side above of glass, and either fixed or movable; if fixed, then air is admitted by openings in the front wall and top of the back wall; if movable, the sashes slide, or are moved in grooves, the lower one being drawn up, and the upper sash let down. Such a house will succeed perfectly well for grapes and pines. The first improvement on this form consists in forming moving glass frames in front, instead of the opaque wall of masonry and shutters; a second consists in adding glass ends; a third, in forming the roof into two slopes; and a fourth, in bevelling the positions of the front sashes, and forming the whole roof into three different slopes, the lower for receiving the sun's rays in winter; the second for spring and autumn; and the third, for midsummer.

SUBSECT. 3. *Details of the Construction of Roofs, or the glazed Part of Hot-houses.*

2472. *The glazed segment, or cover*, may either be wholly fixed, wholly movable, or partake of both modes. Each of these varieties may be considered in respect to component parts and materials.

2473. *Fixed roofs* are either formed of a series of bars of iron or wood, proceeding at once from the front parapet to the back wall; or from the base to the centre, or they may be composed of sashes placed beside each other, or between rafters, as in common lean-to houses. Roofs of this fixed kind have been approved of by Knight for vines; by Beattie, of Soone, for peaches; and by most cultivators for the culture of pines and palms; but, except for the two latter purposes, the general experience of gardeners is (in our opinion, very justly) against them. It is to be observed, that, in all cases of fixed roofs, shutters for ventilation are formed in the parapet, and in the upper part of the back wall immediately under the roof. Economy in first cost, and less breakage of glass afterwards, are the chief arguments in their favour; the latter advantage, however, is generally denied, it being improper glazing rather than the moving of the sashes, which occasions the breakage of glass.



2474. *Movable roofs* are generally composed of sashes six or eight feet long, and three or four feet wide, which slide over each other, and are moved by cords and pulleys, and sometimes balanced by weights, to facilitate their motion; but they are also occasionally formed of sashes which open outwards by means of iron levers at their lower extremities, and hinges at their upper angles (*fig. 580.*), in the manner of the polyprosopic house (*fig. 579.*).

2475. *Roofs partaking of both characters* generally have a few sashes which let down or rise up in the roof or front glass; or in the case of domes or acuminate roofs, the top part rises in the manner of a skylight.

2476. *The material of fixed roofs* is generally iron, as being less bulky in proportion to the strength required, most durable, and admitting, in the case of curvilinear roofs, a curvature to be formed at less expense than it could be of timber. In these roofs, in general, no other bars or opaque bearers are required than those for receiving the glass; and hence their simplicity and unity with regard to component parts, and the equal degree of transparency in every part of the surface.

2477. *The materials of movable roofs* are most commonly timber; but frequently also timber and iron, or timber and copper joined together. Thus cast-iron and wrought-iron rafters are frequently used; and in these are placed sashes with styles and rails of timber, and bars of copper, and of cast or wrought iron.

2478. *Arrangements for covering the roofs of hot-houses by boards, canvass, or mats*, to be lifted or rolled up or down, might be easily contrived, and advantageously used; but, except in pits and low hot-houses, they are not thought worth attending to; it being considered better to gain the admittance of all the light possible, than lose it for the sake of a little economy in fuel.

2479. *The pillars, or props*, which are placed on the parapet to support the rafters,

whether of timber or iron, are generally formed of the same thickness as the rafters, because similar sashes are placed between them.

2480. *Interior uprights*, to support wide roofs, are almost always of iron, either wrought-metal or small cast-iron columns, sometimes forming intersecting arches, or treillaged capitals, or connecting imposts for training creepers.

2481. *The wall-plate, or coping of the parapet*, is sometimes a plate of timber, sometimes of stone, and occasionally of cast-iron. Wherever upright glass is not employed, it must, of necessity, form also the guttering for the water of the roof; and, at the same time, for the water which condenses on the glazed inside of the house.

2482. *Objections to metallic roofs*. In general, it may be observed, that, till lately, gardeners had a prejudice against metallic roofs. We shall here, as briefly as possible, enumerate their objections; which are, expense, rust, breakage of glass, abduction of heat, and attraction of electricity.

Expense. Metallic houses are, in general, rather more expensive than wooden ones; but they admit more light, and are more durable and elegant.

Rust. That all ordinary metals are liable to rust, is undeniable. This objection cannot be got rid of. The reply is, balance against it the advantages of light and durability; and take into consideration, that careful painting will, in a great degree, prevent it. Knight observes, if one third of the sum requisite to keep a wooden roof properly painted be expended upon an iron roof, no injury will ever be sustained from the liability of that to suffer from rust. (*Hort. Trans.*, vol. v. p. 231.)

Breakage of glass. This is altogether denied, as respects cast or wrought iron, at least; and, if applicable at all, can only be so to copper or compound metallic roofs, where weakness produces a bending of the sash; or where corrosion or unequal expansion of improper mixtures of metals, as iron cased with copper, occasions a twisting of the bar. Cast-iron or solid wrought-iron frames have never been known to occasion the breakage of more glass than wood. The grand cause of the breakage of glass arises, in almost every case, from glazing with broad laps. The expansibility of copper is greater than that of brass, and that of brass greater than the expansion of iron, in the proportion of 95, 89, 60. (*Young's Lect.*) Consequently, copper is above one third part more likely to break glass than iron; but, when it is considered that a rod of copper expands only one hundred thousandth part of its length with every degree of heat; and that iron only expands the one hundred and sixty-six thousand six hundred and sixty-sixth part, the practical effects of our climate on these metals can never amount to a sum equal to the breakage of glass.

Abduction of heat. The power of metals to conduct heat is an objection which, like those of rusting and additional expense, cannot be denied. The reply is, the smaller the bars, the less their power of conducting; and a thick coat of paint, and the covering of half the bar by the putty requisite to retain the glass, also lessens this power: it is added, heat may be supplied by art; but solar light, the grand advantage gained by metallic bars, cannot, by any human means, be supplied otherwise than by the transparency of the roof.

Attraction of electricity. To this objection it is replied, that if metallic hot-houses attract electricity, they also conduct it to the ground, so that it cannot do any harm. Also, that no instance can be produced of iron hot-houses having been injured by the effects of this fluid.

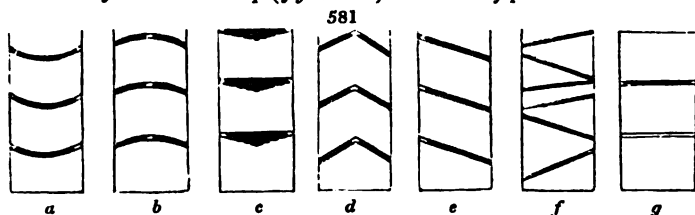
SUBSECT. 4. *Glazing of Hot-house Roofs.*

2483. *Glazing* was formerly performed with the very worst description of glass, called green glass; and, accordingly, Adanson, in 1710, recommends the adoption of Bohemian glass, then the best in Europe, but now equalled by our best *crown* or *patent crown* tables. If, as Bouguer has shown, one fortieth part of the light which falls perpendicularly on the purest crystal is reflected off; or does not pass through it, it may safely be asserted, that green glass reflects off more than three fourths. Economy, as to the quality of glass, therefore, is defeating the intention of building hot-houses, which is to imitate a natural climate in all the qualities of light, heat, air, water, earth, &c. as perfectly as possible. Without a free influx of light, the sickly pale etiolated appearance of plants is more painful than agreeable to the eye of any who take an interest in the vegetable kingdom. As the panes or pieces of glass employed in hot-house roofs lap over each other, the air which enters by the lap, when uneven glass is employed, or careless glazing performed, no doubt suggested the idea of closing the lap with lead or putty. But both these modes being found to prevent the water which collects on the inner surface of glass roofs, from escaping by the outside surface, gave rise, first to partially closing the lap, and subsequently to various forms of panes and descriptions of laps, of which the principal are as follow:—

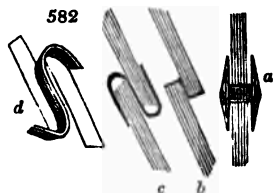
2484. *Common sash-glazing* is performed by even the best hot-house builders with a lap of from one fourth to three fourths of an inch; but by the great majority of glaziers,

with a full inch lap. The objection to this mode is, that the broader the lap, the greater the quantity of water retained in it by capillary attraction; and when such water, through a deficiency of heat in the house, is frozen, the glass is certain of being broken. But, supposing this breakage not to take place, the broader the lap, the sooner it fills up with earthy matter, forming an opaque space, both injurious by excluding light, and unpleasant because imperfect: or, if the lap is to be puttied, the opacity is the same. The accidental filling up of such spaces (when not puttied by art) with dust and earthy matter, is what prevents them from being broken, by excluding the water in a great degree. Where the lap is not more than one fourth of an inch, it may be puttied without a very disagreeable effect. The rectangular pane is the only form which can with propriety be admitted in curvilinear roofs; and the most approved practice as to the lap, whether in roofs or common sashes, is, never to make the lap greater than the thickness of the glass, and not to close it with putty. It is extremely difficult to get glaziers to attend to this; but, by employing superior workmen, and obliging them to remove every pane which shall project over the other more than one sixteenth of an inch, the thing may be accomplished. This is not only the most elegant of all modes for a curved roof, or indeed for any other, but the safest for the glass, which is, we repeat, seldom broken by any other natural means than the expansion of frozen water retained between the laps. It must not be forgotten that this form is also by far the easiest to repair, and that no mode of puttied or closing a narrow lap with lead is of long duration.

2485. *Glazing with a leaden lap (fig. 581. a) was formerly practised with a view of*



excluding the air by a more permanent material than putty. The sort of lap made use of was that used by glaziers in lattice-work windows (fig. 582. a). The panes being inserted in the grooves formed in the edges of the lap, were, of course, all in one plane; and the water, in running down either the outside or inside of the roof, must accumulate on the upper edge of each ribband or cross-string of lead, and so penetrate between it and the glass, and drop on the plants in the house. This, indeed, forms the chief objection to this leaden lap, which is now deservedly exploded.



2486. *An improved form of leaden lap (fig. 582. b) consists in using slips of lead rolled so thin as not to be thicker than fine drawing-paper, in connection with putty, and for the sole purpose of retaining it in its place. It is never allowed to project beyond the exterior edges of the glass, so that it readily permits the descent of the water. Its thinness renders it easily manageable, and the time employed in filling up such laps, when one man is stationed outside the glass, and another within, is not much more than that occupied in glazing a roof with the common putty lap. Such lead laps may either have a small opening in the middle or at the angles, and are equally applicable to any of the modes of glazing to be described. The lead is rolled to any width, and clipped or cut to the size wanted as used.*

2487. *The copper lap (fig. 582. c) is the invention of D. Stewart, and its origin may be recognised in the s shaped shred of lead introduced by glaziers between newly glazed panes, to retain them in their places (fig. 582. d). The lap is drawn through graduated moulds till at last it is brought into the shape of the letter s compressed. It adds greatly to the strength of glazing, by giving each pane a firm bearing on the upper and lower edges, and by preventing water from lodging between the panes.*

2488. *Fragment glazing (fig. 581. b). This is the primitive mode which was adopted by nurserymen and market-gardeners, before it was supposed that the productions raised under glass would pay for any thing better. In steep roofs it answers nearly as well as any other mode in respect to keeping out rain and air; but as a somewhat greater lap is required in these crooked or undulated pieces of glass, a flat roof is liable to be covered by dark lines, formed by the lodging of earthy matter in the laps or interstices.*

2489. *In rhomboidal glazing (fig. 581. c), the panes are in the form of rhomboids; the*

advantage of which is, that the water runs rapidly to the lower angle, and passes off both inside and outside along the bar; and what is retained by capillary attraction is alleged to be so small as not to have the power of breaking the glass.

2490. *Perforated shield glazing* (fig. 581. d). This is a supposed improvement on the last-described mode, which it would be, were it not that by the perforation in the upper part of the shield, as it is called, the dexter and sinister chiefs are liable to be broken off; and by the prolonged acumination of its base, it is rendered obnoxious to the same by casualty in the nomenclature point.

2491. *Entire shield glazing* (fig. 581. e). This plan has been used by Butler, a London hot-house builder; but it does not seem either to merit or obtain general adoption. It is difficult, indeed, to conceive what are the arguments in its favour beyond that of strength, though with a very great loss of light; and this strength may surely be better obtained by Stewart's lap.

2492. *Curvilinear lap glazing* (fig. 581. f). This mode appears, unless on very flat roofs, preferable to the common square mode, because the curve has a tendency to conduct the water to the centre of the pane. If the lap be broad, however, the globule retained there by attraction is situated precisely in the point where it is calculated to do most mischief, being, in fact, as a power on the end of two levers. When the lap is not more than one sixteenth of an inch, no evil of this sort can happen; it also happens less frequently for the first few years after putting the lap, and leaving a small opening in the centre for the water to escape.

2493. *Reversed curvilinear glazing* (fig. 581. g) is a method of throwing the water of condensation to the bars, so as to carry it off by their means, and, if possible, prevent it from dropping in the house.

2494. *Anomalous surfaces* can only be glazed by throwing the panes into triangles, and by no other manner, unless by annealing and bending the glass, because three is the greatest number of points that will touch a globular surface in one plane. By adopting triangular panes the most singular-shaped roofs may be glazed as perfectly as the simplest forms of surface.

2495. *Though the making of putty* be hardly within the gardener's province, yet it is fitting he should know that there are several sorts, of which the following are the principal:—

Soft putty, being a well-wrought paste of flour of whiting and raw linseed-oil;

Hard putty, composed of whiting and boiled linseed-oil;

Harder putty, in which a portion of turpentine, or what is called drying oil, is introduced; and the

Hardest putty, composed of oil, red or white lead, and sand. The first is the most durable of all, because it forms an oleaginous coat on the surface, but it requires a longer time for drying. The hard sorts are apt to crack, if not soon well painted; and the hardest of all, though it appears to be impenetrable, and of the greatest durability, yet renders it difficult to replace a pane when broken. It seems, therefore, quite unfit for hot-houses. Much depends on well working the putty some days before it is to be used; and in general, that putty which has been ground and wrought in a putty-mill is to be preferred.

SUBJECT. 5. Walls and Sheds of Hot-houses.

2496. *Walls* of some sort are necessary for almost every description of hot-house, for even those which are formed of glass on all sides are generally placed on a basis of masonry. But as by far the greater number are erected for culinary purposes, they are placed in the kitchen-garden, with the upper part of their roof leaning against a wall, which forms their northern side or boundary, and is commonly called the back wall, and the lower part resting on a low range of supports of iron or masonry, commonly called the front wall.

2497. *The parapet, or front wall*, of hot-houses comes first in order. Where upright sashes are used, there are generally brick walls, either carried up solid from the foundation, or built on piers, according as it may be desirable to have the roots of the plants within pass through to the soil without, or not. In the case of fixed roofs, that part of the wall which is above ground is formed with horizontal openings, to which opaque or glazed shutters are fixed, opening outwards, for the purpose of admitting air.

2498. *Holes for vine-stems*. In all parapets or front arrangements where vines are to be introduced from without, particular care must be had to provide for the withdrawing of the vines, even when their wood is of a considerable age and thickness. For this reason, where horizontal shutters are used, the lower styles or pieces against which they shut, should always be movable; and, in general, it may be stated, that of the various modes for the introduction of the vine from without, which have been adopted, that by cutting off a corner of the sloping or front sash is the best: by this means, when the sash is opened, a vine of almost any size may be taken out with ease. A piece of thin board or cork cut every year to fit the increasing diameter of the shoot is screwed to the wall-plate or lower style, as the case may be, and the vacuity, which must necessarily be left around the stem, is closed up with moss. When the vine is to be taken out, by unscrewing the triangular board, and opening the sash, or shutter, a more than sufficient space

for drawing out any ordinary-sized plant is obtained, without the least trouble or chance of fracturing the shoots.

SUBJECT. 6. *Furnaces and Flues.*

2499. *The most general mode of heating hot-houses is by fires and smoke-flues, and on a small scale: this will probably long remain so.* Heat is the same material, however produced, and a given quantity of fuel will produce no more heat when burning under a boiler than when burning in a common furnace. Hence, with good air-tight flues, formed of well burnt bricks and tiles accurately cemented with lime-putty, and arranged so as the smoke and hot air may circulate freely, every thing in culture, as far as respects heat, may be perfectly accomplished.

2500. *The hot-house fireplace, or furnace, consists of several parts: a chamber, or oven, to contain the fuel surrounded by brickwork, in which firebrick (a sort containing a large proportion of sand, and thus calculated by their hardness not to crumble by heat, &c.) is used; a hearth or iron grating, on which the fuel is laid; a pit or chamber in which the ashes drop from this grating, and iron doors to the fuel-chamber and ash-pit.*

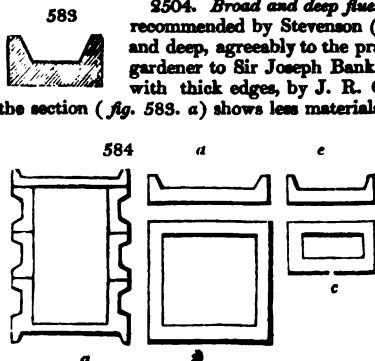
2501. *As to the size of hot-house fireplaces, the door of the furnace may be from ten inches to one foot square; the fuel-chamber from two to four feet long, from eighteen inches to two feet wide, and of the same dimensions as to height. Every thing depends on the kind of fuel to be used. For Newcastle coal, a chamber of two feet long, eighteen inches broad, and eighteen inches high, will answer as well as one of double the size, where smoky Welsh or Lancashire coal is to be used. Various contrivances, as hoppers, horizontal wheels, &c., have been invented for supplying fuel to furnace-fires without manual labour, and especially during night; but, from the nature of combustion, and the common materials used in this country to supply it, no effectual substitute has yet been discovered. If wood or charcoal, or even cinders or coke were used, there would be a greater chance of such inventions succeeding; but we do not think ourselves warranted in detailing any of them.*

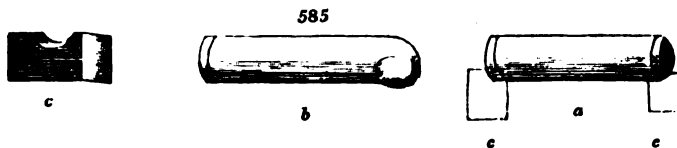
2502. *The modes of constructing flues are various. The original practice was to build them on the naked earth, like drains or conduits; or in the solid walls of the backs and fronts of the pits, like the flues of dwelling-houses. The first improvement seems to have been that of detaching them from the soil by building them on flag-stones, or tiles supported by bricks; and the next was, probably, that of detaching them from every description of wall, and building their sides as thin as possible. A subsequent amelioration consisted in not plastering them within, but in making their joints perfect by lime-putty, by which means the bricks were left to exert their full influence in giving out the heat of the smoke to the house.*

2503. *The sides of common flues are commonly built of bricks placed on edge, and the top covered by tiles, either of the full width of the flue outside measure, or one inch narrower, and the angles filled up with mortar, which Nicol prefers, as neater. Where a stone that will endure fire-heat without cracking is found to be not more expensive than tiles, it is generally reckoned preferable, as offering fewer joints for the escape of the smoke. Such stones are sometimes hollowed on the upper surface, in order to hold water for the benefit of plants in pots, or for steaming the house.*

2504. *Broad and deep flues, agreeably to the Dutch practice, have been recommended by Stevenson (Caled. Mem.); that of making them narrow and deep, agreeably to the practice in Russia, is recommended by Oldacre, gardener to Sir Joseph Banks; and that of using thin bricks (fig. 584.) with thick edges, by J. R. Gowen (Hort. Trans. iii.) In Gowen's flues, the section (fig. 583. a) shows less materials than any other brick flue, the covers (b) and the side wall bricks (c) being quite thin, the base requisite for building the latter on one another being obtained by the thickness of their edges (d, e), which is equal to that of common bricks.*

2505. *Can-flues (fig. 585.), long since used by the Dutch, embedded in sand, and for the last fifty years occasionally in England, are sometimes employed. They consist of earthen pipes, straight (a), or rounded at the ends for returns (b), and joined together by cement, placed on bricks (c). They are rapidly heated, and as soon cooled. None of the heat, however, which passes through them, can be said to be absorbed and lost in the mass of enclosing matter, as Knight and Sir Joseph Banks (Hort. Trans.) assert to be the case with common flues. They are only adapted for moderate fires, but, judiciously*





chosen, may frequently be more suitable and profitable than common flues; as, for example, where there are only slight fires wanted occasionally, or where there is a regular system of watching the fires; in which case, but not otherwise, the temperature can be regulated with sufficient certainty.

2506. *The best sort of flues*, after all that has been said on the subject, is, in our opinion, the common form, built of thin well-burned bricks neatly jointed, with the bottom and top of tiles, and no plaster used either inside or outside. Where only one course of a flue can be admitted, the broader it is the more heat will be given out as it proceeds, and, as a consequence, one extremity of the space to be heated will be hotter than the other; a return or double course of a narrow flue is, therefore, almost always preferable to one course of a broad flue.

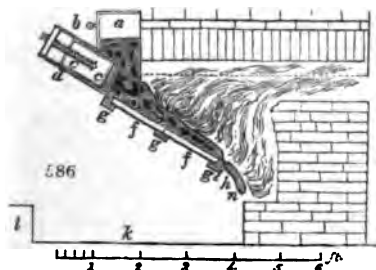
2507. *The size of flues* is seldom less than nine inches wide, by fourteen or eighteen inches high inside measure, which suits a furnace for good coal, whose floor or chamber is two feet long, eighteen inches wide, and eighteen inches high. According as the object varies, so must the proportion both of furnaces and flues.

2508. *The direction of flues*, in general, is round the house, commencing always within a short distance of the parapet, and after making the course of three sides, that is, of the end at which the fire enters, of the front, and of the opposite end, it returns (in narrow houses) near to or in the back wall, or (in wide houses) up the middle, forming a path; and in others, immediately over or along side of the first course. In all narrow houses this last is the best mode.

2509. *The power of flues* depends so much on their construction, the kind of fuel, the roof, mode of glazing, &c., that very little can be affirmed with any degree of certainty on this subject: 3000 cubic feet of air is in general enough for one fire to command in stoves or forcing-houses; and 5000 in lean-to green-houses. In houses exposed on all sides, 2000 cubic feet is enough in stoves, and 3000 cubic feet for green-houses. The safest side on which to err is rather to attach too little than too much extent to each fire, as excessive fires generally force through the flues some smoke or mephitic air; and besides produce too much heat at that part of the house where the flue enters.

2510. *Dampers, or valves*, are useful in flues and chimneys, both in case of accident and also to moderate the heat, or in case of one furnace supplying two flues, to regulate the passage of smoke and heat. For general purposes, however, the ash-pit door is perfectly sufficient. The damper, and furnace, and ash-pit doors ought seldom to be all shut at the same time, as such a confinement of the hot air of the flue is apt, owing to its expansion by increased heat from the hot masonry, to force some of it through the joints of the flue into the house.

2511. *Witty's improved smoke-consuming furnace*. The advantage of this furnace is, that, all the fresh coal supplied to it is carbonised by the heat from the burning coke, or carbonised coal below; the gas disengaged from the coal by the process of carbonisation being also inflamed by the heat. The coal is thus, instead of being burned in a crude state, subjected to carbonisation previously to combustion, and consequently does not produce smoke. In *fig. 586*, which is a section of the furnace, *a* is the hopper,



into which slack, or refuse coal is put through the door *b*; *d* is an oblong square box the width of the furnace, fitted with a screw and cross-bar, by which the pusher or presser, *c*, is moved backwards and forwards at pleasure, in order to let the coals down from the hopper, or to advance them forward down the inclined plane, *ff*, which is made of fine tile supported by cross-bearing bars, *gg*. The grate, *h*, swings on its centre, *i*, which may be placed at the most convenient angle, and supported by a brick placed in the opening at *n*,

which serves for clearing out the ashes and clinkers, when required; *k* is the ash-pit, and *l*, the steps leading to it. (*Gard. Mag.*, vol. vii. p. 483.)

SUBJECT. 7. *Steam Boilers and Tubes.*

2512. *Steam affords a simple and effectual mode of heating hot-houses, and, indeed, large bodies of air in every description of chamber; for no other fluid is found so convenient a carrier of heat.* The heat given out by vapour, differs in nothing from that given out by smoke, though an idea to the contrary prevails among gardeners, from the circumstances of some foul air escaping into the house from the flues, especially if these are over-heated or over-watered; and from some vapour issuing from the steam-tubes when these are not perfectly secure at the joints. Hence flues are said to produce a burnt or drying heat, and steam-tubes a moist or genial heat; and in a popular sense this is correct, for the reasons stated. It is not, however, the genial nature of steam heat which is its chief recommendation for plant-habitations, but the equality of its distribution, and the distance to which it may be carried. Steam can never heat the tubes, even close to the boiler, above 212 degrees, and it will heat them to the same degree, or nearly so, at the distance of 1000, 2000, or an indefinite number of feet. Hence results the convenience of heating any range or assemblage of hot-houses, however great, from one boiler, and the lessened risk of over or insufficient heating at whatever distance the house may be from the fireplace. The secondary advantages of heating by steam are, the saving of fuel and labour, and the neatness and compactness of the whole apparatus. Instead of a gardener having to attend to a dozen or more fires, he has only to attend to one; instead of ashes, and coal, and unsightly objects at a dozen or more places in a garden, they are limited to one place; and, instead of twelve paltry chimney-tops, there is only one, which, being necessarily large and high, may be finished as a pillar, so as to have effect as an object; instead of twelve vomiters of smoke and flakes of soot, the smoke may be burned by using Parkes's or some other smoke-consuming furnace. The steam-tubes occupy much less space in the house than flues, and require no cleaning; they may often pass under paths where flues would extend too deep; there is no danger of steam not *drawing*, or circulating freely, as is often the case with flues, and always when they are too narrow or too wide, or do not ascend from the furnace to the chimney; steam is impelled from the boiler, and will proceed with equal rapidity along small tubes or large ones, and descending or ascending. Finally, with steam, insects may be effectually kept under in hot-houses, with the greatest ease, by merely keeping the atmosphere of the house charged with vapour from the tubes for several hours at a time.

2513. *The disadvantages of steam as a vehicle for conveying heat to hot-houses are few.* On a small scale it is more expensive than the mode by flues, and more trouble is required to attend to one boiler than to one or even two or three furnaces. It is also somewhat more expensive than heating by hot water. These are all the disadvantages we know of. It has been stated by some that steam draws up or etiolates plants, and lessens the flavour of fruits; but we are inclined to consider such effects, when attendant on plants or fruits in houses heated by steam, as resulting from some deficiency of management in other points of culture.

2514. *The boilers used to generate steam are formed of cast or wrought iron, or copper, and are of different shapes.* Wrought iron, or copper, presenting a concave bottom to the fire, are generally preferred at present, and the smoke-consuming furnace most approved is that of Witty, described § 2511. Mr. Stothert of Bath, who has had extensive experience in heating by steam, has given the following, as the principles on which he calculates the size of boilers:—

1. For forcing-houses under ordinary circumstances, he finds that 1 square foot of bottom surface of boiler is equivalent to 150 square feet of glass.

2. Where bottom-heat is required, 1 square foot to 135 feet of glass.

3. For green-houses, 1 square foot is equal to 200 feet.

For houses that are ill glazed, or placed in an exposed situation, ten or fifteen per cent. may be added to the proportionate surface of the boiler.

2515. *Furnaces for boilers.* "The surface of the fire-grating should be from one-fourth to one fifth of the bottom surface of the boiler, according to the strength of the fuel employed." (*Hort. Trans.*, 2d series, vol. i. p. 204.)

2516. *The tubes used for conveying steam may be formed of the same metals as the boilers; but cast-iron is now generally used.* Earthen or stoneware tubes have been tried; but it is extremely difficult to prevent the steam from escaping at their junctions. The tubes are laid along or around the house or chamber to be heated, much in the same manner as flues, only less importance is attached to having the first course from the boiler towards the coldest parts of the house, because the steam-tube is equally heated throughout all its length. As steam circulates with greater rapidity, and conveys more heat in proportion to its bulk than smoke or heated air, steam-pipes are consequently of much less capacity than smoke-flues, and generally from three to six inches diameter inside measure. Where extensive ranges are to be heated by steam, the pipes consist of two sorts, mains or leaders for supply, and common tubes for consumption or condensation.

Contrary to what holds in circulating water or air, the mains may be of much less diameter than the consumption pipes, for the motion of the steam is as the pressure; and, as, the greater the motion, the less the condensation, a pipe of one inch bore makes a better main than one of any larger dimension. This is an important point in regard to appearance as well as economy. In order to procure a large mass of heated matter, M^r. Phail and others have proposed to place the pipes in flues, where such exist. They might also be laid in cellular flues built as cellular walls. The most complete mode, however, is to have parallel ranges of steam-pipes of small diameter, communicating laterally by cocks. Then, when least heat is wanted, let the steam circulate through one range of pipes only; when more, open the cocks which communicate with the second range; and when most, let all the ranges be filled with steam.

2517. *As an example of a complete and extensive application of steam to the heating of botanic hot-houses*, we may refer to the garden of Messrs. Loddiges at Hackney, and that of the Duke of Northumberland at Syon House. Both are very complete of their kind, and, having been executed for several years, may be considered as fully proving the superiority of steam on a large scale, to the former mode of heating by flues. The steam apparatus at Syon House was erected under the direction of the late eminent engineer, Mr. Tredgold, and, it may safely be affirmed, is the most complete apparatus of the kind any where in existence. Notwithstanding this, subsequent improvements in heating have been made, which render it more than probable that, if such hot-houses as those we have mentioned were again to be heated, the mode of circulating hot water in hermetically sealed tubes, invented by Mr. Perkins, would be resorted to, as much more economical, not only in the cost of the apparatus, but in the cost of the preparation for it.

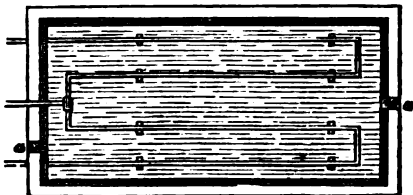
2518. *Steam, however, will be found the most convenient mode of heating garden structures under the following circumstances*: — Where the hot-houses or pits are numerous and scattered about on different levels: where the object is chiefly to heat beds of soil; and generally, wherever there are intervening spaces, that do not require warming between the structures to be heated. The reason why steam is preferable to smoke-flues for this purpose is, that these flues will not circulate smoke and hot air to any great distance; and the reason why steam is preferable to hot water under the boiling point, is of a similar nature. The reason why steam is preferable to hot water under compression, by which, as will be afterwards shown, it is circulated at from 50 to 100 degrees above the boiling point, is, that too much heat will be lost in the space between the structures to be heated.

2519. *One of the most economical modes of applying steam to the heating of hot-houses is to apply it to a bed or mass of loose stones*. This mode appears to have been first adopted by Mr. Hay, of Edinburgh, in 1807, and has been subsequently applied by the same eminent garden architect to a number of pine and melon pits in different parts of Scotland. It has also been adopted in England, and on a very extensive scale, in connection with heating-pipes, and cisterns of water, at the nursery of Miller and Co. at Bristol. Nothing can be more simple than this mode of applying steam. The bed of stones to be heated may be about the usual thickness of a bed of tan or dung; the stones may be from three to six inches in diameter, hard round pebbles being preferred, as less liable to crumble by moisture, and having larger vacuities between. The pipe for the steam is introduced at one end of the bottom of this bed, and is continued to the opposite end. It is uniformly pierced with holes along the two sides, so as to admit of the equal distribution of the steam through the mass of stones. The steam pipe may be of any dimension, it being found that the only difference between a large pipe and a small one is, that the steam proceeds from the latter with greater rapidity. The steam only requires to be introduced once in twenty-four hours in the most severe weather, and in mild weather, once in two or three days is found sufficient. After the steam is turned on, it is kept in that state till it has ceased to condense among the stones, and, consequently, has heated them to its own temperature. This is known by the steam escaping, either through the soil over the stones, or through the sides of the pit; or when a mass of stones is enclosed in a case of masonry, as in the stone flues of the Bristol nursery, the point of saturation is known by the safety valve of the boiler being raised. When we consider the small-sized pipes that may be used for conveying and delivering steam by this mode of its application, there can be no doubt that this is the cheapest mode of heating on a large scale known; and when we revert to the circumstance of its never requiring to be applied oftener than once in the twenty-four hours, and reflect that this renders all night-work unnecessary, the superiority of the plan does not admit of a doubt. In the *Gardener's Magazine*, vol. viii. p. 330., there is a copious account, illustrated by engravings, of the application of this mode of heating to certain pine and melon pits in Scotland; taken from the *Memoirs of the Caledonian Horticultural Society*; but the description is so encumbered with words, and the engravings with letters, that the simplicity of the plan is rendered at first sight so intricate by them, as, no doubt, to deter many from adopting it. Those, however, who wish to know all that has been said on

the subject, will revert to this article, and also to another which will be found in the ninth volume of the *Gardener's Magazine*.

2520. *Stother's application of steam to beds of stones* is given in detail in the *Horticultural Transactions*, 2d series, vol. i., and is thus abridged in the *Gardener's Magazine*, vol. ix.

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and returning again in the opposite direction, as shown in *fig. 588*.; by this means the heat is very easily distributed. At each end of the cistern, a small passage, *a*, is left for the purpose of ascertaining the temperature of the water; and this passage will, if left open, admit considerable humidity to the house or pit. Across the cistern

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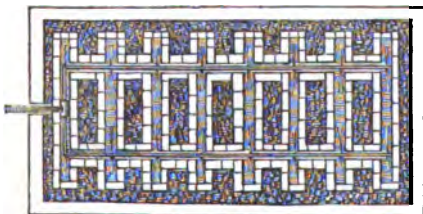


on which is placed a bed of broken stones or bricks about one foot in thickness, which, towards the top, are about the size commonly used for macadamising the public roads: this is again covered with a bed of ashes, in which the pots are placed, as in the usual way."

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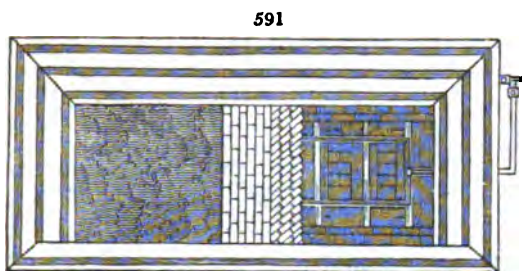
space of the channels with hot vapour; the channels being covered with brick or stone, jointed without mortar, as shown in *fig. 589*. The vapour which percolates between the joists, is arrested by a bed of stones or broken bricks similar to those used in *fig. 588*, and about fourteen inches in depth above the paved bottom; on this again is placed a bed of sand about one foot deep, in which the pots are plunged to any suitable depth. The vapour is so completely arrested by the strata of stones and sand beneath the pots as to communicate a heat congenial with the health of the plants without the least excess of moisture."

2523. *For melon pits*, a hollow chamber is formed over the bed of stones that cover the steam-pipes, as in the plan for pines, § 2520. "Immediately over the bed of stones are laid joists, supporting a paved bottom, jointed without mortar, on which is placed another bed of stones, &c. about eight inches thick, and on this is placed the mould containing the plants. The objects of these arrangements are, first to obtain a perfect uniformity of temperature, and, secondly, to prevent the possibility of any of the roots receiving injury from heat, should they accidentally strike through the mould into the bed of stones; both of which objects are perfectly attained. *Figs. 591. and 592.* represent an elevation and plan of a melon pit erected for W. W. Salmon, Esq., at Devizes,

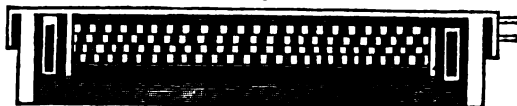
2521. *For heating pine pits.* *Figs. 587. and 588.* represent a mode of obtaining bottom heat, by means of "a cistern of water heated by small steam pipes, which are introduced near the bottom, leaving only sufficient drainage to take away the condensed water. The depth of water in the cistern is about one foot, which is warmed, generally about twice a day, by means of two one-inch steam-pipes, each going to the farther end of the cistern,

2522. *For bulbs and cacti*, "a paved watertight bottom may be built on stones, or any suitable support, with a declivity of one inch in ten feet, to any convenient point for the purpose of drainage, as shown in *figs. 589. and 590.* Channels are formed about three inches deep, and the same width, crossing each other, as shown in *fig. 590.*, which also represents two small steam-pipes, each three quarters of an inch in diameter, closed at the farther end, and having perforations about one tenth of an inch in diameter opposite each other, and in the middle of the channels. The result is, that, when steam is admitted into the pipes, it is discharged in opposite directions, through the orifices, filling the whole

showing also the mode of heating the atmosphere of the pit, by flues of loose stones,

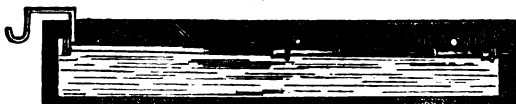


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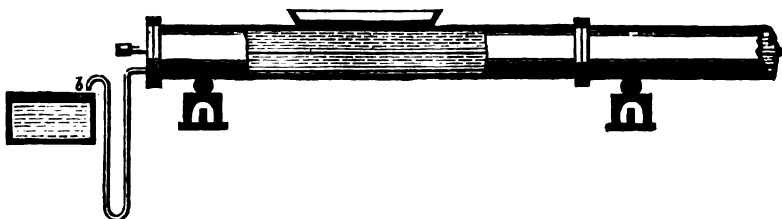
servation of aquatic plants, as erected at Mr. Miller's nursery

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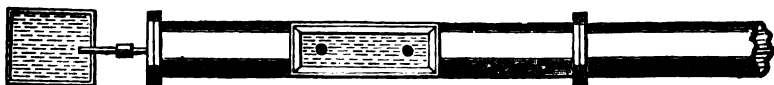
the extremity of the pipe being closed, the steam issues through the small apertures, filling the whole internal area of the large pipe in which it is enclosed, and imparting an equable temperature to the whole extent of surface. This effect cannot be obtained by applying steam in the common way, when but a small increase of temperature is required; as the water immediately in contact with the pipe where the steam is admitted would absorb nearly the whole of its heat, till it arrived at a temperature far beyond what could be allowed in a case of this kind. The dimensions of the reservoir alluded to, are about 3 ft. by 3 ft. 6 in., and 20 ft. long. The external pipe is 4 in. inside in diameter, and the condensed water from it is taken away by a small inverted siphon, *b*, at the farther end.

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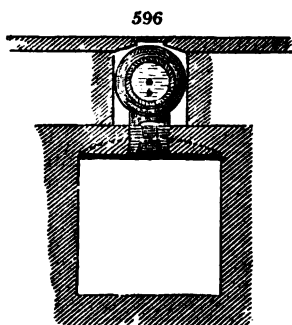
2525. Heating the atmosphere for conservatories, hot-houses, &c. Figs. 594, 595. and 596. represent a mode of heating water in pipes by the agency of steam. It is well

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known that, by the common hot-water apparatus, the heating of an extensive and unconnected establishment of houses by one fire is impracticable in most cases; but, in the mode here represented, the extent of application is in a manner unlimited, whatever be the number or situation of the houses requiring heat. It likewise combines all the advantages of steam as a conductor of heat, with that of a bulk of water as a retainer.

The first adoption of this mode was in a forcing-house, belonging to Mr. Sturge, near



Bath. The water-pipes were 8 in. in diameter, and about 28 ft. long. The steam pipe, of 1 in. in diameter, entering at the centre of one end, and proceeding in rather an inclined direction to the other, is then returned, still inclining, and passed out at the bottom of the bore immediately under the place where it entered; it is then formed into a siphon, *b*, about 3 ft. deep, whence the condensed water is conveyed away. A smaller pipe is also connected with the top of the large one, to receive the increase of water by expansion when heated, which, as the large pipe cools, returns into it again. *Fig. 596.* shows the arrangement of the front pipes under the floor. The air being admitted from the air chamber underneath, through an opening extending the whole length of the pipes, and passing through the upper chamber on each side of the pipes, is discharged through the grating into the house. The arrangement of the back pipes is similar. Shallow cisterns are connected with the upper part of the pipes, about 18 ft. from each other, by means of hollow screws, which admit the water to pass to and fro reciprocally; the capacity of the cistern is more than sufficient to receive the increased bulk of the water, which expands when heated, and returns again into the pipes as the water cools. The external diameter of the front pipes in this instance is 13 in., and of the back pipes 10½ in.; each set of pipes is divided in the middle of their length, except that the nearest division of the front pipes returns about half-way round, the end being in length rather more than 60 ft. These water-pipes have 1½ in. steam-pipes, extending in them their whole length, and returning again, preserving a regular inclination throughout. The back pipes have steam-pipes of 1 in. in diameter, passing through them in a similar way, and the feeding pipes are so arranged that either division of the pipes may be heated separately, or in conjunction with the rest. Another advantage attending this mode of applying heat is, that, as no returning pipes are necessary as in the common hot-water apparatus, the bulk of water is doubled, with the same extent of heating surface, and the retaining power of the apparatus is doubled accordingly. The cisterns are farther serviceable for regulating the humidity of the house, which can be done with the greatest accuracy by attending to the covers.

2536. *Mode of heating the atmosphere of conservatories, hot-houses, &c., by steam discharged into cases of masonry or brickwork.* *Figs. 597. and 598.* represent a mode of

heating, by introducing steam into cases of stone or brickwork, filled with rubble-stones, or pieces of broken brick. This mode is equally applicable to the largest or smallest establishments. The agent being steam, it possesses the same facility of application as steam applied to hot-water pipes, and consequently the same advantages, and may be adopted in conjunction with hot-water pipes or not, as may be thought desirable. *Fig. 597.* represents a cross section of a case of masonry or brickwork, suitable for a greenhouse of 14 ft. wide, with glazed roof, and 2 ft. 6 in. of glass in front. *Fig. 598.* shows a view of the same, with part of the front taken away at each end to show the inside. The steam-pipes are placed about 4 in. above the bottom, and have perforations of about one tenth of an inch in diameter; which vary from 15 to 18 in. asunder throughout their whole length, but become more frequent at the further end, which is closed. The general direction of the holes is upwards, except some few in the bottom, to keep the pipe clear of condensed water. The case being built inclining towards the most convenient spot for draining, the condensed water is taken away by a small siphon, about



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3 or 4 in. deep, as shown in *fig. 598.* A steam-pipe of 1 in. diameter is sufficient for a case of 50 ft. in length; and, if proper attention be paid to the dimensions and distance of the holes, which in this case need not be above one sixth closer at the farther end than at the commencement, scarcely the least difference of temperature will be perceptible at each end of the case; an effect utterly unattainable in the best constructed fire-flue, which,

in appearance, it so much resembles. There is, however, no particular proportion of the height to the breadth; that depending entirely on convenience. Where freestone cases are used, it is found necessary that they should receive two or three coats of linseed oil, to prevent the escape of steam through them. It is better to give moisture to the house by steam-cocks fixed at the top of the cases, as shown in *fig. 598.*; humidity can then be regulated at pleasure.

SUBJECT. 8. *Heating by hot Water.*

2527. *The art of heating by hot water* was invented in Paris in 1777, by M. Bonnemain; and it was first made publicly known in this country by Count Chabannes, in 1815. The first hot-house heated by hot water appears to have been one at Sundridge Park, Kent, which was heated by Count Chabannes, in 1816. In 1818, a pamphlet was published by this gentleman, in which he describes what he calls a "new water calorifère," and its application to various purposes in domestic economy and horticulture. The substance of this pamphlet, and copies of the engravings by which it was illustrated, will be found in the *Gardener's Magazine*, vol. iv. p. 28. Notwithstanding the undoubted fact, that both a dwelling-house and a hot-house were heated by hot water in this country by Count Chabannes, as early as 1816, the invention is claimed by Mr. Anthony Bacon, and Mr. Atkinson; though it appears that neither of these gentlemen began their experiments till 1822, six years after the "water calorifère" had been exhibited to the British public. We have no doubt, however, that the idea was, to a certain extent, if not altogether, original, both on the part of Mr. Bacon and Mr. Atkinson; because, from what is stated in different articles on this subject in the *Gardener's Magazine*, neither of these gentlemen seem to have been at all aware of what had been either done or written by Bonnemain or by Count Chabannes. Mr. Bacon stated, that he took the idea of heating hot-houses by hot water, from having seen, above eighteen years previously to 1822, a leg of mutton boiled in a horse pail. The breech of a gun barrel was put in the fire, and, the muzzle being inserted in the side of the pail near the bottom, the water in the pail was made to boil, and kept boiling. Mr. Atkinson is said to have been led to think it would answer to heat forcing-houses with hot water, from an experiment which he had seen made by the late Count Rumford, about the year 1799. Whatever may be said respecting the invention, nothing can be more certain than that Mr. Atkinson was the first who successfully applied this mode of heating to hot-houses.

2528. *The application of heat by hot water* has spread rapidly, not only in garden structures, but in dwelling-houses, and in heating manufactories and public buildings; so that at the present time it is much more generally applied than steam.

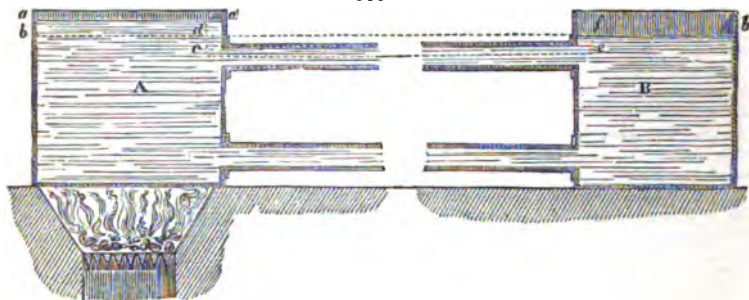
2529. *The advantages* which this mode of heating has over steam are, that as soon as heat is conveyed by the fire to the water, a circulation takes place in the apparatus, by which means heat is immediately communicated to the house, or body to be heated; whereas, in heating by steam, none can be communicated till after the water has been made to boil. A second advantage which hot water has over steam, is that of producing a mass of heated matter, which parts with its heat slowly; whereas, from the gasiform nature of steam, unless it is employed to heat other bodies to its own temperature (as in the mode of its application to stoves, &c. above described, § 2519.), it leaves no supply of heat after it has been withdrawn.

2530. *The improvements* which have been made in the mode of heating by hot water are various. At first, the water was chiefly circulated in tubes perfectly horizontal in their direction. Soon after, it was found that it might be circulated in tubes irregular in point of horizontal direction, and both below and above the level of the boiler. Two engineers, Kewley of London, and Fowler of Devonshire, have circulated water in the two legs of a siphon, which is found to increase the rapidity of its motion; and broad flat pipes have been used, instead of cylindrical ones, as giving out the heat more rapidly. It is but justice to the memory of Count Chabannes to state, that most of these methods seem to have been known to him; and as it is certain that he merely echoed the inventions of Bonnemain, they were in all probability anticipated by that engineer. The last and the most remarkable improvement that has been made with hot water is that of circulating it in hermetically sealed tubes, § 2538, by which the water may be raised to a temperature considerably above the boiling point; and thus not only the heat is conveyed to as great a distance as it can be by steam, but much smaller pipes may be employed in heating. Thus, a pipe of water of one inch in diameter, outside measure, heated to the temperature of 280°, will give out as much heat as one of four inches in diameter heated to 180°. Hence the great economy of this mode of heating, besides other advantages. These are, the little attention that is required to keep the apparatus supplied with water; the certainty that, while the apparatus is in repair, no steam will escape from the joints; the more agreeable appearance of these small pipes than that of the large ones, which must necessarily be employed in circulating water not under compression, and the con-

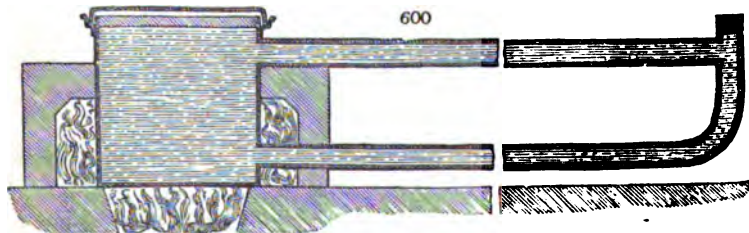
venience of being able to introduce them in situations where there is not room for pipes of larger dimensions. Perhaps to these advantages may be added that of no boiler being requisite; the pipes forming a coil round the fireplace in such a manner that, while the heated water passes out at the top of the coil, the cold enters at the bottom, to be reheated in ascending to the top. The theory of the circulation of hot-water in open vessels will be found laid down in great detail by Mr. Tredgold in the *Gardener's Magazine*, vol. vii. p. 177. The power of imitating other climates and other seasons, Tredgold observes, than those which nature affords us, is known and valued as it ought to be; yet it remains difficult even to imagine the extent to which this power may be applied: in this age it produces luxuries, of which few can enjoy more than the commonest species; but in the next, nay, even in our own, there is a reasonable expectation of a considerable addition to the quantity and quality of these artificial productions, as well as to the vast sources of pleasure and information they afford to the admirers and the students of nature. The vehicle employed to convey and distribute heat in the new process is water; for it has been found that, in an arrangement of vessels connected by pipes, the whole of the water these vessels and pipes contain may be heated by applying heat to one of the vessels; and that in this manner a great extent of heating surface, and a large body of hot water to supply it, may be distributed so as to maintain an elevated and regular temperature in a house for plants, or, indeed, in any other place requiring heat. The obvious advantages of this method are, first, the mild and equal temperature it produces, for the hot surface cannot be hotter than boiling water; secondly, the power of heating such a body of water as will preserve the temperature of the house many hours without attention; and, thirdly, the freedom from smoke, or the other effluvia of smoke flues. In houses for plants, these advantages are most important.

2531. In order to develop the principles on which a hot-water apparatus acts, we may select the simple case of two vessels placed on a horizontal plane, with two pipes to con-

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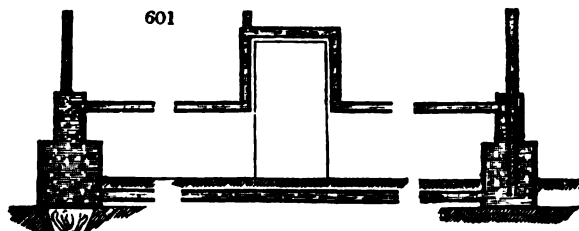
nect them; the vessels being open at the top, and the one pipe connecting the lower parts of the vessels, and the other their upper parts. If the vessels and pipes be filled with



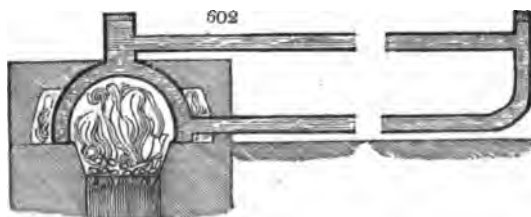
water, and heat be applied to the vessel A, in *fig. 599.*, the effect of heat will expand the water in the vessel A; and its surface will in consequence rise to a higher level *a a*, the former general surface being *b b*. The density of the fluid in the vessel A will decrease in consequence of its expansion; but as soon as the column *c, d*, of fluid above the centre of the upper pipe is of a greater weight than the column *f, e*, above that centre, motion will commence along the upper pipe from A to B, and the change this motion produces on the equilibrium of the fluid will cause a corresponding motion on the lower pipe from B to A; and, in short pipes, the motion will obviously continue till the temperature be nearly the same in both vessels; or, if the water be made to boil

in *a*, it may also be boiling hot in *s*; because ebullition in *a* will assist the motion. If there be sufficient service of pipe for heating the atmosphere, or object required, a reservoir like *s* is not necessary to the motion of the water; a simple bent pipe, as in *fig. 600.*, being all that is essential to motion; the reservoir *s*, in *fig. 599.*, being only for the purpose of reserving a mass of hot water after the fire has gone out. These two modes, which are essentially the same, clearly illustrate the principle on which hot water is circulated in level pipes.

2532. *To circulate water in ascending and descending pipes*, it is necessary to have a close or covered boiler. In this case a pipe may, at any distance from the boiler, rise to any height, and descend again; but it must neither rise twice, nor dip after leaving the boiler. Where it is necessary to raise it, there should be an open pipe inserted at its extremity, of a height equal to the rise. In heating hot-houses, advantage may be taken of this circumstance to carry the hot water over doorways, as in *fig. 601.*

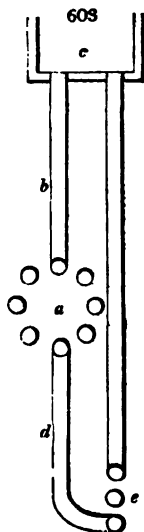


2533. *The boilers for either of the above modes of heating* may be constructed in such a manner as to have the largest possible bottom surface exposed to the action of the fire. According to Mr. Tredgold, for burning a bushel of coals per hour, the area of the fire-grate should not be less than 8, or greater than 16, square feet; and the bottom surface should be four times the area of the grate, with 32 feet of side-flue. A considerable advantage, according to that engineer, results from adopting the larger proportion for the grate and bottom surface, on account of the fire requiring less attention. The best mode of regulating the fire is, by means of a door to the ashpit having a register; an improvement which was first suggested by Dr. Black, and afterwards adopted by Count Rumford. One of the most effective boilers is that adopted by Messrs. Cottam and Hallen, Winsley Street, Oxford Street, London (*fig. 602.*).



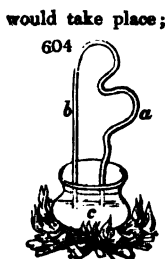
2534. *For circulating water below the level of the boiler*, it is necessary, in the first place, to raise the water, as it is heated, to as great a height above the boiler as it is proposed to circulate it below. This may be done in any closed boiler, with a tube proceeding from its cover; or in any boiler of a height above the fire, equal to the depth below it, to which it is intended to circulate the water. This mode will be very readily understood by a reference to the apparatus of Mr. Weeks, explained by the following diagram (*fig. 603.*). In this figure, *a* is a section of the fireplace, which, instead of having a common boiler over it, is surrounded by cast-iron tubes. The uppermost of these tubes communicates, by means of the upright tube *b*, with the open vessel *c*; and the lowermost is connected, in a similar manner, by means of the tube *d*, with one or any number of tubes, under the level of the boiler at *e*. The uppermost of the tubes, at *e*, is connected by the tube *f* with the open vessel *c*. Now, all these tubes being so connected as to admit of water circulating freely through them, when a fire is made in *a*, the heated water ascends by its rarefaction into the open vessel *c*; and its place in the tubes round the fire is supplied by the colder water from *e*, through *d*; the heated water descending to supply its

place from the open vessel *e*, by the tube *f*. The limits of the depth to which the water will circulate below, is that of the height of the open vessel above. To produce this circulation, it is not necessary that the water should boil; for, as every heated particle will ascend to the open vessel *c*, its place must be supplied by a cold particle from *d*. When the fire is urged so as to raise the water in the open vessel nearly to the boiling point, the circulation goes on with the greatest rapidity. The substitution of tubes round the fire for a boiler over it, is by no means necessary for the success of this plan, though by tubes the rapidity of the circulation is greatly increased. Any close boiler with the tube *b* attached to its cover, and communicating with an open vessel fixed at any height, such as *c*, having another tube, similar to *f*, affixed to it, will circulate the heated water from such vessel to a point below the bottom of the boiler, nearly equal to the balance of atmospheric pressure, or say 30 ft. below it. Messrs. Cottam and Hallen, and Mr. Timothy Bramah, have both circulated hot water on a large scale upon this principle. There is another mode of circulating hot water below the level of the boiler, the invention of a very ingenious architect and engineer, C. A. Busby, Esq., of Brighton; but, as it is not likely ever to be applied to garden structures, we consider it unnecessary here to describe it. In vol. ix. of the *Gardener's Magazine* the details will be found, accompanied by a figure.

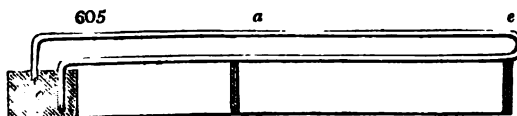


2535. *The circulation of hot water on the siphon principle* appears to have been invented about the same time by Kewley and Fowler, already mentioned; but it was first exemplified by the former engineer, in Colvill's nursery, in 1826. Mr. Fowler took out a patent for his mode in 1829, and some hot-houses in Devonshire have since been heated by it. Mr. Kewley's mode has been extensively employed in various parts of the country. We shall describe both.

2536. *Fowler's method of circulating hot water in his thermosiphon* consists in employing the power of the descending fluid, in the leg of a common siphon, to draw up hot fluids in the opposite leg, "for the purpose of causing hot fluids to flow from boiler to boiler, or from vessel to vessel, through connecting tubes of various lengths and forms. How this is done will be readily understood by reference to the following diagram (fig. 604.). Supposing the water of a uniform temperature in both legs of the siphon, *a b*, no circulation would take place; but supposing it to cool sooner in the long leg, *a*, than in the short leg, *b*, then the equilibrium would be destroyed, and the water in the long leg, *a*, would descend, and draw up hot water through the short leg, *b*; and this circulation would continue as long as the water at *c* was maintained at a temperature above that of the surrounding atmosphere." (*Gard. Mag.*, vol. v. p. 453.) Any engineer will easily see how this principle may be applied to the circulation of hot water in horizontal tubes; and this application has been made in a very perfect manner by Mr. Kewley.



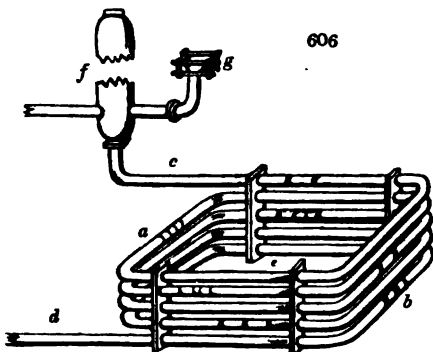
2537. *Kewley's method of circulating hot water on the siphon principle* is one of the very best modes which has yet been applied to the heating of hot-houses, but as it requires some scientific knowledge, as well as practical skill, on the part of the mechanic who fits it up, and as this branch of engineering is in the hands of ironmongers who know very little of its principles, it has by no means become so general as it deserves. Mr. Kewley's mode



will be understood by the following diagram (fig. 605.): *a c e* represent the two legs of the siphon; the upper leg, commencing at *c*, being that through which the heated water ascends, and the lower leg being that by which it returns. The point *e* may be at any distance from the boiler containing the open ends of the siphon. On the upper part of the pipe at *e*, a small orifice is connected with an air-pump, by a pipe which need not be more than half an inch in diameter. The air-pump may be placed in any convenient situation, and the pipe connecting it with the siphon may be bent in any direction. The use of the air-pump is twofold: first, to exhaust the siphon, in order that it may be filled with water; and, secondly, to exhaust the air which always collects in the highest part of any tube in which water is circulated. The expense of a good air-pump, suitable for this

purpose, is about £2; but for those who think this too much, there may be a small brass cock introduced on the upper surface of the highest part of the pipe, and, a funnel being put over it, and stoppers of any kind in the open ends of the siphon, it may be filled through the funnel. Air which collects at this highest point may also be let off by opening the cock, after having previously stopped the open ends of the siphon, and pouring in as much water as will supply the place of the air, after which the cock is to be shut. This mode of circulating hot water will be found exemplified in the nurseries of Messrs. Colvill, of Messrs. Chandler and Sons, and very extensively in the conservatory and garden hot-houses of Clarence lodge, near Roehampton.

2538. *The circulation of hot water in hermetically sealed tubes* is the invention of A. M. Perkins, Esq., the son of the celebrated American engineer. This plan will be readily understood by the diagram (fig. 606.); in which *a b* is a coil of wrought-iron



as *g*, there is what is called an expansion tube (*f*) added, which allows of the expansion of the water in the form of high-pressure steam. The advantages of this mode of heating we have already mentioned, § 2517.

2539. *The application of Mr. Perkins's mode of heating by hot water* has been made very extensively in dwelling-houses and manufactories; the hot-houses of John Horsley Palmer, Esq., the Bank Director, at Parson's Green, Fulham, have been heated in this manner, besides a number of others, and also our own small hot-house and green-house at Bayswater. The advantage, in point of neatness, is very great, from the smallness of the pipes; and there is also little or no smell from the inattention or misconception of attendants, as nothing is required to be done but supplying fuel. By a subsequent invention of Mr. Perkins the contraction and expansion of the tubes is made to operate upon a damper; so that the temperature of the place, or object to be heated, is regulated by the apparatus itself.

2540. *Of all these different modes of circulating hot water*, that which is best adapted for general purposes is the level circulation from an open boiler; it is not in general the cheapest to erect, but it is almost certain to be the most economical in the end, by not going out of repair, and by being more easily managed by the gardener. In no case whatever would we adopt a boiler without a sufficiently large manhole, the cover of which could be easily taken off by the gardener, or any common smith, so as to admit of frequent cleaning of it. The boilers which are found to be the best are those which present a concave bottom to the fire. Mr. Perkins's mode promises to be the best, as it is certainly the most economical, for particular cases.

SUBJECT. 9. Trellises.

2541. *Trellises* are of the greatest use in forcing-houses and houses for fruiting the trees of hot climates. On them the branches are readily spread out to the sun, of whose influence every branch, and every twig and single leaf partake alike; whereas, were they left to grow as standards, unless the house were glass on all sides, only the extremities of the shoots would enjoy sufficient light. The advantages, in point of air, water, pruning, and other parts of culture, are equally in favour of trellises; independently altogether of the tendency which proper training has on woody fruit trees, to induce fruitfulness.

2542. *The material of the trellis* is either wood or metal; its situation in culinary hot-houses is against the back wall, close under the glass roof, or in the middle part of the house, or in all these modes. Sometimes it is in separate parts, and either fixed or movable; and in some cases, though rarely, it is placed across the area of the house. Sometimes it is introduced ornamentally in arches, festoons, &c. The most general plan

is to place it under the glass roof, and at the distance of from ten to twenty inches from it, according to the length of the footstalk of the leaves of the plants to be trained.

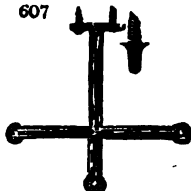
2543. *The back wall trellis* was formerly in general use, and considered the principal part of the house for a crop; but that is now only the case in narrow houses. In many cases a trellis is still applied against the back wall for temporary crops, till the plants trained under the front glass trellis cover the roof; or for figs, which are found to succeed better than most trees under the shade of others.

2544. *The middle trellis* is generally recurvate, so as not to exclude the light from the back wall. Sometimes it is horizontal, for the same purpose; and sometimes it is omitted, and dwarf standards preferred in its room.

2545. *The front or roof trellis* generally extends under the whole of the roof, at a moderate distance from it, according to circumstances. It is generally formed of wires stretched horizontally at 6 or 8 inches' distance, and retained in their places by being passed through wrought-iron trellis-rods proceeding from the parapet to the back wall, or the lower edges of the rafters, when formed in a manner adapted for this end.

2546. *The fixed rafter-trellis* consists ordinarily of three wires, which pass through the points of crosses (Fig. 607.), in breadth from fourteen to eighteen inches, and which crosses are screwed to the under edge of the rafter; the first fixed at the plate of the parapet, the last at the upper end of the rafter, and the intermediate ones at distances of from three to four feet.

607



2547. *The movable rafter-trellis* consists of a rod bent parallel to the roof, with horizontal studs or rods, extending from six to ten inches on each side, containing two collateral wires, the rod itself forming the third. This rod is hinged, or moves in an eye or loop, fixed either immediately above the plate of the parapet, or near the top of the front glass.

It terminates within one or two feet of the back wall, and is suspended from the roof by two or more pieces of chain attached to the studs, the links of which are put on hooks fixed to proper parts of the roof. Their advantage is chiefly in the case of very early forcing, when they can be let down two or three feet from the glass, and thus is lessened the risk of injury from frost. A whole sheet or tegument of trellis, if desirable, may be lowered and raised on the same general plan. (See the details, *Hort. Trans.*, vol. iii.) Rafter-trellises are in general used only for such houses as are not chiefly devoted to vines; such as pinneries, peach-houses, and sometimes green-houses.

2548. *The secondary trellis* is placed from six inches to eighteen inches behind the first, and is used for training shoots of the current year, while that nearest the light is devoted to such as are charged with fruit. In ordinary trellises, the wires are generally placed from nine inches to a foot asunder, in a horizontal direction; on the secondary trellis they are placed at double that distance.

2549. *The cross trellis* has been sometimes employed in peach-houses, and is strongly recommended by Sir George Mackenzie, in what he calls an economical hot-house. These trellises, however, unless kept very low, darken the house to such a degree as to prevent the ripening of fruits.

2550. *The entrance* to hot-houses is commonly at each end, and sometimes in the middle, either of which modes answers perfectly where the ground-plan is a parallelogram; but for any description of curvilinear house, the entrance is more commodiously made through a lobby at each end of the house, which lobby is best formed behind the wall. When there are a number of curvilinear houses placed against one wall, one door in the wall between each will serve every purpose, and the whole will be at once elegant and commodiously connected.

SUBJECT. 10. *Paths, Pits, Stages, Shelves, Doors, &c.*

2551. *The paths* in hot-houses vary in direction, breadth, and construction. In general, one path runs parallel to the front, sometimes upon the front flue, but more generally beside it; at other times, as in peach-houses, it passes near the back wall, or through the middle of the house. In pinneries and houses with pits, it generally surrounds these; and in green-houses it is commonly confined to a course parallel to the front and ends.

2552. *The materials* of which the path is composed in the case of some houses, are mere planks, or lattice-work, supported on cross pieces of timber, in order to admit the sun and air to the soil below, and not to indurate it by the pressure of feet. An improvement on this mode consists in using grated cast-iron plates, which are more durable, and may be set on iron stakes driven in till their tops are on a level, and at a proper height, &c. These gratings are also particularly preferable when the path is over a flue, not only as presenting a cooler surface to walk on than the covers of the flue, but also by

readily admitting the ascent of the heat in the interstices, and preventing the movement of the covers by the motion of walking. But the best material for a permanent path, as in green-houses, botanic stoves, &c. is argillaceous flag-stone, and of this one of the best varieties is that obtained from Arbroath, and known by the name of Arbroath pavement. It is a light grey schistus, which rises in laminae of from three to six inches in thickness, and eight or ten feet square; requires very little work on the surface; and has the property of but very slightly absorbing moisture from the atmosphere, or from the moist ground on which it may be placed. Thus, unless when watered on purpose, it always appears perfectly dry and agreeable, however moist the soil may be below. Where the paths in a house are on different levels, they are commonly united by steps; but an inclined plane, when not steeper than one inch in six, will generally be found more convenient for the purposes of culture and management; and if the slope is one in eight, it is more agreeable to ascend or descend than a stair.

2553. *Pits*, as applied to the interior parts of houses, are excavations, or rather enclosures, for holding bark or other fermentable substances; or sand, or ashes, or sometimes even common garden soil. They should be so formed as that the plants may stand at a moderate distance from the glass, which of course depends on whether they are dwarf bushy plants, as the pine-apple, &c., or taller, as palms and hot-house trees. The pits are generally surrounded by walls of brick, four or nine inches thick; or, to save room, by plates of cast iron, stone, or slate. Sometimes the slope of the surface of the pit has a similar inclination to that of the roof; but as, in this case, the tan or leaves, in the course of fermentation, do not settle or compress regularly, the pots are thrown off their level, and therefore the more common way is to adopt a slope not exceeding 5°, or to form a level surface. Tan will ferment with all the rapidity necessary for bottom heat, if in a layer of two and a half or three feet thick, and therefore no tan-pits need exceed that depth. Those for leaves may be somewhat deeper. Heat from fire, or steam, or water, is sometimes substituted for that afforded by fermentable substances, and in these cases various forms of construction are adopted. Pits may be heated by steam, and hot water, by various modes which have been already pointed out § 2518. to § 2523.

2554. *Beds and borders* in hot-houses are generally formed on the ground level, though sometimes raised above it. They are either composed of earth, for the direct growth of plants, or of gravel or scoriae, in or on which to place pots.

2555. *Shelves*, except such as are placed near the ground, or almost close under the upper angle of the roof, are extremely injurious to the vegetation going forward in the body of the house, by the exclusion of light. This consideration, therefore, must be kept in view in placing them: in some cases they are inadmissible, as in conservatories; in others, as in propagating-houses, the light they exclude can better be spared, than in fruiting or flowering departments. For forcing strawberries, they may be introduced under the roof in vine and peach houses, and removed when their shade proves injurious, &c. The ordinary form is that of a flat board; but an improvement consists in nailing two fillets along its edges, and covering the board with a thin layer of small gravel or scoriae. This preserves a cool genial moisture, which keeps the earthen pot moist, and lessens the effect on the earth of alternate dryings and waterings; and it also admits the more ready escape of water from the orifices in the bottoms of the pots. Some, in the case of forcing strawberries and French beans, have the fillets or ledges of the shelves so high as to contain two or three inches of water, by which means whole rows of pots can be inundated at one operation; but this is too indiscriminate an application of a material on which so much in the growth of plants depends.

2556. *Stages* are shelves in series rising above each other, and falling back so as their general surface may form a slope. They vary in form according to that of the house. The houses with shed roofs and opaque ends have merely a series of steps reaching from one end to the other; but wherever the ends are of glass, by returning each shelf to the back wall, due advantage is obtained from the light furnished by the glass ends. The addition of ledge, or turned-up edges, to each shelf, and the covering them with gravel, is, of course, as advantageous as in separate shelves, and surely more consonant with natural appearances, than leaving them naked like household or book shelves. Shelves and platforms of stone are now very general, and are found more congenial to the plants than dry painted boards.

SUMMARY. 11. *Details for Water, Wind, and Renewal of Air.*

2557. *The reservoirs of water in hot-houses* are commonly cisterns of stone or timber, lined with lead, or cast-iron troughs or basins. Sometimes, also, tanks are built in the ground, and lined with lead or cement. The cistern is sometimes placed in an angle, or other spare part of the house, and the water lifted from it at once with the watering-pots; but a more complete plan is, to build it in an elevated part of the back wall, where it may have the benefit of the heat of the house, and whence pipes may branch off to different parts of the house with cocks, every 30 or 40 feet, for drawing supplies. Tanks

and cisterns below the level of the front gutter may be supplied great part of the year from the water which falls on the roof; but more elevated cisterns must either be supplied by pumps, or elevated springs. The sources of supply, and the quality of the water, must be taken into consideration before the situation of the cisterns are determined on. In all cases, there must be waste-boxes at the cocks, and waste-pipes from the cistern, to counteract the bad effects of leakage.

2558. *Artificial rain.* A very elegant plan has been invented and executed by Messrs. Loddiges, for producing an artificial shower of very fine rain in hot-houses, by conducting pipes horizontally along the roof, at the distance of six or eight feet, and having these pipes very finely perforated by a needle. According to the power of the supply, one or more pipes may be set to work at a time, and a very fine shower thrown down on the leaves of the plants with the greatest regularity. This has been done in one of the palm-houses of these spirited cultivators at Hackney, and for which a medal was voted to them by the Horticultural Society, in 1817. The following is a particular account of this apparatus (*Hort. Trans.* vol. iii. p. 15.):—

2559. *A leaden pipe of half an inch bore* is introduced into one end of the house, in such a situation that the stopcock, which is fixed in it, and which is used for turning on the supply of water, may be within reach: it is then carried either to the upper part, or the back of the house, or to the inside of the ridge of the glass framework, being continued horizontally, and in a straight direction, the whole extent of the house, and fastened to the wall or rafters, by iron staples, at convenient distances. From the point where the pipe commences its horizontal direction, it is perforated with minute holes, through each of which the water, when turned on, issues in a fine stream, and, in descending, is broken, and falls on the plants, in a manner resembling a gentle summer shower. The holes are perforated in the pipe with a needle, fixed into a handle, like that of an awl; it being impossible to have the holes too fine, very small needles are necessarily used for the purpose, and in the operation great numbers are of course broken. The situation of the holes in the pipe must be such as to disperse the water in every direction that may be required, and in this particular the relative position of the pipe, and of the stations of the plants to be watered, must be considered, in making the perforations. The holes are made, on an average, at about two inches' distance from each other, horizontally, but are somewhat more distant near the commencement, and rather closer towards the termination of the pipe, allowing thereby for the relative excess and diminution of pressure, to give an equal supply of water to each end of the house. A single pipe is sufficient for a house of moderate length: one house of Messrs. Loddiges, which is thus watered, is sixty feet long, and the only difference to be made in adapting the plan to a longer range, is to have the pipe larger. The reservoir to supply the pipe, must of course be so much above the level, as to exert a sufficient force on the water in the pipe, to make it flow with rapidity, as it will otherwise escape only in drops; and as too strong a power may be readily controlled by the stopcock, the essential point to be attended to, in this particular, is to secure force enough. From the above details it will be observed, that some nicety is required in the arrangement and formation of the machinery; but it is only necessary to view the operation in Messrs. Loddiges' house, to be convinced of the extreme advantage and utility of the invention, when it is properly executed. (*Sabine, in Hort. Trans.*, vol. iii. p. 15.)

2560. *Wind in hot-houses* has been attempted, or rather recommended to be attempted, by Dr. Anderson and others, by means of fans. If any thing of this sort were desirable, the Eolian machine, invented by B. Deacon, might be employed, either placed in the house, and kept in motion by human or mechanical power, or placed at one end to force in or draw out the air. In a range of houses forming a circle or square, or any endless figure, a perpetual breeze might be readily produced in the following manner:—Place under the floor a powerful fan of the width of the house. Exactly over the fan, place a glass division across the house, and let the fan draw in the air through apertures in the floor on one side of the division, and give it out through similar apertures, or through tubes of any sort, on the other. It is evident, a regular current would thus be produced, more or less powerful according to the size of the fan, and the rapidity of its motion.

2561. *Ventilators, &c.* The general mode of renewing the air, is by opening the sashes or doors of the house, in periods when the exterior temperature and weather is such as not to injure the plants within. The cool air of the atmosphere being then more dense than that of the house, rushes in till it cools down the air of the house nearly to an equilibrium with that without. The next mode most common is that of having a range of boards hinged to oblong openings, in the lower and upper parts of the house, and generally in the front and back wall: those in the back wall opening to the south, or having the opening otherwise guarded, so as to prevent the rushing in of cold north winds. Sometimes these ventilators are made with a cylinder and fans to extract the air, and sometimes, as most generally, they are mere openings of small dimensions; but, in order to effect any circulation or renewal with this sort of ventilators, the opening must have an area of two or three feet, and there must be a considerable difference of temperature between the air of the house and the open air.

2562. *To effect the renewal or cooling down the air, without manual labour*, some contrivances have been adopted besides the automaton gardener of Kewley already described (*fig. 517.*). Dr. Anderson and J. Williams made use of oblong bladders made fast at one end, and with the other attached by means of a cord to a movable pane or small sash. The bladder being filled with air at the common temperature allowed for the house, and hermetically sealed, the window remains at rest; but as the air of the house becomes heated, so does that of the bladder, which consequently swells, and assumes the globular form; its peripheries are brought nearer together, and of course the sash or pane

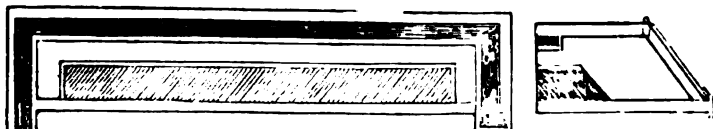
pulled inwards. In a small house this scheme may answer perfectly well for the prevention of extreme heat. Another mode is by using a rod of metal, such as lead, of the whole length of the house, and one end being fixed to the wall, on the other is attached a series of multiplying wheels, the last of which works into one, which in various ways may open valves or shades. As the expansion of lead is considerable, the effect of twenty degrees of increase, with proper machinery, might perhaps guard against extremes, as in the other case. A column of mercury, with a piston-rod and machinery attached, has also been used, and a ring on a barometrical principle is suggested by Silvester; but the only complete mode is that of Kewley. For details at greater length on all the departments of the construction of hot-houses, see *Remarks, &c.* 4to. 1817.

SECT. IV. Mushroom-houses.

2563. The mushroom-house is a genus of plant-habitation, which differs from the others in requiring very little light. The simplest form of the mushroom-house is that of an open shed or roof, supported on props, for throwing off the rain, and protecting from perpendicular cold. Under this, the mushrooms are grown on ridges, covered by straw, &c. to maintain the requisite temperature.

2564. The fixed mushroom-house (*fig. 608.*) is an improvement on the shed, by being better calculated for growing them in winter. Provided it be placed in a dry situation,

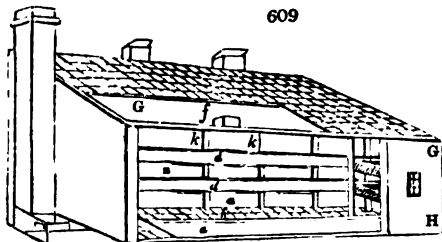
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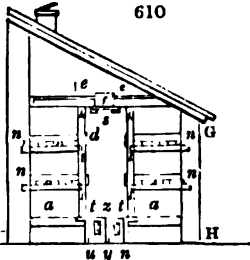
the aspect, size, proportions, doors, or windows are of little consequence. To be sufficiently warmed by one fire in winter, it should not contain more than 10,000 cubic feet of air. As mushrooms will not thrive without some light, and at all events require air, it ought to have two or three windows or valves for these purposes.

2565. The German mushroom-house (*figs. 609, 610, and 611.*) is a common practice with German gardeners to grow mushrooms on shelves, and in pots and boxes, placed behind stages, or other dark parts of their forcing-houses otherwise unoccupied. (*Dietrich's Gartner's Lexicon; Ransleben's Briefe, &c.*) This practice was carried to Russia, and from Russia was brought to England by Isaac Oldacre, who thus describes the sort of house adapted for the German practice: — "The outside walls (G, H, *figs. 609, 610.*) should be 8½ ft. high for four heights of beds, and 6½ ft. high for three heights, and 10 ft. wide within the walls: this is the most convenient width, as it admits of a set of shelves 9½ ft. wide on each side; and affords a space through the middle

609



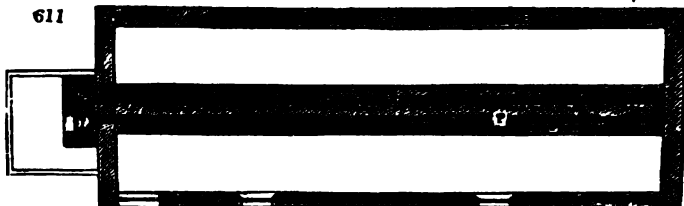
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of the house 3 ft. wide for a double flue and walk upon it. The wall should be 9 in. thick, and the length of the house as it may be judged necessary. When the outside of the house is built, make a floor or ceiling over it (as high as the top of the outside walls) of boards 1 in. thick, and plaster it on the upper side (e e) with road-sand well wrought together, 1 in. thick (this will be found superior to lime), leaving square trunks (f) in the ceiling, 9 in. in diameter, up the middle of the house, at 6 ft. distance from each other, with slides (o) under them, to admit and take off air when necessary; this being done, erect two single brick walls (v v), each 5 bricks high, at the distance of 5½ ft. from the outside walls, to hold up the sides of the floor-beds (a a), and form one side of the air-flues (t u, t u), leaving 3 ft. up the middle (t, x, t) of the house for the flues. Upon these walls (v v) lay planks (t, v) 4½ in. wide, and 3 in. thick, in which to mortise the standards (t, k) which support the shelves. These standards should be 3¼ in. square, and placed 4 ft. 6 in. asunder, and fastened at the top (k k), through the ceiling

When the standards are set up, fix the cross bearers (*i, n, i, n*), that are to support the shelves (*o o*), mortising one end of each into the standards (*i*), the other into the walls (*n*). The first set of bearers should be 2 ft. from the floor, and each succeeding set 2 ft. from that below it. Having thus fixed the uprights (*i, n*), and bearers (*i, n*), at such a height as the building will admit, proceed to form the shelves (*o o*) with boards 1½ in. thick, observing to place a board (*d d*) 8 in. broad and 1 in. thick, in the front of each shelf, to support the front of the beds. Fasten this board on the outside of the standards, that the width of the beds may not be diminished. The shelves being complete, the next thing to be done is the construction of the flue (*P*, *fig. 611.*), which should com-

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mence at the end (*L*) of the house next to the door, run parallel to the shelves the whole length of the house, and return back to the fireplace, where the chimney (*S*) should be built: the sides of the flue inside to be the height of four bricks laid flatwise, and 6 in. wide, which will make the width of the flues 15 in. from outside to outside, and leave a cavity (*i, n*, *figs. 609, 610.*) on each side, betwixt the flue and the walls that are under the shelves, and one (*x, y*) up the middle, betwixt the flues, 2 in. wide, to admit the heat into the house from the sides of the flues. The middle cavity (*x, y*) should be covered with tiles, leaving a space (*A*) of 1 in. betwixt each tile for the admission of the heat. The top of the flue, including the covering, should not be higher than the brick walls that form the front of the floor-beds. The reason why the sides of the flues are recommended to be built stronger than usual, is, because they support the walk. The walk itself is formed by three rows of tiles, the outside rows making the covering of the flues, and those of the centre row are what cover the middle cavity (*x, y*), as above mentioned; the outside cavities (*i, n*) of the flue are left open, the tiles which are placed over the flues being laid so as not to cover these cavities, which allows the heat of the sides of the flues to rise upwards." (*Oldacre*, in *Hort. Trans.*, vol. ii.)

2566. *Callow's mushroom-house* is a very simple structure, but one in which mushrooms can be grown with greater facility than in any other. As this result depends more on the mode of culture than on the form of the house, we shall reserve what we have to say of both till we treat of the culture of this vegetable.

SECT. V. Cold Plant-habitations.

2567. *Cold plant-habitations*, though seldom or never erected, yet deserve to be mentioned as resources under certain circumstances. These circumstances may be, a desire to cultivate the alpine plants of Europe in tropical climates, or to cultivate the mosses and ferns of the north of Europe in its more southern countries.

2568. *The principle on which a cold house can be constructed in a warm climate* must either be that of the exclusion of the heat by coverings or envelopes; or the abduction of heat by evaporation or contact with cold bodies. Heat will be, to a certain extent, excluded, by forming the house in the ground; by excluding the sun's rays from its roof; by a high wall on three sides, leaving only an opening in the middle of the north side; and by a double or treble roof of glass to the excavation. A house to be cooled by evaporation may also be sunk in the ground; or it may be raised above it, shaded from the sun, and over it may be supported a number of shower-pipes (2558.), which, by producing a gentle and continual rain on the glass roof and stone or other sides of the house, would draw off much heat by evaporation. Enclosing it by a line of powerful jets d'eau would effect the same purpose. To produce cold by abduction, the house might be sunk; its floor supported on pillars; and its sides and bottom kept in contact with a running stream; or, if it could be afforded, ice renewable as it melted. These hints are sufficient to show how cold plant-habitations may be formed in any climate: to enter more at length on the subject would be useless, in a work calculated chiefly for the climate of Britain.

CHAP. III.

Edifices used in Gardening.

2569. *Edifices of different kinds are required in gardening, for carrying on operations, for retaining or preserving materials and products, and for recreative or decorative purposes. We shall consider the leading kinds, in the order of economical, anomalous, and decorative edifices. In all of these, the details of construction belong to civil architecture; but the design of the greater part ought to be regulated by the judgment of the gardener or garden-architect.*

SECT. I. *Economical Buildings.*

2570. *Economical buildings are chiefly dwellings, store-rooms, and working-places, entrance-lodges, and buildings for procuring or retaining water.*

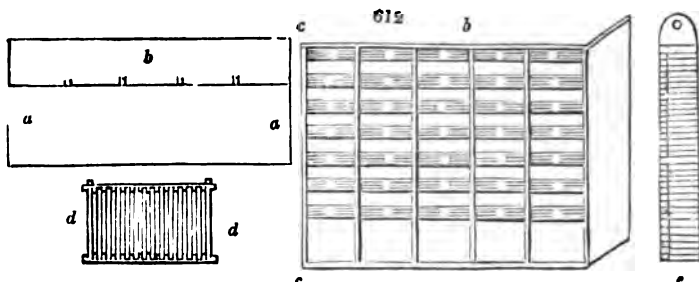
2571. *The head-gardener's dwelling-house, in small places, often assumes the character of porter's lodge to the gate or entrance; or is placed in some point of the grounds requiring protection. In all cases it should be near to the garden, and, if forcing is carried on, the nearer it is placed to that department the better. Sometimes it is placed in the back sheds, but that is an unwholesome situation; such sheds fronting the direct north, and without a single opening to the south, east, or west, are entirely excluded from the sun, except during a few mornings and evenings in summer. A small enclosure, near the forcing-department, and, if possible, on rising ground, so as to command a view of at least that part of the garden, is to be preferred. With respect to accommodation, no dwelling in this country, for a servant expected to do his duty, ought to contain less on the ground-floor than a kitchen, back-kitchen, and parlour; on the floor above that, at least two bed-rooms, with closets, and other requisite appendages, internal as well as external. This will suit a prudent man and his wife, not in circumstances to keep a maid-servant. But for such as afford to keep a servant, or have a large family, more bed-rooms will be necessary, and a larger parlour and kitchen. As a gardener, in commou with other domesticated servants, is liable to be removed from the house he occupies at a short notice, and without any reference to his having, or being able to procure, another, it follows, as a matter of justice, that what are called house-fixtures should be provided by the master. Water should be conducted to a pump fixed in the back-kitchen; a furnace and boiler for washing affixed; a proper range, with oven, &c., dressers, tables, shelves, &c., in the principal kitchen; grates, and such closets and clothes-presses placed in the parlour and other rooms, &c., such as the occupier would place there, if he held the house on lease. In general, we may observe, that a master has seldom occasion to repent making his servants' abode comfortable, and even rather agreeable and elegant, than otherwise. A master of a well-regulated mind, indeed, will be anxious to effect this, as far as lies in his power, for every portion of animated nature under his protection. Designs for gardeners' houses suitable for being placed on each of the four walls of a rectangular kitchen garden, will be found in the *Gard. Mag.*, vols. viii. and ix.*

2572. *The gardener's office is necessarily omitted in small places; but it is an essential requisite wherever several men are kept. It should, if possible, adjoin the dwelling, and be connected with the seed-room, fruit-room and cellar, root-cellar, tool-house, and gardener's lodge. The furniture or appendages to this room are the writing-desk; a bookcase, containing a small library to be lent out to the men; a map of the garden, and of all the grounds under the master's care; a herbarium press; and a cabinet for such specimens of plants as the gardener may find it useful to dry for his own use; or, as often happens, for that of his family; a drawing-board and T square; a board, to be used when new grounds are laying out, as a *plane table* (in geometry); a theodolite, Gunter's chain, and measuring laths; with any similar articles, as spare thermometers, budding-knives, &c.*

2573. *The seed-room may be connected with the office by a door in the lobby. This should be a small room, well ventilated, with a cabinet of drawers, as in a common seed-shop, but on a smaller scale and somewhat different system. The lower tier of drawers should, of course, be the largest, and may be one foot deep by two wide on the face, and eighteen inches broad within. This tier will serve for beans, peas, acorns, mast, &c. A second may be three fourths the size, for carrot, turnip, spinach, larch-seed, &c. A third, half the size, for salad-seeds; and the fourth, for those of pot and sweet herbs, need not be more than four inches deep on the face. The upper part of the cabinet may consist of shallow drawers, divided into ten or twelve compartments each, for flower-seeds; and on the top of all, as being least in requisition, similar shallow drawers, with movable partitions for bulbous roots. As the kind or kinds placed in each drawer will probably vary every year, it seems better that their names should only be written on paper and pasted on. There ought to be a small counter, with a weighing machine (that of *Med-**

Aurst is preferable), an inkstand placed on it, and drawers, with paper bags, packthreads, &c. below. Some seeds, which it is desirable to keep in the fruit, as capsicum, pompon, &c. may be suspended from rows of hooks fixed in the ceiling.

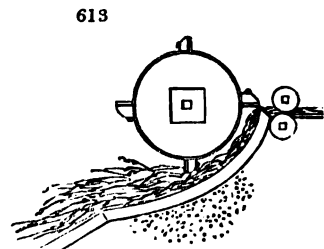
2574. *The fruit-room* may be connected with the seed-room. This ought to be well ventilated; for which purpose, like the three other rooms, it ought to have a small fire-place. The fruit-room was formerly a mere loft, where fruits were kept on the floor in common with onions, with no proper means of separation, or arrangement for systematic consumption. Now, however, they are regularly fitted up, either with shelves of lattice-work, on which to place sieves of different sorts of fruit; or with close shelves, for jars, boxes, &c. according to the various modes adopted of preserving them. The room may be of any form; but one long and narrow (*fig. 612. a a*) is generally best adapted for



ventilation and heating, or drying, when necessary, by a flue. The system of shelves (*b*) may be placed along one side, and may be raised to the height of six feet or more, (*c c*), according to the number wanted. These shelves are formed of open work (*d d*), on which to place square sieves of fruit, each of which should be numbered, and a table or slate (*e*), containing the corresponding numbers, may be hung up in the room, and opposite each number should be a space for noting down daily the number taken out of each sieve for use. From this table statements may be made from time to time of the quantity of fruit on hand for the use of the house-steward. (*Maher*, in *Hort. Trans.* vol. ii. p. 76.) Forsyth directs that all the floors or shelves on which apples are to be kept or sweated, should be made of white deal, as, when red deal is made use of for these purposes, it is liable to give a disagreeable resinous taste to the fruit, and spoil its flavour: when white deal cannot be procured, he advises covering the shelves with canvass. Those sorts of fruit which keep longest are generally best preserved in jars, excluded from the air, and placed in cold dry situations, not under 32° nor above 40°.

2575. *The root-cellar* should be placed beneath the office and seed-shop; and the fruit-cellar below the fruit-room, and both descended to from the lobby. The great object is, to keep the air in these apartments cool; and always, as near as possible, of the same degree of coolness: and for this purpose, the windows should be small, placed below the ground level, and furnished with double or treble casements or sashes. These cellars should also be approached through double doors, for the same reason. The fruit-cellar may be fitted up with bins or cells, like a wine-cellar, in which casks and jars or sieves of fruit may be placed; and the root-cellar may have a few divisions on the ground, to keep different roots apart, and sand, to keep them of uniform plumpness or moisture.

2576. *The seed-rooms or garrets* may consist of one for drying and cleaning seeds; one for drying bulbous roots, as onions, hyacinths, &c.; and one for drying fruits, or preserving them there. In all of these rooms there should be hooks from the roof for hanging bundles of pot-herbs, branches of seeds, sieves, bags, &c., and a movable table or counter in the centre of each, with lattice-shelves below, for holding sieves of roots, seeds, or fruits. A very small fanning-machine, and a couple of grooved cylinders to act as a threshing machine, or a Meikle's hand threshing machine (*fig. 613.*), to be worked by two men, are requisite appendages to the seed-room. Supposing these rooms to



form one wing to the gardener's house, the office opening into his kitchen; then the other wing may consist of a tool-house and men's living-room on the ground floor;

cellars for potatoes and fuel for their use under, and sleeping-apartments over, with a door, lobby, and stair, corresponding with the other wing.

2577. *The tool-house* is commonly a small apartment in the back sheds of hot-houses, in which the tools are laid down or piled up in the angles promiscuously; but in a proper tool-room, wherever situated, there should be contrivances of different sorts for hanging up the tools, so that their important parts, such as the teeth of rakes, blades of hoes and spades, &c. may always be so exposed that the master may see whether or no they are properly cleaned. There are certain tools, of which each workman appropriates one to himself, as spades, scythes, &c.; in these cases a small space should be allotted to each hired man, with his name affixed, &c. Watering-pots, syringes, engines, &c. should have their moveable parts separated, and be reversed, in order that they may drain and continue dry. Lists, nails, and mat-ties, should be kept in close drawers. Pruning instruments oiled, and laid horizontally on latticed shelves or pins. A grindstone and other stones, and bones, with a vice and files for sharpening the tines and teeth of forks and rakes, are the appropriate furniture of the tool-house.

2578. *The lodge for under-gardeners* should never consist of less than three apartments or divisions: first, an outer lobby, with a pump and exit for water, in which the workmen may wash their hands on entering to their meals, and the party who acts as cook or servant, which is generally taken by turns, may wash, scour, &c.; secondly, the cooking and living room, in which should be an economical kitchen-range, with an oven and boiler included, and proper closets, cupboards, tables, &c. to expedite and simplify cooking; and, thirdly, the bedroom over, where the bedsteads should be of iron, narrow, and without curtains, and for not more than one person. To each bed there should be a small clothes-press, in which should be kept the linen, &c. belonging to each bed, and for which the occupier ought to be rendered responsible. A cellar for fuel and edible roots should be formed below. It is a common practice to place the lodges for working gardeners behind the hot-houses, or some high wall, in what is called a back shed. There, in one ill-ventilated apartment, with an earthen or brick floor, the whole routine of cooking, cleaning, eating, and sleeping is performed, and young men are rendered familiar with filth and vermin, and lay the foundation of future diseases, by breathing unwholesome air, and checking the animal functions by cold and damp. How masters can expect any good service from men treated worse than horses, it is difficult to imagine; but the case is tenfold worse, when head-gardeners and their families are compelled to lodge in these shed-houses. Independently of filth and incommodiousness, the mother never fails to contract, early in life, rheumatism or ague; and it is only the extreme healthfulness of the employment of gardening, and the consequent vigour of the operatives, that ward off till a later day the same and similar diseases in the fathers and journeymen. (See *Encyc. of Cott. Arch.*, § 1336, § 1337.)

2579. *As a general arrangement of a gardener's house, office, and other appendages*, the house may form a centre; the office, seed and fruit apartments, cellar, and garrets, one wing; and the lodge for under-gardeners, tool-house, &c. the other.

2580. *A line of sheds* is generally placed behind the range of hot-houses, or behind the hot-wall, or other high wall of the garden. These are used as stores, or places of reserve for utensils, machines, and implements, and for working-sheds. The width and height of this line of sheds is necessarily regulated by the height of the wall. The roof of the shed, being towards the north, and therefore without the advantage of the sun to dry it after rains, should not make an angle of less than 40° with the horizon, and as the lower wall or line of props ought, at least, to be seven feet high above the level of the floor of the shed, the width is regulated accordingly. All the fitting up requisite for the part destined to hold materials, is a few hooks and projecting pins for ladders, &c. and a sound floor, either paved or prepared with mortar, Roman cement, and scoria; and the whole or the greater part of the division may have props or piers in front, instead of a wall and windows.

2581. *The part of these sheds more particularly set apart for working* ought to be enclosed with a wall on all sides, and warmed by a fire-place or flue. It ought to be made perfectly light, and well aired by having numerous windows, and along these a range of benches or tables, for potting cuttings or bulbs, sowing seeds, preparing cuttings, number-tallies, painting and naming them, preparing props for plants, hooks for ladders, lists for wall-trees, making baskets, wattled hurdles, and a great variety of other operations performed in winter, or severe weather, when little or nothing can be done in the open air. It may by some be thought too great a refinement to warm such sheds; but if work is really expected to be done in them during cold weather, the saving will soon be rendered obvious.

2582. *In small gardens*, where there are no hot-houses, one small building is generally devoted to all the purposes for which the office, seed, tool, and fruit rooms, and working-sheds, are used. This should be fitted up with some degree of attention to the various uses for which it is designed, and a fire-place never omitted.

2583. *Buildings for raising water.* There are various contrivances for procuring water in garden-scenery, where it is not found in springs, rills, or lakes; and where it is found, of collecting and retaining it. The principal of these are wells, conduit-pipes or drains, and reservoirs.

2584. *Wells* are vertical excavations in the earth; always of such a depth as to penetrate a porous stratum charged with water, and mostly as much deeper as to form a reservoir in this stratum or in that beneath it. A well otherwise excavated is a mere tank for the water which may ooze into it from the surface strata. The form of the well is generally circular, and to prevent the crumbling down or falling in of the sides, this circle is lined with timber, masonry, or zones of metal. The earthy materials being thus pressed on equally in every point of this circle, are kept in equilibrium. When the well is not very deep, and in firm ground, this casing is built from the bottom to top, after the excavation is finished; but when the soil is loose, the excavation deep, or its diameter considerable, it is built on the top in zones, sometimes separated by horizontal sections of thin oak boards, which, with proper management, sink down as the excavation proceeds. There are various other modes, which those who follow this department of architecture are sufficiently conversant with. The height to which the water rises in the well depends on the height of the strata which supply the water; occasionally it rises to the surface, but generally not within a considerable distance. In this case it is raised by buckets and levers, by buckets and hand-machines placed over the well, or by buckets raised by horse-machines.

2585. *The process of boring the earth for water* has of late been successfully practised in various places, and especially at Tottenham in Middlesex, and Mitcham in Surrey. An augur like that used in draining is employed; and when the spring is reached, the augur hole is kept open by tin tubes soldered one to the other as they are pushed down. Up these tubes the water rises to the height of the source of the spring; and when this height does not reach the surface, a well is dug down to the level to which the water will rise. It is evident, that where the spring will rise to the surface, boring must be a great saving, but less so in proportion as the source of the spring is low. (*London Journal of Arts*, &c. Oct. 1822, p. 204.) Copious details on this subject, illustrated by all the latest invented boring apparatus, will be found in the *Encyc. of Agric.* 2d edit., § 2507 to § 2519.

2586. *Pumps* are of various kinds; as the lifting pump; the forcing pump, for very deep wells; the suction pump; and Siebe's rotatory pump, a recent invention for such as do not exceed thirty-three feet in depth. A good pump for gardens, where the water is not to be raised above twenty-eight or thirty feet in depth, is that of Robertson Buchanan (author of a *Treatise on Heating by Steam*, &c.), because this pump, which also acts by the pressure of the atmosphere, will raise drainings of dunghills, or even water thickened by mud, sand, or gravel. Aust's (of Hoxton) *curvilinear* pump is preferable even to Buchanan's. The advantages depend on the curvilinear form of the barrel, which allows, and indeed obliges, the rod, the handle, and the lever, on which it works, to be all in one piece. Hence simplicity, cheapness, precision of action, more water discharged in proportion to the diameter of the barrel, and less frequent repairs. (*Repertory of Arts*, Jan. 1821.) Perkins's square-barrelled pump is a powerful engine (*London Journal*, &c.); but for this and other contrivances for raising water we must refer to works on hydraulics.

2587. *Reservoirs for water* may be either tanks, cisterns, basins, or ponds. Tanks and cisterns are sometimes old barrels well tarred or painted, and then sunk in the soil; occasionally they are framed boxes of timber, the joints filled with oxide of lead and oil, and the whole pitched over, and then placed where they are to remain either above or on a level with the surface.

2588. *Ponds, or large basins* (fig. 614.), are reservoirs formed in excavations, either in soils retentive of water, or rendered so by the use of clay. This clay is tempered, or made compact and tenacious, by working it so as to exclude the larger globules of air and water, and intimately unite all its parts with as much moisture as leaves it plastic. The bottom and sloping sides of the excavation being smoothed and made firm, this tempered clay or puddle is to be spread evenly over it, from margin to margin, about a foot thick, and well compacted by beating. To preserve it from injury by the pressure of feet, or other accidents, it should be covered with gravel, in thickness according to the supposed liability to accidents. If cattle are to enter it, eighteen inches of coarse gravel, or stones covered with six inches of fine gravel, will not be too much. Sometimes these basins are lined with pavement, tiles, or even lead; and the last material is the best, where complete dryness is an object around the margin.

2589. *Tanks, or cisterns* (fig. 615.), are generally excavations in the earth, lined with masonry, and sometimes raised two or three feet above it. This masonry is always built with mortar which sets or hardens under water, as the Dorking and other sorts of lime, gypsum, and any lime mixed with oxide of iron, in the form of what is called Roman cement, or Puzzolana earth. (*Davy's Elements of Agr. Chem.*, lect. vii.) To

protect this, the bottom of the cistern or basin is sometimes covered with six or eight inches of clay. Sometimes the bottom of the excavation for a pond or tank is naturally

614

615

616



a retentive clay, while the sides are of porous earth. In this case, the simplest way is to raise a wall, or vertical stratum of puddle (*fig. 616.*), from the horizontal stratum of clay, to within a few inches of the surface of the ground.

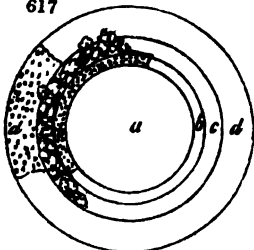
SECT. II. Anomalous Buildings.

2590. *Collecting and preserving ice, rearing bees, &c.* however unsuitable or discordant it may appear, it has long been the custom to delegate to the care of the gardener. In some cases also he has the care of the dove-house, fish-ponds, aviary, a menagerie of wild beasts, and places for snails, frogs, dormice, rabbits, &c.; but we shall only consider the ice-house, apiary, and aviary, as legitimately belonging to gardening, leaving the others to the care of the gamekeeper, or to constitute a particular department in domestic or rural economy. That the subject of anomalous buildings may not occur again, we shall here conclude it by treating also of their management.

SUBJECT. 1. Of the Ice-house and its Management.

2591. *The ice-house.* Ice is kept on the continent in cellars, at a greater or less depth from the surface according to the climate. These cellars are without windows, surrounded by very thick walls, and entered by double and treble doors, sometimes placed in angular or circuitous passages, and always with intervals of several feet between them. Sometimes precautions are taken to carry off any water which may arise from a partial thaw, by forming gutters across the floor, and covering it with a grating of strong lattice-work, leading to a cess-pool in the passage, whence the water can be taken out by utensils without opening the inner door; but very frequently full confidence is had in the coolness of the situation, especially if the surrounding soil be dry. Ice is kept in the cellars of confectioners, and also by some of the market-gardeners, in heaps, with a very thick covering of straw or reeds.

617



2592. *To keep ice in sacks or heaps in the open air,* an elevated circular platform (*fig. 617. a*) is raised of earth; on this the ice is piled up in a conic form during a severe frost, and the addition of water enables the builder to form the cone very steep. On this cone wheat-straw is laid a foot in thickness (*b*), over this a stratum of faggot-wood or spray (*c*), and finally another thick stratum of thatch or long litter of any sort (*d*). In this way ice will keep a year, care being taken to expose it to the air as short time as possible in taking out supplies.

2593. *The form of ice-houses* commonly adopted at country-seats, both in Britain and in France, is generally that of an inverted cone, or rather hen's egg with the broad end uppermost (*fig. 618.*)

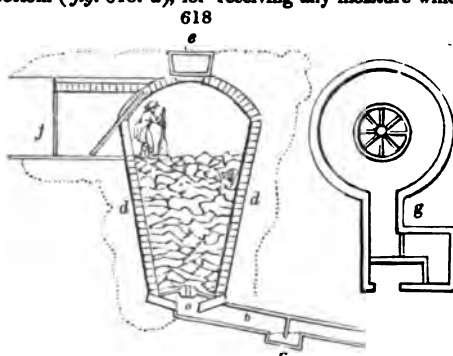
2594. *The proper situation for an ice-house* is a dry spot of ground, as, wherever there is moisture, the ice will be liable to dissolve; of course, in all strong soils which retain the wet, too much care cannot be taken to make drains all round the house to carry off the moisture. The situation should likewise be elevated, that there may be descent enough to convey off any wet that may arise near it, or from the ice melting.

2595. *The depth and diameter of the ice-well* should be proportioned to the quantity of ice wanted; but it is always best to have sufficient room, as when the house is well-built, it will keep the ice two or three years: and there will be this advantage in having it large enough to contain ice for two years' consumption,—that if a mild winter should occur, when there is not ice to be had, there will be a stock in the house to supply the want. Where the quantity wanted is not great, a well of six feet diameter, and eight feet deep, will be large enough; but for a large consumption, it should not be less than nine or ten feet diameter, and as many deep.

2596. *The excavation for the ice-well,* where the situation is either of a dry, chalky,

gravelly, or sandy kind, may be made entirely below the surface of the ground; but in strong loamy, clayey, or moist ground, it will be better to raise the well so high above the surface, as that there may be no danger from the wetness of the soil.

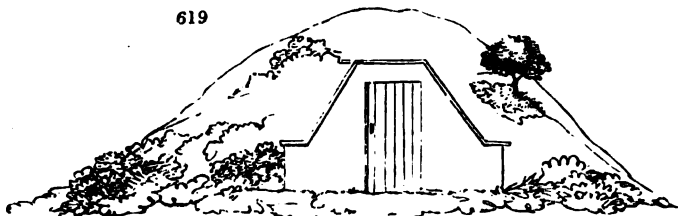
2597. In building the ice-well there should be a space about two feet deep left at the bottom (*fig. 618. a*), for receiving any moisture which may drain from the ice; and a



small underground drain (*b*), containing a stop or trap for the exclusion of air (*c*), should be laid from this, to carry off the wet. Over the space at bottom (*a*) should be placed a strong grate of wood or an old cart-wheel, to let the moisture fall through, which may at any time be produced by the melting of the ice. The sides of the well (*d*) must be walled up with brick or stone at least two feet thick; or the wall may be built hollow. When the proper height is attained, the wall may be arched over with two

arches with a vacuity between, leaving in the centre a hole for the admission of the ice (*e*), and in the sides a door for taking it out (*f*). This door, in order the better to exclude the air, should open into a porch (*g*) with the three other doors, the spaces between which should be filled with straw to exclude more effectually the heat of the atmosphere. The doors should not be on hinges, but be made in two or three parts, falling in a rebate, or groove, from the top; this makes the removal of the straw in the porch unnecessary, when taking out supplies. The whole being covered first with a layer of tempered clay and next with a hill of earth, the appearance will not be disagreeable (*fig. 619.*), and may be made ornamental.

619



2598. *Management.* When the house is finished, it should have time to dry before the ice is put into it; as when the walls are moist, the damp of them frequently dissolves the ice. At the bottom of the well, upon the wooden grate, some small faggots should be laid; and if upon these a layer of reeds be placed smooth for the ice to rest upon, it will be better than straw, which is commonly used. In the choice of the ice, the thinner it is, the better it may be broken to powder; as the smaller it is broken, the better it will unite when put into the well. In putting it in, it should be rammed close, and a space left between it and the wall of the well, by straw being placed for the purpose, so as to give passage to any moisture that may be collected by the dissolving of the ice on the top or otherwise. If snow be used instead of ice, it ought to be pressed very firmly together, so as to exclude air, and in fact approach in texture to ice. To aid in consolidating both ice and snow, a little water may be occasionally poured over it from the rose of a watering-pot. An experienced gardener, in filling his ice-house, after laying down the ice outside the door, pounds it into particles not larger than those of sand or salt. He then carries it into the house, and throws it into the ice-well, in which a man is placed with a rammer to beat and ram it closely; occasionally sprinkling it with a little water to consolidate the whole. When this water is impregnated with salt at the rate of 10 lbs. to 10 gallons, and poured on the ice in such quantities as to saturate it completely, the ice will become as firm as rock, and will keep three times as long as when common water is used. It will also be found to keep much longer when exposed to the air. The reason is to be found in the well-known chemical fact, that salt water, and consequently salted ice, has a less capacity for heat than fresh water or fresh ice. (*Ency. of Cott. Arch.*, § 737.)

2599. An ice-cold chamber is found of great use in horticulture, in preserving vege-

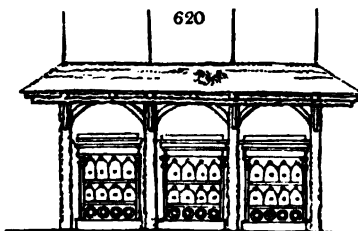
tables, as peas, beans, cauliflowers, &c., in a fresh state, for some time after they are gathered. Potatoes and other tubers and bulbs, also plants in pots, cuttings, &c., may have their vegetation retarded by being placed in so cold an atmosphere. Several ice-houses, Neill informs us, excellently adapted not only for the main purpose, but for these secondary views, which nowise interfere with the other, have lately been constructed in the neighbourhood of Edinburgh, under the directions of Hay, particularly at Dalmeny Park and Dundas Castle. These ice-houses have double walls, a passage being left between the outer and inner. In the thick wall immediately enclosing the ice, are four recesses, with stone shelves for receiving the vegetables or fruits. In the outer wall, the same object is provided for. The roof, it may be added, is arched with stone, and has a hole in the top, over the centre of the ice-chamber, for introducing the ice. The passage between the two walls is likewise arched, and has two or three small grated apertures, which are closed with fitted stones, and may be opened for the purpose of admitting light and air when wanted. (*Supp. to Encyc. Brit. art. Hort.*)

2600. If an ice-cellar were added to the domestic offices of country-seats, and the ice preserved in it, and placed under the immediate care of the steward or housekeeper, it would certainly be more convenient for culinary use, and attended with less risk of melting when ice was taken out. Ice-cold rooms, which would be found useful for various purposes in domestic economy, might be formed adjoining. It is possible, however, that artificial modes of producing cold and ice as wanted, may supersede the use of ice-houses altogether.

SUBJECT. 2. *Of the Apiary, and the Management of Bees.*

2601. The care of bees seems more naturally to belong to gardening than the keeping of ice; because their situation is naturally in the garden, and their produce is a vegetable salt. The garden-bee is found in a wild state in most parts of the globe, in swarms or governments; but never in groups of governments so near together as in a bee-house, which is an artificial and unnatural contrivance to save trouble, and injurious to the insect directly as the number placed together. Thus, if ten acres are sufficient to maintain two hives, a hundred acres will be required to maintain twenty; but while, in the former case, the hives being placed in the centre of the ten acres, each bee need not perform a longer journey than two hundred yards; in the latter, the colony being similarly situated as to the hundred acres, the average journey for each insect will be nearly a mile. Hence, independently of other considerations, one disadvantage of congregating hives in bee-houses or apiaries. The advantages are, greater facility in protecting from heats, colds, or thieves, and greater facilities of examining their condition and progress. Independently of their honey, bees are considered as useful in gardens, by aiding in the impregnation of flowers. For this purpose, a hive is sometimes placed in a cherry-house, and sometimes in peach-houses; or the position of the hive is in the front or end wall of such houses, so as the body of the hive may be half in the house and half in the wall, with two outlets for the bees, — one into the house, and the other into the open air. By this arrangement, the bees can be admitted to the house and open air alternately, and excluded from either at pleasure.

2602. The apiary, or bee-house. The simplest form of a bee-house consists of a few shelves in a recess of a wall or other building (*fig. 620.*) exposed to the south, and with or without shutters, to exclude the sun in summer, and, in part, the frost in winter.



Bee-houses may always be rendered agreeable, and often ornamental objects: they are particularly suitable for flower-gardens; and one may occur in a recess in a wood or copse, accompanied by a picturesque cottage and flower-garden. They enliven a kitchen-garden, and communicate particular impressions of industry and usefulness. So many works of easy access have been published on the subject of bees, that we do not think

it necessary to enter into details. The reader may consult *Puys's Apiarian's Guide*, as one of the latest, and as being divested of many of the fancies which characterise modern works on this subject.

SUBJECT. 3. *Of the Aviary, and of Menageries, Piscinaries, &c.*

2603. The aviary was common to the country-houses of the Romans, but used principally, as it would appear from Pliny, for birds destined to be eaten. Singing birds, however, were kept by the Persians, Greeks, and also the Romans, in wicker cages; and these utensils, no doubt, gave rise to the large and fixed cage called an aviary; but in

what country, and in what age, appears uncertain. They are highly prized in China, and seem there to confer about a similar degree of dignity to a house and family as does a large conservatory in this country; for in the alterations which took place during Lord Amherst's embassy, it was stated, on the part of the emperor, that Sir George Staunton had profited greatly from China, and had built himself a house and an *aviary*. That they were in use in England in Evelyn's time, is evident from a memorandum entered in his Diary, that the Marquis of Argyll took the parrots in his aviary at Sayer's Court for *owls*.

2604. *The canary or singing bird aviary* used not unfrequently to be formed in the opaque-roofed green-house or conservatory, by enclosing one or both ends with a partition of wire; and furnishing them with dead or living trees, or spray and branches suspended from the roof for the birds to perch on. Such are chiefly used for the canary, bullfinch, linnet, &c.

2605. *The parrot aviary* is generally a building formed on purpose, with a glass roof, front, and ends; with shades and curtains to protect it from the sun and frost, and a flue for winter heating. In these, artificial or dead trees with glazed foliage are fixed in the floor, and sometimes cages hung on them; and at other times the birds allowed to fly loose. An aviary of this sort was built at Morden by the late Abraham Goldschmidt.

2606. *The verdant aviary* is that in which, in addition to houses for the different sorts of birds, a net or wire curtain is thrown over the tops of trees, and supported by light posts or hollow rods, so as to enclose a few poles, or even acres, of ground, and water in various forms. In this the birds in fine weather sing on the trees, the aquatic birds sail on the water, or the gold pheasants stroll over the lawn, and in severe seasons they betake themselves to their respective houses or cages. Such an enclosed space will of course contain evergreen, as well as deciduous trees, rocks, reeds, aquatics, long grass for larks and partridges, spruce firs for pheasants, furze-bushes for linnets, &c. An aviary, somewhat in this way, was formed by Catherine of Russia, in the Hermitage Palace; and at Knowsley in Lancashire. In short, these are the only sorts admissible in elegant gardens; since nothing surely to one who is not an enthusiast in this branch of natural history, can be more disagreeable than an apartment filled with the dirt and discordant music of innumerable birds, such, for example, as the large aviary at Kew. Birds from the hot climates are sometimes kept in hot-houses among their native plants, as in the large conservatories at Alton in Britain, and at Vienna. In this case, the doors and openings for giving air must be covered with wire-cloth, and the number must not be great, otherwise they will too much disfigure the plants with their excrement.

2607. *Gallinaceous aviary*. At Chiswick, portable netted enclosures, from ten to twenty feet square, are distributed over a part of the lawn, and display a curious collection of domestic fowls. In each enclosure is a small wooden box or house for sheltering the animals during night, or in severe weather, and for breeding. Each cage or enclosure is contrived to contain one or more trees or shrubs; and water and food are supplied in small basins and appropriate vessels. Curious varieties of aquatic fowls might be placed on floating aviaries on a lake or pond.

2608. *Menageries* were formerly attached to most of the royal gardens and parks of Europe. The most complete examples are those of the Paris garden, and of the two London Zoological Gardens, constructed and arranged, as much as possible, according to the natures and habits of the different animals enclosed. The subject, however, can hardly be considered within our department.

2609. *The piscinary, cochlearium, ranarium, columbarium, &c.* belong to that part of rural economy which forms the connecting link between rural and domestic economy.

SECT. III. Decorative Buildings.

2610. *The general characteristic of decorative buildings is*, that they are introduced more for their picturesque effect as parts of external scenery, than as absolutely necessary. Their construction, like the others, belongs chiefly to civil architecture and sculpture; but the choice and emplacement to gardening. Their variety is almost endless; but we shall rank a few selections under the different heads of useful, convenient, and characteristic decorations.

SUBJECT. 1. Useful Decorative Buildings.

2611. *Useful decorations* are such as, while they serve as ornaments, or to heighten the effect of a scene, are also applied to some real use, as in the case of cottages and bridges. They are the class of decorative buildings most general, and least liable to objection.

2612. *Cottages* are of various sorts: one grand division is founded on the style of architecture employed, as Grecian, Gothic, Chinese, &c.; another, on the materials used, as stone, brick, timber unbarked, or wicker-work, with moss or mud; and another, on the peculiar style of different countries, as English, Swedish, Italian, &c. This sub-

ject will be found treated at length in our *Encyclopedia of Cottage, Farm, and Villa Architecture*.

2613. *The bridge* is one of the grandest decorations of garden-scenery, where really useful. None require so little architectural elaboration, because every mind recognises the object in view, and most minds are pleased with the means employed to attain that object in proportion to their simplicity. There are an immense variety of bridges, which may be classed according to the mechanical principles of their structure, the style of architecture, or the materials used. With respect to the principles of their mechanical structure, the materials of bridges are held together, either by their gravity, as in all arches, whether of stone, iron, or timber; or by their tenacity, as in single planks, flat bridges of iron or timber, and those new and wonderful exertions of ingenuity, suspended bridges, of which fine examples have been executed across the Menai and the Tweed, and the principles of which we have elsewhere (*Annals of Philosophy*, Jan. 1816) entered into at large. With respect to styles of architecture, the bridge affords little opportunity of detailed display; but the openings may be circular or pointed arches, or right-lined, or a mixture of these. As to material, bridges of tenacity are formed of timber or wrought iron; bridges of gravity, generally of cast iron or stone; but they may be formed of any material. This subject will be found treated at length in our forthcoming *Encyclopedia of Landscape Gardening and Garden Architecture*.

2614. *Sepulchral structures* have been adopted as parts of garden-scenery from the earliest times. They are most common in the Protestant countries of Europe, and in England are to be found in parks and pleasure-grounds in various characters and styles, from the consecrated flower-plot, as at Nuneham Courtenay, to the superb mausoleum of Castle Howard, or of Cobham Hall.

2615. *The gate* is of various forms and materials, according to those of the barrier of which it constitutes a part. In all gates, the essential part of the construction, or those lines which maintain its strength and position, and facilitate its motion, are to be distinguished from such as serve chiefly to render it a barrier, or as decorations. On this subject ample information will be found in the *Encyclopedias of Agriculture, and of Cottage and Villa Architecture*.

2616. *Rails or fences*, for parks and garden-scenery, are, as to lines, similarly characterised as gates; and, like gates, fences are of many species, from the rudest barriers without nails or iron-work (fig. 621.), to the numerous sorts of iron and wire barriers. Hurdles, whether of wood or iron, are the most convenient description of temporary fences.

They are manufactured of various forms and dimensions, so as to prove, as to height, and openings between the rails, rods, or wires, barriers to hares, sheep, cattle, or deer. Where iron fences are considered as permanent fixtures, those parts which are inserted in the ground should be of cast iron, as resisting oxidation much better than the wrought material. It ought, at the same time, to be covered with tar, pitch, or pyroligneous acid, or, whilst hot, painted over with oil. For interior fences, poles or laths may be formed into trellis-work of different kinds; preserving the bark of the former, and pitching or charring the ends inserted in the earth. A neat low garden fence, or border, and one which will last a long time, may be made of the stems of young larch-trees (fig. 622.).

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2617. *Walls* are unquestionably the grandest fences for parks; and arched portals, the noblest entrances; between these and the hedge or pale, and rustic gate, designs in every degree of gradation, both for lodges, gates, and fences, will be found in the works of Wright, Gandy, Robertson, Aikin, Pocock, and other architects who have published on the rural department of their art. The pattern books of manufacturers of iron gates and hurdles, and of wire-workers, may also be advantageously consulted.

SUBJECT. 2. *Convenient Decorations.*

2618. Of *convenient decorations* the variety is almost endless, from the prospect-tower to the rustic seat; besides aquatic decorations, agreeable to the eye and convenient for the purposes of recreation or culture. Their emplacement, as in the former section, belongs to gardening, and their construction to architecture and engineering.

2619. The *prospect-tower* is a noble object to look at, and a gratifying and instructive position to look from. It should be placed on the highest grounds of a residence, in order to command as wide a prospect as possible, to serve as a fixed recognised point to strangers in making a tour of the grounds. It may very properly be accompanied by a cottage; or the lower part of it may be occupied by the family of a forester, game-keeper, or any rural pensioner, to keep it in order, &c.

2620. The *kiosque* is the Chinese prospect-tower, of peculiar construction, characterised by numerous stories, designated by projecting roofs and pendent bells. An example exists at Kew, and its details will be found in the *Plans of the Buildings, &c.*, erected there by Sir W. Chambers. Sometimes the prospect-tower is a hollow column, as in the monumental column of London, that to the memory of Lord Nelson at Edinburgh, and to Lord Hill at Shrewsbury; but the stairs in such buildings are necessarily too narrow for the prospect-tower of country-residences; and besides, there can be no rooms as resting-places, which are absolutely necessary, where ease and enjoyment are studied, and where some attention is had to the delicacy of women, and the frailties of old age.

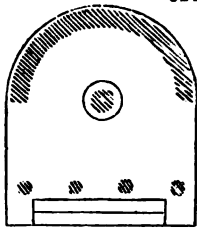
2621. *Temples*, either models, or imitations of the religious buildings of the Greeks and heathen Romans, are sometimes introduced in garden-scenery to give dignity and beauty. In residences of a certain extent and character, they may be admissible as imitations, as resting-places, and as repositories of sculptures or antiquities. Though their introduction has been brought into contempt by its frequency, and by bad imitations in perishable materials, yet they are not for that reason to be rejected by good taste. They may often add dignity and a classic air to a scene; and when erected of durable materials, and copied from good models, will, like their originals, please as independent objects. Knight, and some other connoisseurs of less note, disgusted by the abuse of temples, have argued, as it appears to us, too exclusively against their introduction, and contend for cottages as the fittest ornaments of rural scenery: but why limit the resources of an art, because they are liable to abuse? Thatched roofs may become tiresome, as well as columns; and if Stow is an example of the latter carried to excess, White Knights is as certainly of the former.

2622. *Porches and porticoes* (fig. 623.) are sometimes employed as decorative marks

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to the entrances of scenes; and sometimes merely as roofs to shelter seats or resting benches.

2623. *Alcoves* (fig. 624.) are used as winter resting-places, as being fully exposed to the sun.

2624. *Arbours* are used as summer seats and resting-places: they may be shaded with fruit-trees, as the vine, currant, cherry; climbing ornamental shrubs, as ivy, clematis, &c.; or herbaceous,

as everlasting pea, gourd, &c. They are generally formed of timber lattice-work, sometimes of woven rods, or wicker-work, and occasionally of wire.

2625. The *Italian arbour* (fig. 625.) is generally covered with a dome, often framed of thick iron or copper wire painted, and covered with vines or honeysuckles.

2626. The *French arbour* (fig. 626.) is characterised by the various lines and surfaces, which enter into the composition of the roof.

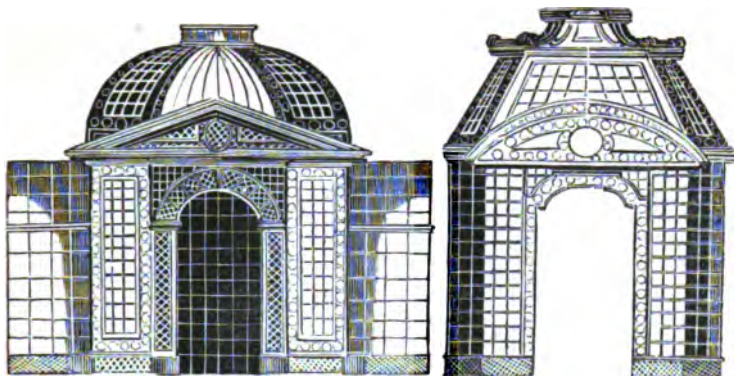
2627. *Caves and caverns*, where they exist naturally in the grounds of a residence, as at Piercefield, Corby Castle, &c., or can be readily formed, are to be regarded more as singularities or picturesque objects than as places of use or enjoyment in this climate; in Italy and Spain they are great luxuries.

2628. *Grottoes* are resting-places in recluse situations, rudely covered externally, and within finished with shells, corals, spars, crystallisations, and other marine and mineral productions, according to fancy. To add to the effect, pieces of looking-glass are inserted in different places and positions.

2629. *Roofed seats, boat-houses, moss houses, flint houses, bark huts*, and similar constructions, are different modes of forming resting-places containing seats, and sometimes other furniture or conveniences in or near them. Very neat buildings and furniture of this class may be formed of hazel-rods; or of any tree with a clean bark and straight

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shoots, as young oaks or mountain ash. The spruce fir affords a good outside material: and five or six young trees coupled together, make good rustic columns. At White Knights, Bagshot Park, the Slopes at Windsor, and Bothwell Castle, are good examples of covered seats of the rustic kind. (figs. 627, 628, 629.)

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2630. *Roofed seats of a more polished description* are boarded structures, generally semi-octagonal, and placed so as to be open to the south. Sometimes they are portable, moving on wheels, so as to be placed in different positions, according to the hour of the day, or season of the year, which, in confined spots, is a desirable circumstance. Sometimes they turn on rollers, or on a central pivot, for the same object, and this is very common in what are called barrel-seats. In general they are opaque, but occasionally their sides are glazed, to admit the sun to the interior in winter.

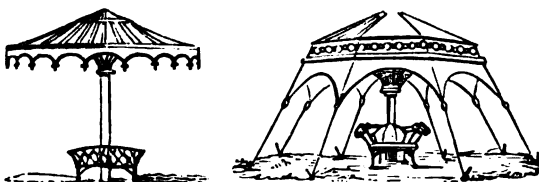
2631. *Folding chairs.* A sort of medium seat, between the roofed and the exposed, is formed by constructing the backs of chairs, benches, or sofas with hinges, so as they may fold down over the seat, and so protect it from rain. After rain, when these backs are replaced in their proper position, a dry seat, and dry back to lean against, are at once obtained.

2632. *Elegant structures of the seat kind for summer use* may be constructed of iron rods and wires, and painted canvass; the iron forming the supporting skeleton, and the

canvass the protecting tegument. The mushroom or umbrella form (fig. 630.), and that of the Turkish tent (fig. 631.), the oriental pavilion, or any other exotic form, free from vulgarity and meagre lines, may be made choice of on such occasions.

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2633. *Exposed seats* include a great variety, rising in gradation from the turf bank to the carved couch. Intermediate forms are stone benches, root stools, sections of trunks of trees, wooden, stone, or cast-iron mushrooms painted or covered with moss, or mat, or heath; the Chinese barrel-seat, the rustic stool, chair, tripod, sofa, the cast-iron couch or sofa, the wheeling-chair, and many sub-varieties.

2634. *Swings, see-saws, &c.*, are not very common in English gardens; but, as exercising places for children, are very proper in retired, but airy parts of the pleasure-ground. In every country-residence where there are children, contrivances for their exercise and amusement ought to be considered essential objects; for these purposes, a riding school, and bath or pond for learning to swim and row a boat, may be considered essential.

2635. *Of constructions for displaying water*, as an artificial decoration, the principal are cascades, waterfalls, jets, and fountains. The foundation of the cascade and waterfall, is the head or dam which must be thrown across the river or stream; and in this, two things are to be considered, its strength, and the materials of which it is composed.

2636. *With respect to strength*, the pressure of water is as its depth, and consequently a dam, whose section is a right-angled triangle, and whose hypotenuse forms an angle of 45° , with the base formed of any material of greater specific gravity than water, would, as far as strength is concerned, hold in equilibrium a body of still water of a depth equal to its perpendicular. If the hypotenuse, or sloping side, be placed next the water, it will more than hold the water in equilibrium, by the weight of the triangle of the water superincumbent on the triangle of the dam or bank.

2637. *That the materials of the bank must be of a nature impervious to water*, and also must adhere to the base or bottom, so as not to admit water to escape beneath it, are obvious conditions of the foregoing proposition. The practice of forming dams or heads is derived from this theory; but to guard against accident, the base of the triangle is always made three or more times greater than its height; the slope next the stream may form an angle with the horizon, of from 40° to 20° , and that on the lower side is regulated by the uses of the dam. If for raising water so as to cover a hollow where there is little or no overflow expected, then the slope on the under side is generally of earth, 40° or 35° , turfed or planted; if for a cascade, the slope is regulated by the form or undulations on which the rocks to produce the breaking of the water are to be placed; and if for a waterfall, a perpendicular wall is substituted, over which the water projects itself in a sheet or lamina, in breadth proportioned to the quantity of the current. In all these cases, instead of forming the dam entirely of materials impervious to water, it is sufficient if a vertical stratum of wrought-clay be brought up its centre, and the surface of the bank rendered firm by a coating of gravel on the slope next the water.

2638. *The construction of the waterfall, where avowedly artificial*, is nothing more than a strong-built wall across the stream, perfectly level at top, and with a strong, smooth, accurately fitted, and well jointed coping. On the perfection of the coping, both as to level and jointing, depends the regular distribution of the thin sheet of water to be projected. Formerly, artificial cascades of this sort were curved in the ground plan, the concavity pointing down the stream, by which some strength and a better view of the water were supposed to be obtained. With respect to strength, this can only hold true, or at least be of consequence, in cases where the upper slope of the dam is very steep, and the force of the current great; and as to a fuller view, this can only take place when the eye of the spectator is in the focus of the segment. Where a natural waterfall is to be imitated, the upright wall must be built of huge irregular blocks; the horizontal lamina of water broken in the same way, by placing fragments of rocks grouped here and there, so as to throw the whole into parts; and, as nature is never methodical, to form it as if in part a cascade.

2639. *In imitating a natural cascade in garden-scenery*, the horizontal line must here also be perfect, to prevent waste of water in dry seasons; and from this to the base of the lower slope the surface must be paved by irregular blocks, observing to group the prominent fragments, and not distribute them regularly over the surface. In the infancy of landscape-gardening, the lower bank or slope of the dam was formed into ogee, and other curves, or a serpentine line, and smoothly paved; fixing, on the convexities of the curves, projecting boards across the current; and the current being thus interrupted, was thrown up in arched waves. Such was the sort of beauty then admired; for it is a long time in the progress of improvement before man can see any other beauty than that which he has himself produced.

2640. *The greatest danger in imitating cascades and waterfalls consisting in attempting too much*, a very few blocks, disposed with a painter's eye, will effect all that can be in good taste in most garden-scenes; and in forming or improving them in natural rivers, there will generally be found indications both as to situation and style, especially if the country be uneven, or stony, or rocky. Nothing can be in worse taste than piles of stones and rocks across a river, either natural or artificial, in a tame alluvial meadow: they may be well chosen fragments from suitable materials, and arranged so as to form a cascade or waterfall very beautiful of itself, but whose beauty is really deformity or monotony, relatively to the surrounding scenery, or to that whole of which it should form an accordant part.

2641. *Jets and other hydraulic devices*, though now less in repute than formerly, are not

to be rejected in confined artificial scenes, and form an essential decoration where the ancient style of landscape is introduced in any degree of perfection.

2642. *The first requisite for jets or projected spouts, or threads of water*, by atmospheric pressure, is a sufficiently elevated source or reservoir of supply. This being obtained, pipes are to be conducted from it to the situations for the jets. No jets, however constructed, will rise as high as the fountain-head; because the water is impeded by the resistance of the air, the friction against the opening of the pipe or adjutage, and its own gravity. It is not easy to lay down data on this head; if the bore of the adjutage be too small, the rising stream will want sufficient weight and power to divide the air, and so being dashed against it will fall down in vapour or mist. If too large, it will not rise at all. The length of pipe between the reservoir and the jet will also impede its rising in a slight degree by the friction of the water on the pipe. This is estimated by P. J. François (*Art des Fontaines*, 137.) at one foot for every hundred yards from the reservoir. The proportion which this author gives to the adjutages, relatively to the conducting-pipes, is one fourth; and thus, for a jet of four lines, or a third of an inch, he requires an adjutage of between four and five lines, and a conducting-pipe of one inch and a half diameter; for a jet of six or seven lines, a conducting-pipe of two inches, and so on. From these data, the height of the fountain and the diameter of the conducting-pipe being given, the height to which a jet can be forced can be estimated with tolerable accuracy, and the contrary; but where the pipes are already laid, and the power of the head, owing to intervening obstructions, not very accurately known, the method by trial and correction, by means of a leaden nozzle, the orifice of which may be readily increased or diminished, will lead to the exact power under all the circumstances.

2643. *Adjutages* are of various sorts. Some are contrived so as to throw up the water in the form of sheaves, fans, showers, to support balls, &c.; others to throw it out horizontally, or in curved lines, according to the taste of the designer; but the most usual form is a simple opening to throw the spout or jet upright. The grandest jet of any is a perpendicular column issuing from a rocky base, on which the water falling, produces a double effect both of sound and visual display. A jet rising from a naked tube in the middle of a basin or canal, and the waters falling on its smooth surface, is unnatural, without being artificially grand.

2644. *Drooping fountains*, overflowing vases, shells (as the *Châma gigas*), cisterns, sarcophagi, dripping rocks, and rock-works, are easily formed, requiring only the reservoir to be as high as the orifice whence the dip or descent proceeds. This description of fountains, with a surrounding basin, is peculiarly adapted for the growth of aquatic plants. Both classes of water-works successfully combine.

2645. *Waste drains*. In all water-works in gardens, pipes or drains must be contrived to carry off such of the water as is not used in culture. The diameter of these should be somewhat larger than the conducting pipes, for obvious reasons.

2646. *Sun-dials* are venerable and pleasing garden decorations; and should be placed in conspicuous frequented parts, as in the intersection of principal walks, where the "note which they give of time" may be readily recognised by the passenger. Elegant and cheap forms are now to be procured in cast-iron, or artificial stone, which, it is to be hoped, will render their use more frequent.

2647. *Fanes* are useful in the same way, but are an unsuitable garden ornament, though frequently introduced on the summits of garden buildings. The ideas to which they give rise, as connected with ships, flags, fairs, military standards, &c., are all opposite to the stillness and repose of gardens. Over a library or office they are useful, connected with an internal index; and they are characteristic and proper over churches, family chapels, clock-towers, and domestic offices.

SUBJECT. 3. *Characteristic Decorations.*

2648. *As characteristic decorations* are purely decorative, without any pretensions to convenience, they should ever be very sparingly employed, and only by persons of judgment and experience. A tyro in gardening will be more apt to render himself ridiculous by the use of decorations than by any other point of practice, and most apt by the use of characteristic decorations.

2649. *Rocks* are generally considered as parts of the foundation of the earth, and their general character is that of grandeur, sometimes mixed with the *singular*, *fantastic*, or *romantic*. Their expression forms a fine contrast to that of perishable vegetation, and therefore they have been eagerly sought after in gardens, both on this account, and as forming a suitable habitation for certain descriptions of plants. Plant-rockworks are protuberant surfaces, or declivities irregularly covered with rocky fragments, land-stones, conglomerated gravel, vitrified bricks, vitrified scorias, flints, shells, spar, or other earthy and hard mineral bodies. Such works are, in general, to be looked on more as scenes of culture, than of design or picturesque beauty.

2650. *Rockworks for effect or character* require more consideration than most gar-

deners are aware of. The first thing is to study the character of the country, and of the strata of earthy materials, whether earth, gravel, sand, or rock, or a mere nucleus of either of these, such as they actually exist, so as to decide whether rocks may, with propriety, be introduced at all; or, if to be introduced, of what kind and to what extent. The design being thus finally fixed on, the execution is more a matter of labour than of skill.

2651. *The ruins of objects adapted by their natures or constructions to brave time, have always excited veneration; and this sentiment, forming a contrast with those emotions raised by mere verdant scenes, has ever been esteemed very desirable in gardens. Hence the attempt to produce them by forming artificial ruins, which, being absolute deceptions, cannot admit of justification. If any thing is admissible in this way, it is the heightening the expression of ruins which already exist, by the addition of some parts, which may be supposed to have existed there when the edifice was more entire. Thus, the remains of a castle-wall, not otherwise recognisable from that of a common house or enclosure, may be pierced with a window or a loop-hole, in the style appropriate to its date, or it may be heightened or extended in some degree. In other cases, turrets, or pinnacles, or battlements, or chimney-tops, may be added according to circumstances, and as a judicious and experienced taste and antiquarian architect may direct. Unless the style of the age of the ruins be adopted, the additions become worse than useless to all such as are conversant in the history of architecture, of which an example may be given in the modern Gothic turrets, in the grounds of White Knights, intended to represent the abbey of that name, founded soon after the Norman conquest.*

2652. *Antiquities are nearly allied to ruins, but differ from them in being of some value as objects, independently of locality. They may be valuable from their great age, as druidical; from historical traditions connected with them, as stones indicating the site of a battle, the cross-stone of an ancient town, &c.; or from the excellence of the workmanship or the material, as in the fragments of Grecian and Roman sculpture and architecture. This class of decorations is very common in Italy, and especially near Rome and Naples. Viewed as parts of landscape, almost every thing depends on their union with the surrounding scenery.*

2653. *Rarities and curiosities, like antiquities, possess a sort of absolute value; but the sentiments to which they give rise are more allied to wonder than veneration. They are occasionally introduced in gardening, such as the jawbones of the whale, basaltic columns, lava blocks, pillars of earthy rock-salt. The tuffa, corals, and madrepores brought from Otaheite by Captain Cook, as ballast, now form part of the rock-work in the Chelsea garden. Chinese rocks, idols, and other Chinese garden-ornaments, are sometimes admitted, not as imitations of rocks or sculpture, but as curiosities.*

2654. *Monumental objects, as obelisks, columns, pyramids, may occasionally be introduced with great effect, both in a picturesque and historical view, of which Blenheim, Stow, Castle Howard, &c. afford fine examples; but their introduction is easily carried to the extreme, and then it defeats itself, as at Stow.*

2655. *Sculptures. Of statues, therms, busts, pedestals, altars, urns, and similar sculptures, nearly the same remarks may be made. Used sparingly, they excite interest, often produce character, and are always individually beautiful, as in the pleasure-grounds of Blenheim, where a few are judiciously introduced; but profusely scattered about, they distract attention.*

2656. *Vegetable sculptures are very appropriate in parterres and other scenes in the ancient style. That they may be executed with correctness and without loss of time, the skeleton should be formed of wire, within which all the shoots should be confined, and when once the form is filled up with vegetation, the gardener has only to clip the protruding shoots.*

2657. *Inscriptions, as historical records, without comment, may in some cases be admissible; as the date when any work was begun and finished, the height of elevated points above the level of the sea, or relatively to other surrounding elevated and conspicuous objects, &c. &c.; but sentimental and religious inscriptions cannot be approved of by men in general.*

2658. *Eye-traps, painted perspectives, on walls or boards, as terminations, mock hermits, soldiers, banditti, wooden lions (as at Hawkstone, and Corby Castle), sheep in stucco, or any other figures of men or animals, intended to pass for realities, though still used in Holland and France, may be pronounced as too puerile for the present age. If they are still admired by the city mob in a suburban tea-garden, so much the better; the mob must be pleased as well as their superiors, and the rich vulgar may join with them; but the object of all the arts, whether useful or agreeable, is to elevate our tastes and enjoyments; and therefore, as soon as men's minds are prepared for any refinement on former things, the particular art to which these things belong should prepare the way for their removal, by presenting appropriate substitutes. A few reading tents and portable coffee-houses, scattered in umbrageous and picturesque situations, over the*

public parks round London and Edinburgh, as at Paris and Vienna, would be as fitting resources for one class of pedestrians, as those crowded yards called tea-gardens are for others.

CHAP. IV.

Of the Improvement of the Mechanical Agents of Gardening.

2659. *The greater number of the implements and buildings enumerated in the foregoing chapters may no doubt be done without, even in the first-rate gardens.* A number more, however, might have been added, which are in use in particular situations and circumstances, but we have omitted them, some as not meriting to become general, and others because their forms or constructions were too obsolete for modern practice, or too new and imperfect in construction to merit recommendation. A gardener of science and experience is not to be confined in his choice to what is or has been in this or in any department of his art; but, drawing from the resources of his own mind, he may, and ought, not only to improve what is already in use, but to design and get executed new tools, instruments, and constructions, better calculated to effect the ends in view generally, or more suited to the exigencies of his particular case. Notwithstanding the alterations and ameliorations which have of late been so frequently made, there are few of the mechanical agents of gardening now in use that do not admit of some, and many of them, unquestionably, of much improvement. The ultimate effect of all these ameliorations is to lessen human labour, and to increase the quantity, or improve the quality, of garden-productions, so that every attempt to extend them is highly meritorious.

2660. *As a general principle in respect to implements, structures, and buildings,* the best designs should be selected, and their execution procured in the best manner and of the best materials. This can scarcely be too strongly impressed on the mind of the gardener or his employer. With tools or instruments made of improper timber or iron, and of indifferent workmanship, the operator can never satisfy himself or his master. The quantity of his labour is less, and the quality inferior; add to this, that the instrument soon begins to decay, and requires to be renewed; so that, independently altogether of the loss in the quantity and quality of labour, the loss occasioned by the renewal of the tool, instrument, or machine, ought to be a sufficient inducement to procure at first only the very best. The true way to insure this, where the party are not judges, is to employ tradesmen of good repute and long standing. In general, seedsmen should be the persons from whom all the implements of gardening ought to be procurable; but as they often omit this branch of their business, from the want of regular demand, recourse must be had to ironmongers, or to Horticultural and Agricultural Repositories; of which the two principal in London, in 1833, are Weir's, in Oxford Street, and Cottam and Hallen's, in Winsley Street.

2661. *Hot-houses are by far the most important class of garden-constructions.* With respect to them, no degree of horticultural skill and practical attention will compensate for the want of light or air, or a bad exposure; and where the arrangements for supplying artificial heat are imperfect, the risk is great, and painful for a zealous gardener to contemplate. One night may destroy the labours of the past year, and forbid hope for the year to come; the blame may be laid where it is not merited, and a faithful servant may lose his situation and his character, without having committed either errors of ignorance or carelessness.

2662. *In all structures and edifices,* the most complete, elegant, or grand design, when badly executed, is disagreeable to the view, defective in the object of its erection, and ruinous to the proprietor. Bad foundations and roofs, improper materials, materials of different degrees of durability, piled incongruously together, and bad workmanship form the elements of bad execution. In no country are materials and labour obtained in greater perfection than in England; and in all regular works coming under the architect or the engineer, we generally find little to condemn, and often much to admire in the execution of the work. Garden-buildings, however, and especially that important class, hot-houses, are, relatively to civil architecture, an anomalous class of structures; and hence they are more the subject of chance or caprice in design, and of local convenience in execution, than those of any department of rural architecture. The subject of horticultural architecture, indeed, till very lately, has not been deemed of sufficient importance, to induce an architect to make himself master of the first step towards improvement in every art, the knowledge of what has already been done in it by others. Hence it follows, that garden-buildings, and especially hot-houses, are left either wholly to gardeners, who understand little of the science of architecture, or wholly to architects, who understand as little of the science of gardening. The consequence in either case generally is,

incongruity in appearance, want of success in the useful results, and want of permanency in duration. It would be more easy to adduce examples than to avoid the charge of partiality in the selection.

2663. *The recent improvement in the manufacture of iron, and the high price of timber*, have greatly extended the use of the former material in most erections, and contributed, from the novelty of the thing, to a good deal of incongruity in the disposition of the materials of buildings. Thus we have cast-iron sashes in deal frames, cast-iron rafters placed on timber wall-plates, iron bars sheathed with copper, and many such discordant arrangements, certain in the end of defeating the purpose for which they were adopted.

2664. *Artists.* There are two modes which proprietors may adopt who are desirous of embodying in garden-erections the modern improvements. The first is, to employ a first-rate head gardener, and to authorise and require of him, to consult with a regular architect or engineer, previously to fixing on any plan for a structure or machine; and the second is, to employ a regular garden-architect. A connoisseur will, no doubt, think for himself, and form his own plans; and a spirited amateur will be the first to adopt new improvements; but the policy of a well-regulated mind will induce any one who has no pretensions to particular skill himself, to adopt one of the first two modes.

BOOK IV.

OF THE OPERATIONS OF GARDENING.

2665. *ALL the operations of gardening* are mechanical, in the first instance, though the principal intention of many of them is to effect chemical changes, and of others, changes on the vital principle. They are also all manual, or effected by man; who, though possessing little power over nature in his naked, unarmed state, yet taking in his hands some one of the implements, instruments, or machines described, becomes thereby armed with a new power, and operates on the soil, or on the vegetable itself, by effecting changes in his own centre of gravity, and by muscular movements of his legs and arms, which are calculated, by pushing, drawing, or lifting, to bring the implement into the action proper for performing the operation in view. All these movements are governed by the laws of dynamics; and the operations performed are all referable to one or more of the mechanical powers, and chiefly to the lever and the wedge.

2666. *The operations of gardening present astonishing proofs of the advanced state of the art.* In the infancy of gardening, as the implements were few, so would be also the operations of culture. The ground would be loosened on the surface with a hooked stick, or scratched with a bone, or a horn in the spring season; the plants or seeds would be rudely inserted, and the produce in autumn broken over or pulled up, as wanted by the family, or tribe to which they belonged. But in the present state of human improvement, the operations of gardening have branched out into a number and a variety which at first sight appear astonishing. The operations of pulverisation and sowing, for example, are not confined to spring; but are practised in every month of the year. The season of reaping or gathering crops is equally extended; and for such productions as cannot be produced, or preserved, in the open air, recourse is had to hot-houses, and fruit and root store-rooms. Vegetation is accelerated, retarded and modified, almost at the will of the operator; and this is done by processes, which suppose him to possess a considerable degree of physiological and chemical science, as well as practical skill and mechanical dexterity. Thus, shading, airing, and watering are operations, which, though simple in themselves, cannot be performed without continual reference to the state of the plant, of the soil, and of the climate or weather. Hence it is, that an operative gardener who really knows his profession, requires to be not only a habile workman, but a thinking and reasoning being, and a steady man. We shall consider the operations of gardening, 1. As consisting of operations or labours in which strength is chiefly required; 2. As operations where skill is more required than strength; and, 3. As operations or processes where strength, skill, and science, are combined

CHAP. I.

Operations of Gardening, in which Strength is chiefly required in the Operator.

2667. *To acquire the practice of these operations*, a few hours' labour with the implements or machines will be of more use than a volume of words; all that we shall submit,

therefore, will be some observations relatively to the mechanical action of the implement and operator, the object of the operation, and the best season for performing it. This class of gardening operations may be arranged thus:—1. Mechanical operations common to all arts of manual labour; 2. Garden-labours on the soil; and, 3. Garden-labours on plants.

SECT. I. *Mechanical Operations common to all Arts of manual Labour.*

2668. *All the operations which man performs with implements or machines* are, as far as his own person is concerned, reducible to lifting, carrying, drawing, and thrusting. Man himself, considered as an engine, derives his power from alterations in the position of his centre of gravity; and he applies this power chiefly by his hands, arms, and legs acting as levers of the third kind.

2669. *Lifting* is performed by first stooping or lowering the centre of gravity, and at the same time throwing it to one side. The object being then laid hold of by the hands, the body is raised, and the centre of gravity, in being restored to its true position, acts as a counterbalancing weight to the weight to be raised. The weight retained by the hand is now raised a certain height, never exceeding half that of the man; if to be raised higher, recourse is had to muscular strength, or the power of the arms to act as levers.

2670. *Carrying.* To carry a thing is merely to walk with a greater weight than before; and walking is performed by a series of alternate derangements and adjustments of the centre of gravity, slow or rapid, according as the person may walk or run. According to Delolme, the most advantageous weight for a man of common strength to carry horizontally is 112lbs.; or, if he returns unladen, 135lbs.

2671. *Drawing.* In this operation, the upper part of the body is thrown forward, so as to act as a power to counterbalance or lift up the body or weight to be moved; and by joining to this lifting motion the operation of walking, the weight is at once lifted up and drawn along. This compound operation is exemplified in a horse, when straining at a draught in a plough or cart. He first lowers his chest, then raises it, and lastly steps forward. When drawing at ease, the lifting motion is scarcely distinguishable from the progressive one.

2672. *Pushing or thrusting* is performed exactly on the same principles as drawing, and differs from it chiefly in the kind of implement or machine which requires to be employed; all machines which are to be pushed requiring to be attached to the animal machine by parts acting by their rigidity; whereas, those to be drawn may be attached by parts acting by their tenuity merely.

2673. *All these operations may be varied in quantity*, either by a variation in the weight or gravity of the man, or moving power; or by a variation in the time or rapidity of his motions. Thus a heavy man may, in one movement, lift a weight ten times greater than can be done by one of less weight; but a light man may, by increasing the time of performance, lift the same weight at ten times. A man, who in digging can apply with his feet five cwt. of his weight towards pushing the wedge or blade of the spade into the soil, has an evident advantage over a lighter man who can only apply three cwt. for that purpose; but yet the latter may equal the former, by accompanying his power or foot with a proportionate increase of motion. The power in this last case is said to be obtained by the *momentum*; or, the quantity of matter in a body multiplied by the velocity with which it is moved. Power, therefore, we thus ascertain, is obtained by matter and motion jointly; and, what may be deficient in the one, may be made up by excess in the other. Thus, a small, light workman may (though with more animal exertion) produce as much work as a larger or heavier man: for if we suppose the quantity of matter in the large man to be thirty, and his motion at the rate of two; then if the quantity of matter in the small man be twenty, and his motion at the rate of three, he will produce an equal effect with the large man. As small human machines, or little men, are generally constructed of firmer materials, or are more healthy and animated than large ones, the small man performs his rapid motions with nearly as great ease to himself as the heavy man slowly moves his ponderous weight; so that in point of final result they are very nearly on a par.

SECT. II. *Garden Labours on the Soil.*

2674. *The simple labours peculiar to arts of culture* are performed either in the body of the soil, as picking, digging, &c.; on its surface, as hoeing, raking, &c.; or on vegetables, as cutting, clipping, &c.

2675. *Picking.* The pick, as we have seen (*fig. 291.*) is a blunt wedge, with a lever attached to it at right angles; and the operation of picking consists in driving in the wedge perpendicularly, so as to produce fracture, and then causing it to operate horizontally by the lever or handle, so as to effect separation, and thus to break up and loosen hard, compact, or stony soils. The pick is also used to loosen stones or roots; and the

pick-axe is used to cut the latter. For breaking and pulverising the soil, the most favourable conditions are, that the earth should be moderately moist, to facilitate the entrance of the pick, but in tenacious soils not so much so as to impede fracture and separation.

2676. *Digging.* The spade is a thin wedge, with a lever attached in the same plane; and the operation of digging consists in thrusting in the wedge by the momentum (or weight and motion) of the operator, which effects fracture; a movement of the lever next effects separation, whilst the operator, by stooping and rising again, lifts up the spitful or section of earth on the blade or wedge of the spade, which, when so raised, is dropped in a reversed position, and at a short distance from the unbroken ground. The separation between the dug and undug ground is called the trench or furrow; and when a piece of ground is to be dug, a furrow is first opened at that end of it where the work is to commence, and the earth taken out is carried to the end where it is to terminate, where it serves to close the furrow. In digging, regard must be had to maintain a uniform depth throughout; to reverse the position of each spitful, so as what was before surface may now be buried; to break and comminute every part where pulverisation is the leading object; to preserve each spitful as entire, and place it separate, or isolated as much as possible, where aëration is the object; to mix in manures regularly where they are added; to bury weeds not injurious; and to remove others, and all extraneous matters, as stones, &c., in every case. For all these purposes a deep open trench is requisite; and that this may not be diminished in the course of the operation, it must never be increased in length. If allowed to become crooked by irregular advances in the digging, it is thus increased in length, and necessarily diminished in capacity; unless, indeed, the dug ground is allowed to assume an uneven surface, which is a fault equally to be avoided.

2677. *Weather for the operation.* Digging, for pulverisation and mixing in manures, is best performed in dry weather; but for the purposes of aëration, a degree of moisture and tenacity in the soil is more favourable for laying it up in lumps, or entire pieces. The usual length of the blade of a spade is from ten inches to a foot; but, as it is always inserted somewhat obliquely, the depth of pulverisation in gardens attained by simple digging seldom exceeds nine inches, and in breaking up firm grounds it is seldom so much.

2678. *Shovelling* is merely the lifting part of digging, and the shovel being broader than the spade, it is used to lift up fragments separated by that implement or the pick.

2679. *Excavating* is the operation of working out pits, furrows, or other hollows in grounds, either for the commencement of other operations, as digging or trenching, or for planting, burying manures, inserting roots; or, on a large scale, for forming pieces of artificial water, &c.

2680. *Levelling*, in the ordinary sense of the term, as used in gardening, consists in spreading abroad the soil in such a way that its surface may be nearly in one uniform plane, either level or nearly so; to be correct, this plane ought to be parallel with that of the horizon; but very generally an even surface, if not very far from level, answers all its purposes. The terms *level* and *even*, in ground-work, however, ought to be considered as quite distinct: the former should be like the surface of still water, and the latter merely free from inequalities.

2681. *Marking with the line* is an operation preparatory to some others, and consists in stretching and fixing the line or cord along the surface by means of its attached pins or stakes, in the direction or position desired; and in cutting a slight continuous notch, mark, or slit in the ground, along its edge with the spade.

2682. *Trenching* is a mode of pulverising and mixing the soil, or of pulverising and changing its surface, to a greater depth than can be done by the spade alone. For trenching, with a view to pulverising and changing the surface, a trench is formed like the furrow in digging, but two or more times wider and deeper; the plot or piece to be trenched is next marked off with the line into parallel strips of this width; and, beginning at one of these, the operator digs or picks the surface stratum, and throws it in the bottom of the trench. Having completed with the shovel the removal of the surface stratum, a second, and a third, or fourth, according to the depth of the soil and other circumstances, is removed in the same way; and thus, when the operation is completed, the position of the different strata is exactly the reverse of what they were before. In trenching, with a view to mixture and pulverisation, all that is necessary is to open, at one corner of the plot, a trench or excavation of the desired depth, three or four feet broad, and six or eight feet long. Then proceed to fill this excavation from one end by working out a similar one. In this way proceed across the piece to be trenched, and then return, and so on in parallel courses to the end of the plot, observing that the face or position of the moved soil in the trench must always be that of a slope, in order that whatever is thrown there may be mixed, and not deposited in regular layers, as in the other case. To effect this most completely, the operator should always stand in the

bottom of the trench, and first picking down and mixing the materials, from the solid side, should next take them up with the shovel, and throw them on the slope or face of the moved soil, keeping a distinct space of two or three feet between them. For want of attention to this, in trenching new soils for gardens and plantations, it may be truly said that half the benefit derivable from the operation is lost. In general, in trenching, three points which were mentioned under digging, such as turning, breaking, dunging, &c., require to be attended to; and sometimes an additional object, that of producing a level from an irregular surface is desired. In this case double care is requisite to avoid forming subterraneous basins or hollows, which might retain water in the substratum, at the bottom of the moved soil; and also to mix inferior with better soil, &c., where it becomes requisite to penetrate into depositions of inferior earthy matters.

2683. *Ridging* is a mode of finishing the surface, applicable either to dug or trenched grounds; which, when so finished, are called ridge-dug or ridge-trenched. Instead of being formed with an even surface, ridged grounds are finished in ridges, or close ranges of parallel elevations, whose sections are nearly equilateral triangles. Hence, supposing the triangles to touch at their bases, two thirds more of surface will be exposed to the influence of the atmosphere and the weather, than in even surfaces.

2684. *Forking*. The fork is composed of two or three separate, parallel, and uniform wedges, joined so as to form one general blade; which is acted on like the spade, by means of a shoulder or hilt, for thrusting it into the matters to be forked; and of a lever or handle for separating and lifting them. In gardening, forking is used for two purposes; for pulverising the soil among growing crops, and for moving vegetable manures. In the first case, the operation is similar to digging, the only difference being that pulverisation is more attended to than reversing the surface; in the other, the fork separates chiefly by drawing and lifting; hence, for moving manure, a round-pronged (or dung) fork (*fig.* 298.) produces least friction during the discharge of the forkful and reinsertion; and, for pulverising the soil, a broad-pronged (or garden) fork (*fig.* 297.) separates and lifts the soil more readily. Dry weather is essentially requisite in forking soils, and most desirable for spreading manures; but dunghills may be turned, and hot-beds made, during rain, with no great injury.

2685. *Hoeing* is performed by drawing or thrusting the wedge or blade of the draw or thrust hoe along the surface of the soil, so as to cut weeds at or under the surface, and slightly to pulverise the soil. It is used for four purposes, sometimes together, but commonly separate; first, to loosen weeds so as they may die for want of nourishment, or be gathered or raked off, for which either the thrust or draw hoe may be used; secondly, to stir the soil, and for this purpose, when no weeds require killing, the pronged hoe is preferable, as being thrust deeper with less force, and as less likely to cut the roots of plants; thirdly, to draw up or accumulate soil about the stems of plants, in doing which, a hoe with a large blade or shovel will produce most effect; and fourthly, to form a hollow gutter or drill, in which to sow or insert the seeds of plants, for which a large or small draw-hoe may be used, according to the size of the seeds to be buried. The use of the hoe for any of the above purposes requires dry weather.

2686. *Raking* is performed by drawing through the surface of the soil, or over it, a series of small equilateral wedges or teeth, either with a view to minute pulverisation, or to collecting weeds, stones, or such other extraneous matters as do not pass through the interstices of the teeth of the rake. The teeth of the rake being placed nearly at right angles to the handle, it follows that the lower the handle is held in performing the operation, the deeper will be the pulverisation; and on the contrary, that the higher it is held, the interstices being lessened, the fewer extraneous matters will pass through the teeth. The angle at which the handle of the rake is held must therefore depend on the object in view; the medium is 45° . For all raking, except that of new-mown grass, dry weather is essentially requisite.

2687. *Cuffing* is a mode of excavating used in preparing a surface for seeds, and in covering them when sown; the surface being well pulverised by digging and raking, is laid out into beds with alleys between, at least three times the breadth of the operator's foot. Then take a wooden-headed or cuffing-rake, and standing on the alley of the opposite side of the bed, turn the rake on its back, push off the earth from the one half of the bed to the purposed depth, as far as the side of the alley marked by your feet, being careful to keep the earth so pushed off quite straight. When one side is finished, turn round and do the other in the same manner. After the seeds are sown take the rake, and stand on the alley on the opposite side of the bed; put in the teeth of the rake immediately beyond the cuffing or ridge of earth pressed off, and, by a sudden pull, draw it on the bed so as to cover its own half equally; having finished this half, do the other in the same manner, and the operation is completed. (*Sang's Plant. Kal.* 242.)

2688. *Scraping* is drawing a broad and blunt wedge along hard surfaces; in gardening generally those of lawns or walks, to remove excrementitious matters thrown out of

the soil by worms. Moist weather best suits the operation on lawns, and dry weather on gravel.

2689. *Sweeping*, mechanically considered, is the same operation as scraping. In gardening, it is chiefly used after mowing, and for collecting leaves; for both which purposes dewy mornings are preferable, as at such seasons, the leaves or grass being moist, conglomerate without adhering to the dry soil.

2690. *Wheeling* is a mode of carrying materials in which the weight is divided between the axle of the wheel and the arms of the operator. The arms or shafts of the barrow thus become levers of the second kind, in which the power is at one end and the fulcrum at the other, and the weight between them. The weight is carried or moved on by the continual change of the fulcrum with the turning of the wheel; and this turning is produced by the operator throwing forward his centre of gravity, so as to push against the wheel by means of the moveable axle, &c. The chief obstacles to wheeling are the roughness or softness of the surface to be wheeled on. Where this is firm, there wheeling will be best performed with the greater part of the load resting on the axle; but when soft and deep, the centre of gravity should be nearest the operator, who will find it easier to carry than to overcome excessive friction. Dry weather is obviously preferable for this operation. "With wheelbarrows," Dr. Young observes, "men will do half as much more work as with hods."

2691. *Beating* is the application of pressure to surfaces or to materials, with a view to render them more fit for particular uses. Thus, in new-laid turf verges, or gravel alleys, compactness and adhesion are required and obtained by beating; in working clay for puddling or claying the bottom of ponds or cisterns, intimate mixture, exclusion of air and of hard particles, are effected by the same means.

2692. *Rolling* is the application of pressure to surfaces on a large scale, and chiefly to turf and gravel. The roller, mechanically considered, is the second mechanical power, or wheel and axle, to which the handle becomes a lever of the second kind, as in the wheelbarrow. The amount of its action is as the breadth of the wheel and joint weight of it and of the axle; it is drawn over the surface, and produces by far the greatest effect when the ground is saturated with moisture below, but dry on the immediate surface.

2693. *Sifting and screening* are operations for separating the coarser from the finer particles of earth, gravel, tanners' bark, &c. The materials require to be dry, well broken, and then thrown on the screen (*fig. 438.*), which being a grated inclined plane, in sliding down it, the smaller materials drop through while the larger pass on. In sifting, the same process is effected by motion with a sieve, or circular and flat grating of limited extent. The screen is calculated for coarser operations, as sifting gravel and bark on a large scale, and the sieve for finer operations with plant-moulds and composts.

SECT. III. *Garden Labours with Plants.*

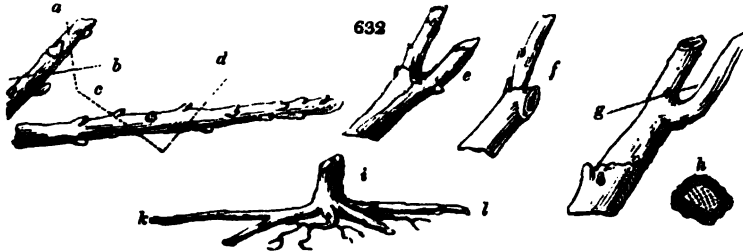
2694. *The simple operations performed on vegetables* are sawing, cutting, clipping, splitting, mowing, and weeding.

2695. *Sawing.* The saw is a conjoined series of uniform wedges, which, when drawn and thrust in succession across a branch or trunk, gradually wear it through. In performing this operation, the regularity of the pressure and motion are chiefly to be attended to. In green or live shoots, the double-toothed saw produces less friction on the sides of the plate, by opening a larger channel for its motion. Where parts are detached from living trees, the living section ought generally to be smoothed over with a knife, chisel, or file; and a previous precaution in large trees is to cut a notch in the lower part of the branch immediately under and in the line of the section, in order to prevent any accident to the bark, when the amputated part falls off. Sawing is a coarser mode of cutting, mowing, or shaving; or a finer mode of raking, in which the teeth follow all in one line.

2696. *Cutting* is performed by means of a very sharp wedge, and either by drawing this through obliquely or across the body to be cut, as in using the knife; or by pressing or striking the axe or hedge-bill obliquely into the body, first on one side of an imaginary line of section, and then on the other, so as to work out a trench across the branch or trunk, and so effect its separation. The axe, in gardening, is chiefly used in felling trees, and for separating their trunks, branches, and roots into parts. The knife is extensively used for small trees, and the hedge-bill and chisel for those of larger size. In amputating with the knife, one operation or *draw-cut* ought generally to be sufficient to separate the parts; and this ought to be made with the knife sufficiently sharp, and the motion so quick as to produce a clean, smooth section, with the bark uninjured.

2697. *Every draw-cut* produces a smooth section, and a fractured or bruised section. and one essential part of cutting living vegetables, is to take care that the fractured section be on the part amputated. Another desirable object is, that the section of the living

or remaining part should be so inclined (*a*, *fig.* 632.) as not to lodge water or overflowing sap; and be so far turned to the ground (*d*) or to the north, as not to be struck by the



direct rays of the sun. To accomplish both these purposes, as well as to make sure of having the fractured section on the part amputated, the general practice is to cut from below or from the under edge of the branch or shoot, unless the position of the leading bud occasions a deviation from the rule (*b*). The cut should also be made in all shoots of not more than three or four years old, within one fourth to half an inch, or a little more of the bud intended to take the lead; when this is not done, and half an inch or more of shoot left without a bud (*c* and *e*), the consequence is, the stump dies back to the bud in the course of the season (*g*), and if not carefully cut off (*f*), will end in a decaying orifice both unsightly and injurious. The bud selected for a leader ought always to be a leaf-bud, and in general the plane of the section ought to be parallel to the angle which the bud makes with the stem (*d*). Exceptions occur in the case of plants with much pith (*k*), as the vine, elder, &c., in cutting the year-old shoots of which, an inch or more ought to be left, as these always die back a few lines; and thus the leading bud might be injured, if this precaution were not taken. In like manner, when pruning a large tree, the section of amputation ought to be made so oblique as to throw off the rain; as generally as possible, it should be turned from the sun, and rather downwards than upwards, in order to shield it from heat and cracking: and whenever it can be done, it should be made near a branch, shoot, or bud, which may take the lead in the room of that cut off; and thus, by keeping the principle of life in action at the section, speedily heal up the wound.

2698. *In pruning roots*, the same principle, as far as applicable, ought to be attended to; the trunk or stem when cut over ought to be sloped to the north (*i*), and the lateral roots cut so as the section may be on the under side (*k*), and therefore less likely to rot than when the cut faces the surface of the ground (*l*) or is bruised by neglecting to form the smooth section on the attached extremity. When roots are large always cut to a lateral, and when they are small to a fibre; for in roots as in shoots, naked extremities always die back to the nearest leader. When a root broken or bruised has neither laterals nor fibres, then merely cut back to sound wood, leaving a smooth section; for the sap, which always operates first and most powerfully at the extremities both of roots and shoots, will there originate fibres.

2699. *In cutting with the chisel*, the blade is applied below the branch to be amputated so as to rest on the trunk or main branch; and so applied, a quick blow with a mallet is applied to the handle of the chisel by the operator or his assistant. If this does not effect a separation, it is to be repeated. In forest-pruning it is often advantageous to apply one cut of the chisel on the underside of the branch, and then saw it through with the forest-saw from the upper.

2700. *Clipping* is an imperfect mode of cutting, adapted for expedition and for small shoots. The separation is effected by bruising or crushing along with cutting, and, in consequence, both sections are fractured. In gardening it is chiefly applied for keeping hedges and edgings in shape; but the hedge-knife (*fig.* 370.), which operates by clean, rapid draw-cuts, given always from below, is generally preferable, as not decreasing the live ends of the amputated shoots. The new pruning-shears (*fig.* 376.), and the averruncator (*fig.* 375.), it is to be observed, by producing cuts much more like the draw-cuts of knives, are greatly to be preferred to the common hedge-shears.

2701. *In respect to the seasons for sawing, cutting, or clipping living trees*, the best seem early in spring, and in midsummer. Early in autumn, trees are apt to bleed; later, and in winter, the section is liable to injury from the weather; but trees pruned early in spring remain only a short period before the wound begins to heal; and in those pruned at midsummer wounds heal immediately. There are, however, exceptions as to spring pruning in evergreens, cherries, and other gummiferous trees; and summer pruning is but ill adapted for forest-work or trees in crowded scenery.

2702. *Splitting* as an operation of gardening, is generally performed on roots of trees remaining in the soil, for the purpose of facilitating their eradication. The wedge in its simplest form, and of iron, is driven in by a hammer or mallet, till it produces fracture and separation, when the parts are removed as detached, &c.

2703. *Mowing* is performed by the rapid motion of a very sharp wedge across the matters to be cut or mown, and at an oblique angle to them. In gardening it is applied to grassy surfaces, in order, by repeated amputations, to keep the plants short, spreading, and thick, and, by always admitting light and air to the roots or stools, to render the surface green. This operation requiring great force, and also a twisting motion of the body, brings almost every muscle into action, and is, in fact, one of the most severe in vegetable culture.

2704. *Mowing from a boat* is in use for cutting weeds in rivers and ponds. The operator stands in the boat, and is rowed forward by another, as required. Sometimes scythe-blades are tied or rivetted together, and worked by means of ropes like a saw from one shore to the other; but the first mode is generally reckoned the best, even in public canals, and is unquestionably so in gardening.

2705. *Weeding* is the operation of drawing, or digging out such plants from any given plot as are foreign to those cultivated there. In this sense every plant may become a weed relatively; but absolute or universal weeds are such as are cultivated in no department of gardening, excepting in that purely botanical. Weeds are drawn out of the ground by the hand or by pincers, or they are dug or forked out by weeding tools. Aquatic weeds are necessarily drawn up by pincers. The best season for weeding is after rain.

CHAP. II.

Operations of Gardening in which Skill is more required than Strength.

2706. *Operations of skill require the end to be known and kept in view by the operator, during the operation.* The labours which we have enumerated in the foregoing chapter, may almost all be performed by the labourer without reference to any plan or design; but those which come next to be enumerated, require a greater or lesser degree of reference to the ultimate object. Of this, even the simple operations of digging a drain to carry off water, planting in a row, or forming a bed of earth, may be mentioned as examples. Previously to proceeding to these operations, it becomes necessary to consider the subject of transferring designs from ground to paper or to memory, and from paper or memory to ground; we shall then be prepared to treat of executing designs.

Sect. I. *Of transferring Designs from Ground to Paper or Memory.*

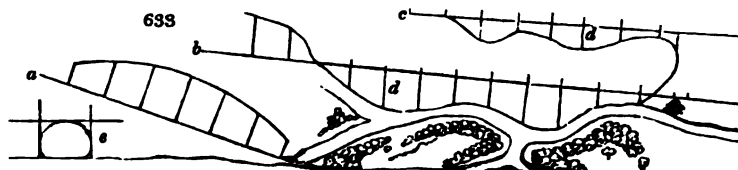
2707. *The art of taking plans or designs of objects* is to be considered as part of a gardener's general education, since none who aspire to any degree of eminence in their profession ought to be ignorant of the first principles of geometry, land-surveying, and drawing. We shall merely, therefore, touch on a few points to assist a gardener in bringing the knowledge he has so acquired into action. A gardener may require to take plans of gardens, or parts of gardens, or of implements or buildings, for his own instruction, or to execute similar objects for his employer. It is as requisite, therefore, that a gardener should be able to copy a garden, as a carpenter a gate or a roof.

2708. *The dimensions of simple objects*, as of a bed of earth or dung, border or other plot, a gardener may retain in memory, and transfer from memory to the imitation or copy; but in general he will require the assistance of graphic memoranda, either of the pen or pencil, or both. The instruments necessary for taking measurements and angles, so as to transfer plans from the ground to paper, are the measuring-line or chain, the measuring-rod, and occasionally the theodolite; but for all ordinary purposes the chain and rod are sufficient.

2709. *The simplest form of surface-plan* to transfer from ground to paper is a circle; for here it is only necessary to find the diameter. The next is a parallelogram or bed, of which it is requisite to take the length and breadth. Most of the details of the plans of kitchen-gardens may be reduced to parallelograms; so that they may be transferred to paper, or even taken down arithmetically, as in a land-surveyor's field-book, with great ease.

2710. *Irregular figures*, as parterres, outlines of picturesque plantations (fig. 633.), or water; or the plans of winding walks, require greater nicety. In such cases, temporary or imaginary lines (fig. 633. a, b, c), forming parts of regular figures (as d with b, fig. 633.), are first to be formed, or partially indicated, around or through the plot to be transferred; and dimensions are next to be taken relatively to these known and simple

lines or figures. Of all temporary or skeleton figures, the triangle is the most simple, the most correct, and the most generally used. The skeleton or temporary figure (*e*) or line (*a*, *b*, &c.) being transferred to paper, the dimensions (*d*) are set off from it, and the irregular plot and all its details are thus correctly delineated.



2711. *Raised or depressed surfaces*, whether naturally or artificially so, require a sort of double measurement; first, horizontally, by true horizontal lines, to get the surface-plan; and next, to measure their elevations or depressions from these lines, in order to find their height or depth. Few gardens of any description are made perfectly flat; the borders of the kitchen-departments generally rise on each side of the walks; and in large parterres, one of the chief beauties arises from the inequalities of the surface. The depth of ponds, excavations for dung, earth, &c.; ridges, hot-beds, rockwork, even houses, trees, &c., are all to be measured with reference both to their horizontal and perpendicular extension. Four persons are required in performing such operations accurately; two to hold the chain or line in a horizontal position, or in the plane of the general surface; one to take the dimensions downwards or upwards from this with the measuring-rod, and one to mark down the dimensions.

2712. *In protracting elevations and depressions on paper*, the simplest way is to introduce sections, in dotted or otherwise distinguished lines, to prevent their being mistaken for surface-lines; or, in wavy surfaces, figures may be introduced, thus 7 or 1, to denote their elevation above, or depression below, some piece of water, or other surface fixed on as a medium. Some excellent observations on this subject will be found in Major Lehman's *Topographical Plan Drawing*, as translated by Lieutenant Siborn.

2713. *Where it is in contemplation to form pieces of water*, the elevations and depressions, or levels must be taken and recorded, either by sections or arithmetically, with the greatest accuracy; and, in some cases, sections may be required to show particular trees, buildings, the depth of water, or other objects. (*Fig. 634.*)

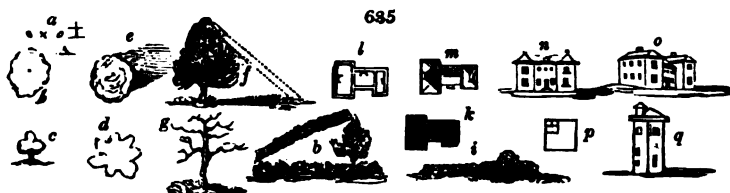


2714. *With respect to the elevations and shapes of hills and mountains* which may lie within parks or plantations, they are only to be measured correctly by the quadrant and theodolite, in the hands of regular land-surveyors; and, therefore, are not considered as here included. Their shape and dimensions are laid down in maps in the same manner as those of smaller deviations from the flat surface. Inaccessible dimensions of height, as of trees or buildings, are obtained by the quadrant, or by relative comparison of shadows; of depth, as of water or wells, by rods; of breadth or length, by finding the two angles of a triangle whose base shall be in one extremity of the distance, and whose apex shall be in the other. These, and many other equally simple problems in trigonometry, need not be enlarged on, because they must be supposed to form a part of general education.

2715. *The greatest accuracy is requisite in transferring plans of garden-scenery*. Not only the mere ground-lines are to be transferred; but, to form a complete plan, the distances between scattered trees, or trees in rows or otherwise regularly disposed, ought to be marked, the situations of their stems indicated, and, where they are of considerable size, representations of the horizontal extension of their heads (*Fig. 635. b*) should also be given. The same ought to be done in the case of walls, buildings, and all other raised objects. The intention of a ground-plan is to give an idea of the superstructure; and without such additions to the mere ground-lines, as these and others of a pictorial nature (*Fig. 635.*), that idea must be very imperfect, at least in plans of mixed scenery.

2716. *For protracting rural objects* various modes have been adopted by land-surveyors:

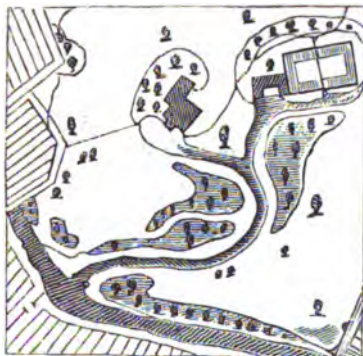
trees are sometimes shown by small crosses or ciphers, triangles or dots (*fig. 635. a*) ; by an orbiculate line representing the extension of the branches or head, and a dot in the



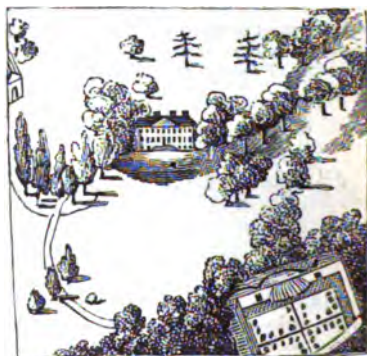
place of the trunk (*b* and *d*) ; by the same, with the addition of a shadow, taken when the sun is south or south-west, and his elevation exactly 45° , by which the points of the compass are readily ascertained throughout the plan, and the shape of the head, and the height of the tree exhibited (*c*) ; sometimes an elevation or profile of the tree is given, either in foliage (*f*), or to show the form of the trunk and branches (*g*), or merely to give a rude idea of a tree (*e*). Hedge-rows, whether with or without trees, are either shown in elevation or profile (*h*), or in vertical profile or bird's-eye view (*i*). They may be delineated either in skeleton or foliage. Buildings may be shown either in general plan (*k*), detailed plan (*l*), vertical profile of the roof (*m*), elevation (*n*), perspective view (*o*) ; or a plan may be given (*p*), and a diagonal elevation (*q*) taken and placed opposite the plan in the margin of the map.

2717. In portraying the general surface of land-estates, different modes have been adopted by modern land-surveyors. The first we shall mention is the old mode of giving what may be called the ground-lines only ; as of roads, fences, water-courses, situations of buildings and trees (*fig. 636*). This mode has no other pretensions than that of accuracy of dimensions, and can give few ideas to a stranger who has not seen the property, beside those of its contents and general outline.

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2718. In the second, *elevations of the objects* are added to these lines ; but which, in crowded parts, tend much to obscure them. (*fig. 637.*) This mode is perhaps the best calculated of any to give common observers a general notion of an estate ; more especially if ably executed. Very frequently, however, this mode is attempted by artists ignorant of the first principles of drawing, optics, or perspective, and without taste.

2719. In the third, a *vertical profile*, or geometrical bird's-eye view, that is, a bird's-eye view in which all the objects are laid down to a scale, is presented. In this the upper surface of every object is seen exactly as it would appear to an eye considerably elevated above it, and looking centrally down on it. (*fig. 638.*) This mode, properly executed, is calculated to give a more accurate idea of the surface-objects of an estate than any other ; and if the declivities be correctly indicated, and the shade of the hollows and eminences be laid on with reference to some medium elevation, referred to or illustrated by sections, taken in the direction of indicated lines (*a...b*), it will give an equally correct idea of the variations of the ground. In short, it is the best mode for most purposes, and is now coming into general use.

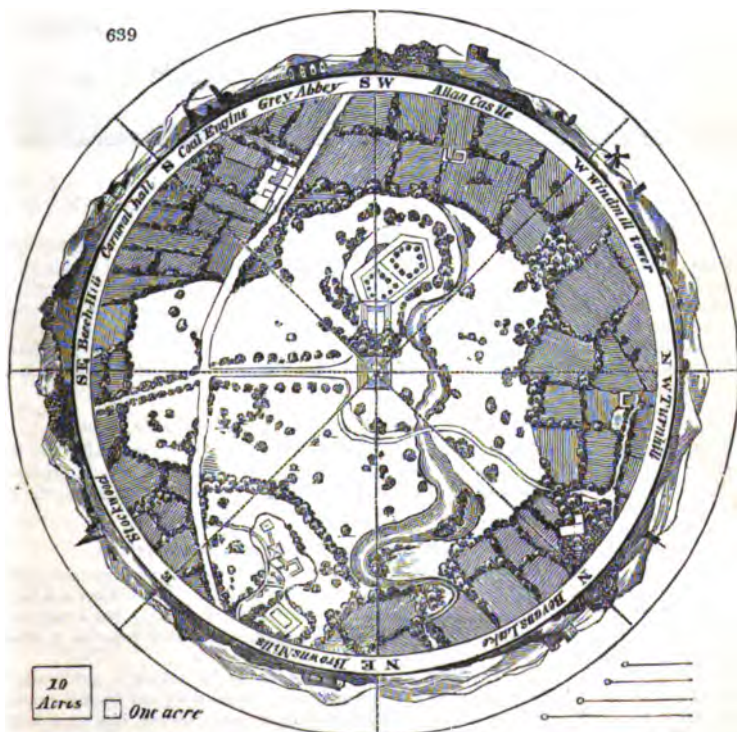
2720. A very complete method of giving the plan of an estate, is to adopt the profile manner and include such a portion of the plans of the adjoining estates or country as

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shall be contained within a circle of moderate extent (*fig. 639.*), the centre of which may be the centre of the demesne-lands, family-mansion, or prospect-tower. Around a map

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so formed, the distant scenery, as seen from the roof of the house or prospect-tower, may form a panoramic circumference, or margin of prospects. (*fig. 639.*) In all these modes, dimensions and contents are given or obtainable along with effect; in those which follow, effect or general appearance only is obtained.

2721. *The natural bird's-eye view* is intended to give a general idea of the external appearance of an estate. In this the eye of the spectator is supposed to be considerably elevated above the centre of the estate, and all the objects are portrayed exactly as they would appear to him in that situation; largest in the centre, and gradually diminishing to the circumference of the circle of vision. In such a delineation, parts of other adjoining estates may often require to be included, in order to complete the circle; but these are necessary to the general idea, and can easily be distinguished from the principal property by minute marks on the drawing.

2722. *In the panoramic view*, the delineator supposes himself placed on an eminence, as the roof of the mansion, where that is central, and looking down on all that he sees on every side. Where there is a prominent hill, or where the mansion is on an eminence, this is a very desirable mode of giving a general idea of a domain; and by the aid of horizontal lines, and lines converging to them from the centre of vision, some idea may be had, on flat surfaces at least, of the relative heights and distances of objects.

2723. *A simple mode is to give a general view, or distant prospect* of the estate, or its principal parts (*fig. 640.*), as seen from some elevated conspicuous hill, building, or

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object near it; or if the estate, as is frequently the case, is situated on the side of a hill, or range of hills, a situation on the plain, or flat grounds opposite to it, will be sufficient.

2724. *Models of estates* are sometimes formed in cork, *papier maché*, and other substances, which, for hilly scenery, are very useful and entertaining. A model of this kind, formed of putty, and coloured in imitation of nature, was made by us, in Edinburgh, in the year 1805, an account of which will be found in the *Farmer's Magazine* for that year. In 1827, an extensive model, capable of being taken to pieces so as to show the mineral structure of an estate in Wales, was formed by R. C. Taylor, Esq., now of the Alleghany mountains, near Pittsburg, and was exhibited in the National Repository in London in the following year.

SECT. II. *Of transferring Designs from Paper or Memory to the Ground.*

2725. *Staking or marking out plans* is a subject requiring much greater skill than the last, on account of the inequalities and other obstructions met with on the ground's surface. It may be considered, 1. As to transferring figures to plane surfaces; 2. To irregular or obstructed surfaces; and, 3. Arranging quantities.

SUBJECT. 1. *Transferring Figures and Designs to plane Surfaces.*

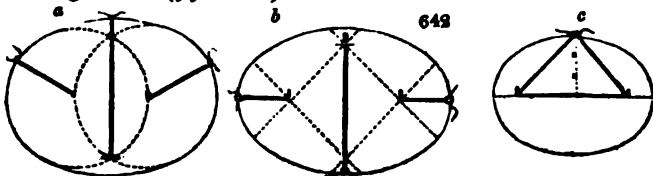
2726. *The transferring of plane or regular figures to even ground* is nothing more than performing the elementary problems of geometry on a large scale. The subject has been amply illustrated by Switzer, Le Blond, and other writers of their day; but a very few examples will here suffice, as the school education of gardeners is now superior to what it was in their times.

2727. *A perpendicular* to any line may be found either by taking a garden-line, doubling a portion of it and applying the extremities at equal distances from the point whence the perpendicular is to proceed (*fig. 641. a*); or more simply, but, on a large scale, with less accuracy, by applying the garden-square (*b*); or on any scale by the use of a rope or line united at the extremity, and divided in the proportions of 6, 8, and 10 (*c*). The 6 is to be placed as the perpendicular of a right-angled triangle, the 8 as the base, and the 10 as the hypotenuse; or, three rods of similar proportions, or divided into feet, and the proper numbers taken, may be used for this purpose. Switzer informs us this

was the mode in which all right-angled figures in gardens, and all other works, were set out in his time.

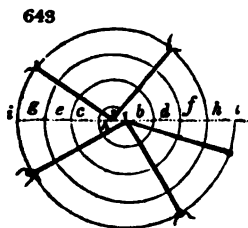
2728. *To divide an angle, a line united at the extremities, and divided into four equal parts (d), may readily be so applied to any angle as to divide it equally; or the same thing may be done by a portion of line bisected, and its extremities applied at equal distances from the angle (e). A line divided into three equal parts readily forms an equilateral triangle. (fig. 641. f.)*

2729. *To describe an oval within a given length, the length may be divided into three equal parts; then let the two inner points so found be the centres of two circles which shall form the ends of the oval, and the sides may be formed by segments whose centres are the intersecting points of the circles. (fig. 642. a.) The same oval may be formed by dividing the given line into four parts; forming the ends by segments of which the two outermost points are the centres, and the sides by segments proceeding from a line passing at right angles through the centre of the given line. (fig. 642. b.)*



2730. *The gardener's oval, or one in which both diameters are given, is thus formed. Bisect the long diameter by the transverse one, itself thus bisected by the other. Divide half the transverse diameter into three parts. Take one of these parts, and set it off from both extremities of the long diameter. Fix there two pins or stakes, and fix a third stake one part from the end of the transverse diameter; double a line and put it round these stakes, of such a length that when stretched, it may touch the extremities of one of the diameters. Then, with a pin in this extremity, move it completely round, and so strike out the oval. (fig. 642. c.) The long and short diameters are more easily divided arithmetically; thus, supposing the given length of the oval be ninety feet, and its width sixty feet; then the third part of half of the width is ten feet, and this distance set back from the extremities of the diameters gives the situation of the stakes at once.*

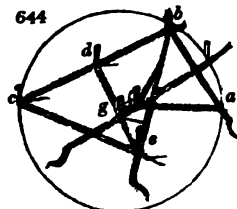
2731. *A spiral line, or volute, may be sometimes required in gardening, for laying out labyrinths or curious parterres. The width or diameter of the spiral being given (fig. 643. i, k), bisect it, and divide each half into as many parts as the spiral is to form revolutions. (fig. 643. g to h.)*



Then, from the centre draw all the halves of the spirals which are on one side of the diameter line (bc, de, fg, hi); and from the point where the first semi-spiral intersects the diameter line (b), as a centre, draw all the others (dc, fe, hg).

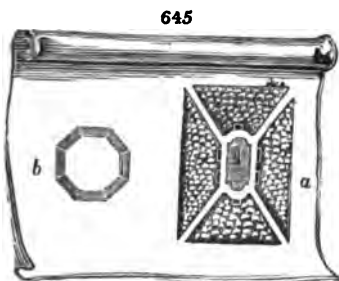
2732. *Uniting three points in a curved line. A very useful problem, both in laying down plans on paper and transferring them to gardening, is that which teaches how, from any three points (fig. 644. a, b, c), not in a straight line, to find the centre of a circle whose circumference shall pass through them. Imagine the three points connected by two straight lines; bisect these lines by others (g and e), perpendicular to them, and where these intersect (at g) will be found the centre of the circle whose circumference shall pass through the three points.*

straight line, to find the centre



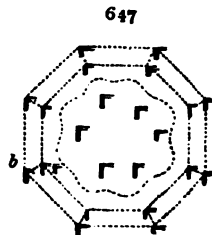
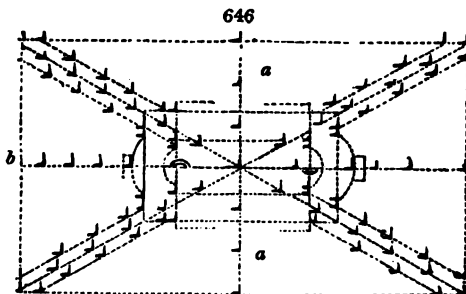
2733. *The method of laying out polygons on even ground, or any geometrical figure, will be perfectly simple to such as can perform the problems on paper; all the difference on the ground is, that the line is used instead of the compasses, with or without the assistance of the square and arithmetical calculation.*

2734. *Laying out the ground-lines of gardens, parterres, or any large figures on plane surfaces, is merely a mixed application of geometrical problems.* It is only necessary to premise, that a straight line is found by placing rods upright, so as they may range one behind the other at convenient distances, and so accurately adjusted, that the one next

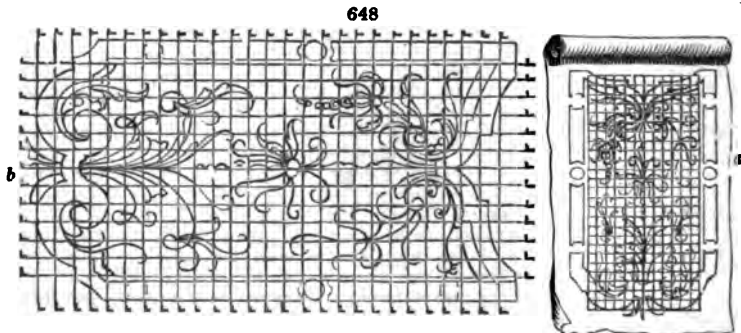


the eye may conceal all the rest. A plan of a garden, &c. (fig. 645. a) being given with a scale and north and south line attached, first find its extreme dimensions, and supposing you have space sufficient for laying it out, find the central lines (fig. 646. a, a, b, b), and lay them down first, distinguishing them by rows of stakes; then from these set off the lines of the central plot, if any, the walks, alleys, walls, &c., distinguishing them by strong stakes, which may remain till the ground is put into proper form.

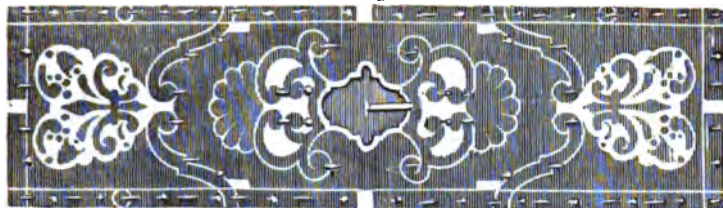
2735. *In laying out polygonal gardens, or plots, or ponds (fig. 645. b), when the dimensions are too great for inscribing a circle of the full size with a line, the obvious mode is to form a small circle in the centre, and mark the figure on its circumference; then from the point where the sides intersect, radii can be extended as far as required, and the length of one being found, the rest can be adjusted accordingly, and the plot thus laid out of the required size. (fig. 647.)*



2736. *Intricate and fanciful figures of parterres are most correctly transferred to ground, as they are copied on paper, by covering the figure to be copied with squares (fig. 648. a) formed by temporary lines intersecting each other at equal distances and right angles, and by tracing on the ground similar squares, but much larger, according to the scale. (fig. 648. b.)* Sometimes the figure is drawn on paper in black, and the



squares in red, while the squares on the ground are formed as sawyers mark the intended path of the saw before sawing up a log of timber; that is, by stretching cords rubbed with chalk, which, by being struck on the ground (previously made perfectly smooth), leave white lines. With the plan in one hand and a pointed rod in the other, the design is thus readily traced across these indications. The French and Italians lay out their most curious parterres (fig. 649.) in this way.

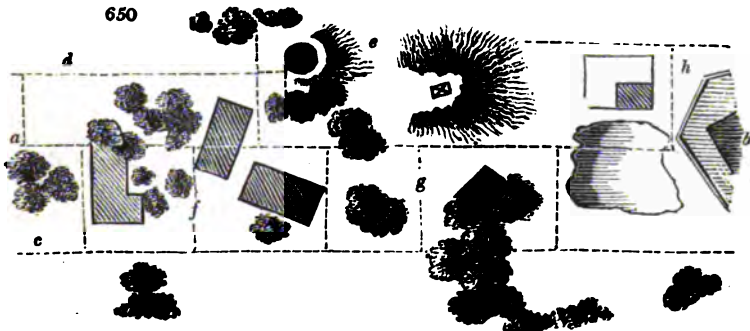


SUBJECT. 2. Transferring Figures and Designs to irregular Surfaces.

2737. *Staking or marking out plans on irregular surfaces* constitutes the most difficult part of practice, whether in arranging grounds in the country, or in laying out streets, or other improvements in towns. These difficulties do not arise from the intricacy of the principles of action; but from the variety of operations often requisite to overcome the obstructions. They may be all classed under three heads; that of transferring a straight line, a curved line, and a level line.

2738. *Where a straight line* is to be indicated among objects or inequalities not more than fifteen or twenty feet high, its plan or tract on the earth (*fig. 650. a . . . b*) may be found by the use of poles, a few feet higher than the elevation of the obstructions, the director being placed on a step-ladder, or other elevation at one end. Where this method cannot be adopted on account of the height of the inequalities, the line must either be formed along the summits of these inequalities, which may be done if they are houses, hills, or trees; or parallel lines (*c, d, e*) must be formed where practicable, and the main line found by offsets (*f, g, h*) from those collateral lines at such places as are

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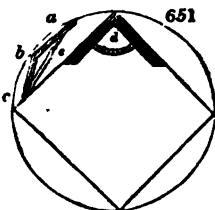
suitable. A third method, but one not always perfectly accurate, is to take a plan of the field or scene of operations, and on this to set out the proposed line; then by ascertaining its bearings and distances relatively to the obstructions, it may be transferred from the paper to the ground. In carrying straight lines through woods, lanterns have been used; but a much more correct method is to elevate poles above the surface of the wood.

2739. *Continuous lines* may always be made perfectly straight, however irregular the surface, by following the same parallel as indicated by points of the compass, or by the shadow of the operator during sunshine. If the needle does not move, or the shadow of the spectator is always projected at the same angle to his course, the direction in which he walks, in either case, must be straight. The mode of forming right lines in such circumstances being understood; the formation of right-lined figures is merely a repetition of the process, uniting each side by the required angle.

2740. *Curved lines* on irregular surfaces are in general only to be laid down by the previous establishment of straight lines; first, leading straight lines (*fig. 633. a, b, c*) and next secondary straight lines (*fig. 633. d, d*), which shall form skeletons to the curves. A second mode, and on a large scale by much the most certain, is to find the leading points of the curves by triangles from a known base or known bases; but as both modes are rare in the practice of gardening, they need not be enlarged on.

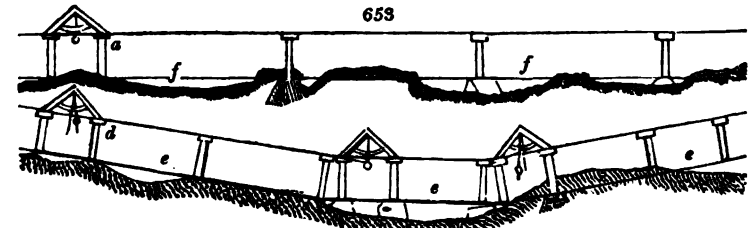
2741. *Circles, ovals, and every description of curvilinear figure*, may be laid down by either of the above modes; but where the obstructions are not great, circles, or parts of circles, may be transferred more expeditiously by the following method:— The diameter

of the circle (*fig. 651.*), and any two points (*a* and *c*) which its circumference is to touch,



being given, next ascertain the side of the largest square which the circle will contain. Then, if the director place himself in the given point of the circumference, and look either through the sights of a theodolite, or along the edge of a common carpenter's square (*d*), or any right-angled board, the straight line traced by his eye will intersect the situation of the circumference of the circle; if he then causes to be measured along that straight line, the length of the side of the square contained within the circle, the extent of the dimension will determine a point in the circumference. Then looking along the other side of the square, or through the sights of the theodolite at right angles to the former observation, he will by a similar process determine another circumferential point; and now, by changing his position either to the right or left, taking care to set off always the same dimension from the side of the square, he will trace out the circumference of the circle, or any portion of it. It is evident to any person in the slightest degree acquainted with practical geometry, that the same object may be attained by an adjusted triangle (such as *e*), the extremities of which will indicate points in the circumference without further trouble. A very obvious application of this instrument is that of reducing an irregular basin of water to a circular figure. The director moves round with the adjusted triangle (*fig. 652. a*); his assistant sets off the dimensions; and as each point in the circumference is ascertained, it is marked by a stake (*b, c, d*). — Other modes on similar principles, well known to land-surveyors, are occasionally resorted to in laying out gardens, especially in the geometric style, and in preparing the foundations of farmhouses, and other rural offices and appendages.

2742. A level line (*fig. 653. f f*), whether straight or curved in direction, can only be determined on an irregular surface by measuring down from an elevated level line (*a*), or from level lines in parallel directions, and so transferring the points by horizontal levels to the proper line. Straight rods are the ready means of measuring downwards, and the points must be marked by hillocks or hollows (*b*); or by smooth-headed stakes driven into the surface, and protruding above, or sunk under it, according to the obstructions.



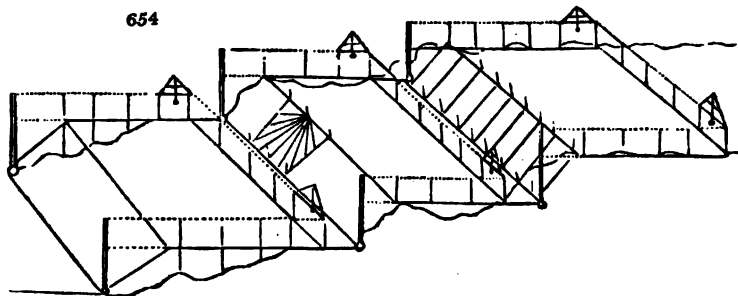
2743. Lines of uniform acclivity or declivity (*fig. 653. e, e, e*) are readily formed on the same principle. In this and the former case, the common level and the boring-pieces (*a* and *d*), with measuring rods and stakes, are all the instruments required. The formation of level lines and uniform slopes, by the boring-pieces and common level, ought to be familiar to every working gardener; for, without considerable adroitness in this department of garden-operations, none can be considered as fit to form a walk, or even plant a box-edging.

2744. Levelling for terrace-slopes (*fig. 654.*), or for geometrical surfaces, however varied, is performed by the union of both modes, and requires no explanation to those who have acquired the rudiments of geometry, or understand what has been described.

SUBJECT. 3. Of the Arrangement of Quantities.

2745. The dividing and subdividing of land is generally the business of the land-surveyor, but it sometimes comes under the practice of the gardener, on a small scale, and on simple principles. Thus it may be required to determine the dimensions of a square, of a circle, of an oval, or of a mixed figure of a kitchen-garden, which shall contain a

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certain number of acres, or acres and parts of acres. Or, on a certain compartment in a garden of given breadth and length, it may be required to sow or plant a certain number of poles of any given crop, &c.

2746. *Where the figures are simple and regular*, as squares, parallelograms, triangles, circles, &c., these problems are easily solved; but where they are irregular, the safest way for practical gardeners, not much in the habit of calculation, is by *trial and correction*. Thus, supposing it required to find the dimensions and ground-plan of a garden-wall, which shall enclose two acres, the north and south walls to be straight and parallel, and the two ends parts of ellipses. Try a parallelogram, which shall contain $1\frac{1}{2}$ acres, and try and adjust two curves to its ends, which shall each contain $\frac{1}{2}$ of an acre. If $\frac{1}{2}$ of an acre does not give sufficiently curved ends, narrow the parallelogram part a little, which will admit an increase to the curved ends. All this being laid down on paper to a scale, when the figure is completed, ascertain its contents by the scale, and vary it as above, till it corresponds exactly with what is required.

2747. *For more intricate figures*, first cover the paper with squares, each containing a certain area; say a yard, a pole, &c., according to the magnitude of the design to be adjusted. Then, on these squares adjust the form and the contents of the given figure, by alternate delineations of the desired shape, and numbering the squares for the desired contents. When the end appears to be attained, prove the whole by measuring from the scale.

2748. *With respect to measuring for cropping compartments or borders*, supposing it is desired to sow three poles of turnips on a compartment 60 feet broad, then the first question is simply, given 60 feet as one side, required the length of another requisite to form a pole. A pole contains $30\frac{1}{2}$ square yards, or $273\frac{1}{2}$ square feet; dividing the last sum by 60, the quotient, 4 feet 6 $\frac{1}{2}$ inches, is the length of one pole at this breadth. Or, if by links, then 60 feet = 136.2 links, and 625 square links = 1 square pole; hence $625 \div 136.2 = 6\frac{1}{2}$ links. 3×4 feet 6 $\frac{1}{2}$ inches, or $3 \times 6\frac{1}{2}$ links = 13 feet 8 inches, or $20\frac{1}{2}$ links, the length of three poles of the given breadth.

2749. *For arranging work done by contract*, it is necessary for the gardener to be able to determine the superficial and solid contents of the ground; whether it is to be cultivated on the surface, as in digging or hoeing; turned over to a considerable depth, as in digging drains or trenching; or removed from its place, as in forming excavations for water or foundations. All this is abundantly simple, where the first rudiments of mensuration are understood. The most important part is what relates to digging out large excavations, and wheeling the earth to different distances; and to guide in this, the following rules, known to every canal contractor, may be worth attending to by the gardener.

2750. *For excavating and transporting earth*. In soft ground, where no other tool than the spade is necessary, a man will throw up a cubic yard of 27 solid feet in an hour, or ten cubic yards in a day. But if picking or hacking be necessary, an additional man will be required; and very strong gravel will require two. The rates of a cubic yard depending thus upon each circumstance, they will be in the ratio of the arithmetical numbers 1, 2, 3. If, therefore, the wages of a labourer be 2s. 6d. per day, the price of a yard will be 3d. for cutting only; 6d. for cutting and hacking; and 9d. when two hackers are necessary. In sandy ground, when wheeling is requisite, three men will be required to remove 30 cubic yards in a day, to a distance of 20 yards, two filling and one wheeling; but to remove the same quantity in a day, to any greater distance, an additional man will be required for every twenty yards.

2751. *To find the price of removing any number of cubic yards to any given distance*:—Divide the distance in yards by 20, which gives the number of wheelers; add the two cutters to the quotient, and you will have the whole number employed; multiply the

sum by the daily wages of a labourer, and the produce will be the price of 30 cubic yards. — Then, as 30 cubic yards is to the whole number, so is the price of 30 cubic yards to the cost of the whole.

Example. What will it cost to remove 2750 cubic yards to the distance of 120 yards, a man's wages being 3s. per day? First, $120 \div 20 = 6$, the number of wheelers; then, $+ 2$ fillers = 8 men employed, which, at 3s. per day, gives 24s. as the price of 30 cubic yards; then $30 : 24 :: 2750$ and $24 \times 2750 \div 30 = 110l$.

SECT. III. *Of carrying Designs into Execution.*

2752. *To realise alterations projected or marked out on the ground*, recourse is had to the mechanical operations of gardening. These require to be directed to the following objects: — Removing surface incumbrances, smoothing surfaces, draining off superfluous water, forming excavations for retaining water, forming artificial surfaces, and forming walks and roads.

2753. *Removing surface incumbrances* is one of the first operations of improvement in reclaiming neglected lands, or preparing them for ulterior purposes. The obstacles are generally large blocks of stone, bushes, roots of trees, and sometimes artificial obstacles, as parts of walls, hedges, buildings, &c. Where the stones cannot be ultimately rendered useful or ornamental near to where they lie, they must be loosened by levers, and placed on sledges and dragged off; and to facilitate this, they may be previously blown in pieces by gunpowder; or large pits may be dug, and they may be buried near to where they lie. The other obstacles are easily got rid of; large roots may be split with wedges, reft with gunpowder, and drawn out by wrenches; or, the hydrostatic press may be applied, as for drawing piles. The use of gunpowder was formerly often attended with accidents to the operators; but the risk was greatly lessened, when it was discovered that sand might be poured in, instead of ramming clay and stony matters over the charge (*Supp. Encyc. Brit. art. Blasting*); and gunpowder is now rendered altogether unnecessary by the most valuable discovery of Robert Mallet, Esq., of Dublin, of a mode of splitting rocks by insertion in the jumper holes of male and female screws. (See *Gard. Mag.*, vol. ix.)

2754. *Smoothing surfaces.* Whatever be the nature of the future improvements, this operation generally takes place to a certain extent after the removal of obstacles. Pits, quarries, pools, &c. are to be filled up; banks, dikes, artificial mounds, and excrescences to be broken down and scattered about, before the natural surface can be duly understood and appreciated, and before drains and other preliminary improvements, as roads, fences, &c., can be conveniently marked out.

2755. *Draining off superfluous water by subterraneous drains.* As the theory of this subject belongs more properly to agriculture than gardening, we shall confine our remarks to execution. The designer or director of the improvements having, by the aid of levelling, and consideration of the causes of the superfluous moisture, marked out by proper stakes the main drain and lateral cuts, the lowest point or outlet of the former is first to be begun upon, and excavated to the proper width and depth. If the soil be very soft, the materials for filling in, or forming the channel, or drain, should be previously carted there, as this operation, performed on soft ground after the excavation is made, is apt to damage the sides of the drain. No part of the drain ought to be filled, till the whole has been completed, and any errors in the level of its bottom or water-way corrected. The height to which the materials are to be laid, must be regulated by the use to which the surface is to be applied. For permanent pastures, as in lawns and parks, they may be brought near the surface; but in kitchen-gardens, or scenery where digging or trenching are occasionally to take place, they should not come within six inches of the bottom of the loosened strata. As to materials for drains, whatever will form a porous or hollow stratum or vein may be employed; but round stones are unquestionably the most durable for collecting-drains; and tubes of earthenware, or built drains of stone or bricks, for drains of conveyance. The most complete description of master-drain, is one with a built cylinder or barrel of stone or brick below, covered by a vein or vertical stratum of round stones, terminating near the surface in coarse gravel. Wherever much draining is to be done, all the various methods should be considered, as detailed in the county surveys, and collected in Marshall's *Treatise on Landed Property*, and Johnston's *System of Draining*; and those fixed on which may be considered as most suitable to the particular case.

2756. *Draining off superfluous water by surface drains* is seldom admissible with good effect in garden-scenery. Ridges, whether broad or narrow, communicate a vulgar field-like character to parks or lawns; and large open gutters are only ditches. Perhaps the least objectionable mode is to use the mole-plough, or to form underground gutters with the spade on a similar principle. The blade of the spade should be in the form of the letter V, rather blunt at the point; and as each spitful is dug out, half its lower part is to be cut off, and the upper part returned to the gutter, so that no external deformity is produced. Such drains, as well as the channels made by the mole-plough, require to be renewed every three or four years, especially if cattle and horses are admitted on the grounds in winter. Hence, many use straw or small faggot-wood to fill the gutters as in Norfolk, or flints as in Kent, gravel as in Berkshire, or clinders and scorles as in some parts of Lancashire.

2757. *Forming excavations for retaining water.* Previously to commencing this operation, the levels must be staked out with great accuracy, as well as the places indicated from which the larger masses of earth are to be moved or to which they are to be taken. Excavations for water vary in respect to the difficulties and manner of execution, according as they may be intended for running or stagnated water; for water already existing on the spot, or to be brought there, or according to the nature of the soil and surface. For running water, more depends on the design than on the execution; for a current, if well directed, will, in a short time, form a suitable bed and banks for itself; but for

stagnated water, all depends on art, both in the design of the shape and the execution of the bed and margin. Water already existing in a body on the spot, generally implies a suitableness of soil for retaining it, and the existence of springs for an increased supply; and these serve as useful guides in the course of execution; but where water is to be brought to a situation, it generally implies an unsuitableness both of soil and surface to retain it, and hence it requires the greatest attention in the application of art, both as to design and execution. The most suitable surface for water is a hollow or level, and the best soil a clay or strong loam. In all these cases, the executive part reduces itself to three operations; the removal and disposal of the earth, the formation of the bed and margin, and the formation of the dam or head and sluice.

2758. *In the removal and disposal of the earth*, regard should be had to preserve the best soil for what is to be future surface; and, in poor lands, it may often be advisable to dig or pare off the surface of the spots to be covered by the excavated earth, and preserve them for the same purpose. Where the new soil is to be thinly scattered over the old, following, trenching, or digging, may effect the proper mixture. When large masses of new earth are to be laid down, that of the worst quality must be the farthest removed from the probable reach of the roots of future trees; or, if the roots of trees will penetrate the whole mass, then the whole soil should be mixed. Gravelly materials should be kept at such a distance from the margin of the water, as not to act as a drain from it; and, in forming the mass of earth requisite at most dams or heads, the less gravel or porous matter used alone, the more compact and retentive will be the head. In every mode in which excavated earth is disposed of, care is requisite to blend its outlines with those already existing, so as to avoid all appearance of patches laid on, bumps, warts, or excrescences, than which nothing is more disagreeable in surfaces.

2759. *In the formation of the bed*, where the excavation has been made in a level surface, no further attention is requisite than attending to the depths indicated in the design, which will generally be greatest towards the middle, and diminishing to the sides, as in nature. Few pieces of water require to be deeper in the middle than ten feet, which will generally deter cattle from wading across them, and prove unfavourable for the growth of most aquatic plants. Where a piece of water is formed by damming up, or throwing a head across a hollow, of which, perhaps, the most notable instance on record is that of Blenheim, the bottom does not require any attention, except adjoining the head; the mass of materials forming which, should be disposed as an inclined plane under the body of water, for the sake of securing the head; and to prevent the water from penetrating into this mass of materials, its surface should be regularly clayed or puddled over, as well as a part of the firm ground on all sides, and even in the bottom of the excavation. For if this firm ground be of a sandy or gravelly nature, the water may, by entering it, find its way to the mass of new and not yet consolidated earthy matters, and by softening them, speedily ruin the whole mound or head. A safe mode is to leave the head to consolidate for a year or more before filling with water. This was Brown's practice at Blenheim, Harewood Hall, and other places.

2760. *When water is formed on the side of a hill*, the lower part of the excavation must be raised and clayed with equal care, as in the case of the head or dam, and for the same reasons. It is almost needless to mention, that claying must never be omitted where the bottom or sides are either newly formed, or not naturally retentive of water. Where clay cannot be had, loamy, or calcareous, and even somewhat sandy earth, by abundant working, becomes retentive of water. This the celebrated engineer Brindley first discovered and practised.

2761. *The margin of all water, where nature is imitated*, ought, as much as possible, to be formed of stony or gravelly materials, as most likely to give a dry appearance quite to the edge of the water, to admit of walking there, of cattle drinking without sinking into the ground, and bemiring themselves, and to prevent the growth of such grasses and aquatics as communicate a morassy or maraby appearance, and finally as being more natural and picturesque than banks of mud. For this purpose, during the excavation, all, or a suitable quantity of such gravelly or stony materials as occur, should be reserved for depositing along the margin, for at least one yard beyond the edge of the water, and two yards down the slope of the bed. If suitable materials are not to be had from the excavation, they should be procured; for without them there can be but little beauty in the margins, at least of stagnated water. The margins of rivers may be left in a great degree to nature, watching every proper opportunity after floods or winds, to heighten indications of picturesque effects, not materially inconsistent with local character and utility.

2762. *In the formation of the head, or dam*, the points requiring particular attention are the claying, and the forming the sluice or valve for emptying the pond. Claying should either be performed over the whole of the inner surface of the head, or by a perpendicular stratum of clay in the middle of the bank. The last mode is the most simple of execution; but if the great body of loose materials are of a sandy or porous nature,

the former will be found the safest ; either however, well executed, will suffice ; and in this point of practice, execution is certainly of more consequence than design.

2763. *The sluice* is the stopper or valve to a drain, carried through the bank of a piece of artificial water at the lowest part of its bed, in order that it may be emptied at pleasure. There are various kinds, from the simple tube and stopper, to the plank-sluice or grooved frame. This last is formed of a plate of boards, generally two or three feet wide, and six or eight feet high, attached to a stalk, and worked by means of a pinion and ratchet in a frame of timber. The sluice is built vertically into the drain as a damper is into a flue, and the length of the stalk and frame is always such as to reach somewhat above the ground's surface for convenience of working. The grand object as to the sluice is to construct it so as to admit the least possible escape of water. This will generally be best attained by forming the tunnel, in which the sluice is to be built, in the solid ground at the side of the head, and not in the new and loose earth, building it of masonry or brick set in cement, claying it completely on all sides, and fitting in the sluice with the greatest nicety.

2764. *Siphon sluice.* As it is practically impossible to form sluices and drains that do not lose more or less water, owing to the great pressure of the volume in the lake or pond, it is better, where the supply is very limited, to have no drain or sluice, and to draw off the water when required by a large siphon, which may easily be formed of boards ; or a drain may be formed, and, instead of a sluice, a well of clay adopted as a stopper. The power of drawing off the water is seldom used, and, unless in fishponds, or where frequent clearing is necessary, sluices are of little use. The superfluous water which escapes over the head when abundant, may form a cascade or waterfall ; but where the waste is small, it may escape at one side, as a small gurgling rill over a bed formed of well-worked clay, to prevent its working out hollows and covered by gravel, stones, &c., to give it a clear and natural-looking appearance. As the head is generally a straight mound, destitute of natural beauty, it should be disguised by small islands, or varied by planting on the margin, or both ; but as our present business is merely to describe the operations requisite to the formation of pieces of water, we must refer, for what concerns it as a material of landscape, to LANDSCAPE-GARDENING. (Part III. Book IV.)

2765. *Surfaces to imitate nature*, such as hills, knolls, and all the variety of raised surfaces in pleasure-grounds, are formed by heaping up materials in the indicated shapes ; and valleys of equal variety, by hollowing them out ; in both cases, studying to keep the best earth at the surface, and so to blend the forms with those to which they are united, that no line of demarcation may ever afterwards be discoverable.

2766. *Surfaces avowedly artificial*, as levels, terraces, slopes, banks, beds of earth, or dung-beds, being once distinctly marked out, are executed with equal facility and greater certainty of attaining the end or effect. Formerly the geometric style of gardening afforded an ample field for the exercise of this class of operations ; but at present they are chiefly confined to the kitchen-garden, the sites of buildings, and a limited space around the mansion. Whatever may be the surface destined for a court or square of buildings, as a stable-yard or farmery, it must be reduced to a plane or planes, connected in such a way as not to interfere with utility or effect. It is not essential that the surface be formed to a perfect level, or to any one slope, but that order and connection should enter into the choice of the slopes, whatever that may be. In kitchen-gardens it sometimes happens that a level, or one general slope, may be adopted ; but much more frequently that different slopes enter into the composition of the enclosed surface. These subordinate planes or surfaces are all so connected as to balance and harmonise, and to present to the intelligent eye a work, not of chance, but of design and reflection. In a seemingly level garden it often happens that not one of the compartments is level ; but each compartment of itself forms one plane, diverging from the centre, north wall, or some other point of the garden, and terminating on the same level, at the extreme corners of the compartment, or at the lower extremity of the garden. Besides these means, the formation of raised borders, and the objects of gardens, such as espaliers, bushes, &c. enable the designer to harmonise forms and surfaces seemingly the most incongruous and unsuitable for a scene of culture.

2767. *There are two modes of reducing an irregular surface to a plane.* The first is by taking sections of the surface in parallel lines at every ten or twenty feet distance, according as the surface may be more or less irregular ; laying down these sections on paper geometrically, and from the whole finding a mean section. The stakes of all the parallel lines of levels still remaining in the ground, it will be easy to transfer the mean section by raising these stakes in some places, and lowering them in others, as the scale of the diagram will direct. The second and more general mode is by approximation, or trial and correction, which, in all ordinary cases, is sufficiently correct. Suppose an irregular surface, 100 feet square, is to be reduced to a level or plane. The degree of slope is first ascertained (by the American or any other level) from the highest side of the square to the lower, and it is found, we shall suppose, that the ground will not easily reduce to a horizontal surface. It is, therefore, determined to reduce it to a slope ; and for this purpose a certain height is determined on by the eye, for the extremities of the slope ; in fixing on which, the object is to adjust the slope to the earth, so as the former may be completed without exterior aid or superfluity. Supposing the lower side of the plot to be twenty-five inches below the level of the upper side, then the fall is a quarter of an inch in each foot, and a few lines of stakes can be run across the ground in the direction of the slope, with their tops adjusted to this declivity. Or this may be omitted, and the same end attained by boring-pieces used after the ground has been roughly levelled. But this is one, among many parts of the business of a gardener, which can more readily be acquired by practice than by verbal instruction.

2768. *Walks* are spaces in gardens formed for the purposes of inspecting the garden, recreation, and carrying on the operations of gardening. As one great requisite is, that they should always be dry, the bottom of the walk in most cases forms a drain. There are three descriptions of walks common to gardens ; those of *gravel*, *sand*, and *grass*. All walks consist of two parts, their substrata and surface-covering. The substratum is generally placed in an excavation, the section of which is a segment of a circle, or an inverted pointed arch, being deepest in the centre, where, in wet soils and situations, a notch or drain is often formed to carry off the water which oozes from the sides of the bottom, or sinks through the gravel. In all ordinary cases, however, the water will run

off without this notch, provided the general levels of the bottoms of the walks, or the drains which cross them, or lead from them, be contrived accordingly. The foundation of the walks is to be filled with stones, the largest at bottom; or with rubbish of old buildings, flints, or any other similar materials, observing always to place the smallest at top. When this is done, before the covering of gravel, sand, or turf is laid on, the substratum should be well rolled, so as it may never afterwards vary its position, either with the weight of the covering, or any weight which may pass over it.

2769. *The covering of gravel (fig. 655. a) need seldom be thicker than six inches, and*



generally four inches will be sufficient.

That this gravel may bind in so thin a stratum, it is requisite that it be free from larger stones than those the size of a pigeon's egg, that the general size be that of large gooseberries or plums, and that there be about a

sixth part of ferruginous sand to promote its binding. The choice of gravel is seldom within the power of the gardener; but, in general, pit-gravel is to be preferred to river-gravel, as binding better, and having a better colour. Gravel abounding in oxide of iron, if laid down where it is finally to remain when newly taken out of the pit, and well watered and rolled, will often bind into one compact body, like what is called pudding-stone. Such gravels, however, are seldom well coloured. The best in this respect in England, and also a good gravel for binding, is the gravel of Kensington, to which good qualities it adds that of being the most beautiful in the world. There are some very agreeable sea gravels, formed chiefly of small shells, or fragments of larger ones. The way to make a handsome walk with this gravel is to mix it with about a tenth part of a composition consisting of equal parts of brickdust and puzzolana earth or Roman cement. This done, and the gravel laid down in a wet state, and well rolled, it will form a surface like that of shell-marble. Where gravel does not contain a sufficient mixture of soil or earthy matter to cause it to bind, this quality may be supplied by clay burnt, and then reduced to a state of powder, and mixed with the gravel before it is laid on, or mixed with water, and thrown over the walks after they have been covered with gravel; in both cases rolling the whole firmly immediately after the clay has been applied.

2770. *Where a covering of sand is adopted, its thickness must depend on its qualities, and whether sand is taken from preference or necessity. When sand is taken from preference, the intention is to produce soft walks, which shall yield to the feet like turf, and in this case its thickness may be from three to six inches; but if sand is used because gravel cannot be procured, then little more should be laid on than what is sufficient to fill up the interstices of the upper surface of the substrata. Sometimes an attempt is made to bind such sand, by mixing it with dried clay in a state of powder, or with the scrapings of stone roads, and then watering and rolling; but it is not often that this succeeds; and it may certainly be considered as unfortunate where the best walks about a residence are covered with sand.*

2771. *The covering of turf and earth (fig. 655. b) should not be less than six inches in thickness, that there may be sufficient pasturage and moisture for the roots of the grasses in the dry season. For this purpose, the soil laid under the turf should be a medium between a stiff clayey and a loose sandy soil, so as more completely to serve as a sponge than either.*

2772. *Substitutes for gravel and sand are burned lumps of clay reduced to powder, pounded bricks, stones, or slates, scoriam, ashes, soaper's waste, coal, shells, sawdust, tanner's bark, ferruginous earth, and even moss or peat earth. Bark and peat earth are often used in Holland; the former, when fresh, has much of the colour of Kensington gravel, and, like it, sorts well with vegetation.*

2773. *Substitutes for turf are green mosses recently gathered, and stuck on mortar or cement; the same process may be followed with lichens from trees, or with flow-moss or heath-tops.*

2774. *The form of the surface of gravel, sand, and grass walks, should almost always be flat; or, in the case of gravel, gently raised in the middle, so as to throw the water towards the sides, in approaching which it may sink gently into the substrata. But in turf walks this should never be attempted; as it is desirable, on account of equally watering the plants, and retaining an equal firmness throughout their surface, that the water should sink in where it falls. It is a common practice to form turf walks of solid earth, without any regard to the substrata; and this succeeds very well in dry soils, and where such walks are little used except in summer; but whenever turf walks are to be in constant use, the above is much the best way of forming them. Gravel and sand have, in like manner, been laid on the surface of the soil in small gardens, and in very dry sub-soils; and, where this can be done with the attainment of the desired objects, it has this advantage, that the roots of trees may range under the walks, as, indeed, always happens*

in shrubberies and plantations. The scoriae of metals, coal-ashes, the refuse of mines and glassworks, and other similar matters, are often used instead of gravel; but their colour seldom harmonises well with that of vegetation.

2775. *Walks formed of flagstones*, supported on stone or brick piers, would, in all countries where this description of stone abounds, form the best kind of walk for a kitchen-garden. The cost would be somewhat greater at first; but this would be amply compensated by the saving in care of gravel, and in the annual clipping of box, or whatever other vegetable edging might be employed. The flagstones being raised a few inches above the soil, for the sake of admitting air to it, the ground covered might thus be rendered available for all the adjoining fruit or other trees or shrubs. Such walks might be used immediately after rain without the slightest inconvenience.

2776. *The breadth of walks* generally depends on the extent or scale of the whole residence, and not on that of the particular garden or scene, which, though small, may be connected with greater. Walks should never be narrower than is sufficient to allow two persons to walk abreast, the minimum breadth for which is four feet six inches; but they may be large enough for a party of half a dozen, or, in public walks, or walks in extensive pleasure-grounds, avenues, &c., for one or two dozen. For the latter number thirty-six feet suffice. *The direction of walks* depends on their particular use, and on their connection with the different scenes or subjects of gardening.

2777. *Alleys* are small walks, generally covered with a thin coat of sand, gravel, or shells. In parterres they are sometimes of various widths, to suit the particular forms which constitute the design; and there also they are sometimes covered with different sorts of gravels, shells, scoriae, &c., or paved with flints, pebbles, &c.; but the alleys of separation, in walled gardens, are generally two feet wide, and are formed in right lines, parallel to the main walks, or borders. Sometimes they are not gravelled, and at other times they are covered with road grit, or the scrapings of roads; which, of course, is the powder of the material of which the road is made, mixed with vegetable matter from the droppings of horses and cattle, and is considered as well adapted for binding, or forming a compact surface.

2778. *Roads* are walks on a large scale; they are formed on the same general plan; but, when of fifteen or twenty feet in breadth, and on a wet or retentive soil, they have generally a drain on each side, instead of one in the centre. On the sides of slopes, where, during heavy rains, these roads intercept the water from the upper grounds, they should have frequent gratings, or pierced stones, communicating with the drains on the upper side (*fig. 656.*), unless provision be made for intercepting the water before it comes on the gravel, by a gentle hollow (*a*), running



parallel with, and close to, the road, and communicating in like manner with the drains.

2779. *The durability and comfort of roads and walks* depend on their power to resist the action of animals walking on them, of machines being rolled over them, of weather, and of vegetation. A dry firm substratum is necessary for all these purposes; and this, as already observed, is to be obtained by draining either in the centre or on the sides, and by a stratum of gravel or fragments of stones; the largest, in walks, of two or three ounces each, and, in garden-roads, of six or eight ounces; in both cases covered with smaller gravel. For resisting animals, a degree of compactness, solidity, and homogeneous texture of surface is requisite, according to the weight of the animals and their burdens, and the area of their feet. Thus, supposing a man to weigh seven hundred weight, and to carry a load of two hundred weight, and the area of one of his feet to be twenty-five inches, then the walk or road will require to bear at least forty pounds per square inch, and so on. But an animal not only presses vertically on a walk or road, but his feet (the feet of man singly, and of quadrupeds relatively to each other), acting as levers of the third kind, have a tendency to force up and derange the materials under the point of the foot in the action of walking, in the same way as the lower end of a ladder, when rearing up against a wall, has a tendency to press into and derange that part of the ground which acts as a fulcrum. Hence an additional reason for firmness of surface, and also for using small materials; for, if the end of a ladder, or the extremity of the foot, or any point of pressure, were to exert itself on one end or extremity of a stone, it would act as a weight on the end of a lever; and, depressing one end and raising the other end, would derange at once the substratum and the surface. During rain, or when the surface of the road was moist, this operation would go on in at least a duplicate ratio. Whatever may be the weight of a four-wheeled carriage or waggon, it presses on the road on four points only, whose united areas seldom exceed one foot; hence the necessity of firmness, and also of materials reduced to a size, whose areas are less than the separate

areas of the four pressing points, in order to prevent derangement from leverage or compound action. This subject has been ably illustrated by R. L. Edgeworth; and has been practically exemplified, to a great and beneficial extent, by J. L. M'Adam (*Rules for repairing Roads, &c.* 1823), who has effected an entire change in the system of public road-making followed in this country. (See our *Encyc. of Agriculture.*)

2780. *To resist weather*, the grand object is to get rid of superfluous water; subterraneous sources are to be cut off by drains, and surface water is not to be allowed to sink into the road; but the surface is to be gently raised, and rendered and kept, by rolling, and continually obliterating foot or machine marks, so smooth and impervious, as to throw the water entirely to the sides. By these means, the effects of frost, heavy carriages, and narrow wheels, are greatly lessened.

2781. *To resist vegetation*, a road must be in constant use; but firmness is useful even in this point of view, and also the exclusion of vegetable earths from the gravels or other materials used in forming the surface of garden-walks and approach-roads. Roads watered with strong salt water every two or three years, it is found, will not produce weeds.

CHAP. III.

Scientific Processes and Operations.

2782. *Scientific processes and operations* include the master-operations of gardening as an art of culture. These operations are all mechanical; but some depend, for their beneficial result, on chemical changes, as in the preparation of composts and manures; others depend on the prevention of chemical changes, as in the preserving and keeping of fruits and roots; some on imitations of climates, as in the management of hot-houses; but the greater number are dependent on the laws of vegetable life, as in the operations of propagating, rearing, accelerating, and retarding vegetation. Other processes to be treated of are of a mixed nature, and some depend on the laws of animal life, as in the operations for destroying vermin and insects.

SECT. I. *Preparation of fermenting Substances for Hotbeds, Manures, and Composts.*

2783. *The fermenting substances used in forming hotbeds* are, stable litter or dung in a recent or fresh state, tanner's bark, leaves of trees, grass, and the herbaceous parts of plants generally.

2784. *Stable dung* is in the most general use for forming hotbeds, which are masses of this dung after it has undergone its most violent fermentation. These masses are generally in the form of solid parallelograms of magnitude proportioned to the frames which are to be placed on them, the degree of heat required, and the season of the year in which they are formed.

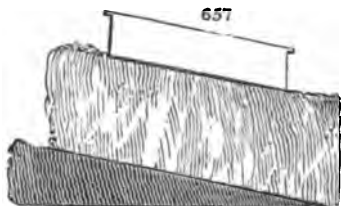
2785. *Tanner's bark* is only preferred to dung because the substance which undergoes the process of putrid fermentation requires longer time to decay. Hence it is found useful in the bark-pits of hot-houses, as requiring to be seldom removed or renewed than dung, or any other known fermentable substance that can be procured in equal quantity.

2786. *Leaves*, and especially oak leaves, come the nearest to bark, and have the additional advantage, that, when perfectly rotten, like dung, they form a rich mould or excellent manure; whereas rotten tanners' bark is found rather injurious than useful to vegetation, unless well mixed with lime and earth.

2787. *Preparation of manures for hotbeds.* The object of preparation, in these three substances, being to get rid of the violent heat which is produced when the fermentation is most powerful, it is obvious that preparation must consist in facilitating the process. For this purpose, a certain degree of moisture and air in the fermenting bodies are requisite; and hence the business of the gardener is to turn them over frequently, and apply water when the process appears impeded for want of it, and exclude rain when it seems chilled and impeded by too much water. Recent stable dung generally requires to lie a month in ridges or beds, and be turned over in that time thrice before it is fit for cucumber beds of the common construction; but for M'Phail's hotbeds, or for linings, or for frames with movable bottoms, three weeks, a fortnight, or less, will suffice; or no time at all need be given, but the dung formed at once into linings. Tan and leaves require in general a month; but much depends on the state of the weather, and the season of the year. Fermentation is always most rapid in summer; and if the materials are spread abroad during frost, it is totally impeded. In winter, the process of preparation generally goes on, under cover from the weather, in the back sheds; which situation is also the best in summer, as full exposure to the sun and wind dries too much the exterior surface; but where sheds cannot be had, it will go on very well in the open air. A great deal of heat is undoubtedly lost in the process of fermentation; and some cul-

tivators have recently devised plans to turn it to some account, by fermenting dung in vineries, which are just beginning to be forced, or in vaults under pine-pits or plant-stoves. The latter mode seems one of the best in point of economy, and is capable of being turned to considerable advantage where common dung-beds are extensively used; but the most economical plan of any seems to be that of employing only M'Phail's pits, or such as are constructed on similar principles.

2788. *The formation of dung-beds* is effected by first marking out the dimensions of the plan, which should be six inches wider on all sides than that of the frame to be placed over it, and then, by successive layers of dung laid on by the fork, raising it to the desired height, pressing it gently and equally throughout. In general, such beds are formed on a level surface; but Knight's mode (*fig. 657.*) is, to form a surface of earth as a basis, which shall incline to the horizon to the extent of fifteen degrees; on this he forms the dung-bed to the same inclination; and, finally, the frame, when placed on such a bed, if, as is usual, it be deepest behind, will present its glass at an angle of twenty degrees, instead of six or eight, which is undoubtedly of great advantage in the winter



season. This seems a very desirable improvement where light is an object, which it must be, in a high degree, in the case of the culture of cucumbers and melons, as well as in forcing flowers.

2789. *Ashes* are often mixed with the dung of hotbeds, and are supposed to promote the steadiness and duration of their heat; and to revive it, if somewhat decayed. Tan and leaves have also been used for the same purpose; and it is generally found that about one third of tan and two thirds of dung will form a more durable and less violent heat than a bed wholly of dung. The heat of dung-beds is revived by linings or collateral and surrounding walls or banks of fresh dung, the old dung of the bed being previously cut down close to the frame. These linings, as before observed, require less preparation than the dung for the beds. The dung-bed being formed, and having stood two or three days with the frame and lights placed over it to protect it from rain, is next to be covered with earth, of quality and in quantity according to the purpose to which it is to be applied. In severe weather, the sides of the bed are often protected by bundles of straw or faggots, which tend to prevent the escape of the heat.

2790. *Collecting and forming composts for manure* is an essential part of the economy of the garden, no less than of the farm. The following judicious observations on this subject, by Bishop, merit attention:—

“Without enumerating the various means that, with careful economy, may be used for increasing the stock of garden manure, such as collecting the urine of animals, chamber-lie, soap-suds, or mixing fresh soils of opposite qualities, I shall confine myself to a plain statement of a method I have practised for these several years past with much success. Like many others, I am so situated that the produce of the stable-yard is the only allowance of dung that can conveniently be allotted for the garden; and this, although every way advantageous for hotbeds, and other purposes of forcing, is not fit to use as a manure for garden crops, without having its qualities altered by fermentation, or blended with substances of a heavier nature: it would, indeed, in many cases, be more injurious than beneficial; I, therefore, during the summer and autumn, have all the offals in the garden, such as weeds, leaves of strawberries and other vegetables, short grass, peas and asparagus haum, with the foliage of trees and shrubs when newly shed, carefully collected into a heap. These are all turned over, and mixed, during the winter, that they may be sufficiently rotted to mix with the dung against the end of summer. I have also another heap, formed with the prunings from gooseberry and currant bushes, fruit trees, raspberry shoots, clippings of box edgings, and loppings from shrubs; also the roots of greens and cabbages, which are generally burnt at two different periods in the year, viz. in spring and autumn; but, previous to each burning, I endeavour to pare up all the coarse grasses around the garden, with a portion of the soil adhering thereto, and, whenever these are sufficiently dried, have them collected to the heap intended to be burnt. The fire is kindled at a convenient distance from the heaps, and a portion of such as burn most easily is first applied, until the fire hath gained a considerable power. After this, the process of burning is continued, by applying lighter and heavier substances alternately, that the one may preserve the action of the fire, and the other prevent it from reducing them too much to ashes. When the whole are thus consumed, a quantity of mould is thrown over the heap, to prevent the fire from breaking through; and, as soon as it can be broken into with safety, it is mixed up into a dunghill with the rotted vegetables, moss earth, and stable-yard dung, in such proportions as is likely to

ensure a moderate fermentation, which is generally completed in three or four weeks ; at which time, I think, it is most advantageously applied, in having it carried to the ground, and instantly dug in." (*Mem. Caled. Hort. Soc.*, vol. i. p. 443.)

2791. *Liquid manures* are highly approved of by many cultivators, and especially by Knight. They are formed by infusing rich dungs, as those of fowls, sheep, pigs, &c., or blood, in three or four times their bulk of water ; and the application of the extract so procured is made at the usual seasons of watering, taking care to apply it only to the roots. Knight uses this mode of manuring chiefly with plants in pots, and is convinced, from experience, that trees and shrubs may grow and bear fruit in very small pots, if abundantly supplied with nourishment in this manner. (*Hort. Trans.*, vol. ii. p. 127.) For some plants, as the pine, vine, cauliflower, cucumber, and others which gardeners consider as *gross feeders*, liquid manures may be applied during their full vigour of growth ; but the practice, we think, would be dangerous, if so applied to culinary or fruit-bearing plants in general, as producing too much excitement.

2792. *Collecting and forming composts for mould.* Composts are mixtures of several earths, or earthy substances or dungs, either for the improvement of the general soil under culture, or for the culture of particular plants.

2793. *In respect to composts for the amendment of the general soil* of the garden, their quality must depend on that of the natural soil : if this be light, loose, or sandy, it may be assisted by the addition of heavy loams, clays, &c. from ponds and ditches, cleanings of sewers, &c. On the other hand, heavy, clayey, and all stubborn soils may be assisted by light composts of sandy earth, drift, and sea sand, the shovellings of turnpike roads, the cleansing of streets, all kinds of ashes, rotten tanners' bark, rotten wood and saw-dust, and other similar light opening materials that can be most conveniently procured.

2794. *Composts for particular plants* may be reduced to, light sandy loam from old pastures ; strong loam, approaching nearly to brick earth, from the same source ; peat earth from the surface of heaths or commons ; bog earth from bogs or morasses ; vegetable earth from decayed leaves, stalks, cow-dung, &c. ; sand, either sea sand, drift sand, or powdered stone, so as to be as free as possible from iron ; lime rubbish ; and, lastly, common garden earth. There are no known plants that will not grow or thrive in one or other of these earths ; alone, or mixed with some other earth, or with rotten dung, or leaves. Nurserymen, whose practice may be considered a safe criterion to judge from, have seldom more than three sorts of earth : loam, approaching to the qualities of brick earth ; peat or bog earth, from heaths or morasses ; and the common soil of their nursery. With these, and the addition of a little sand for striking plants, some sifted lime rubbish for succulents, and some well-rotted cow-dung for bulbs and some sorts of trees, they contrive to grow thousands of different species in as great perfection (taking the difference between plants in pots and plants in the free soil and air) as in their native countries ; and many, as the pine, vine, camellia, rose, &c., in a superior manner.

2795. *Practical limits to ingredients for composts.* Cushing, one of the best writers on the propagation of exotics, observes, "Loam, peat, and sand seem to be the three simples of nature, if I may so call them, most requisite for our purpose ; to which we occasionally add, as mollifiers, vegetable or leaf mould, and well-rotted dung ; from the judicious mixture and preparation of which, composts may be made to suit plants introduced from any quarter of the globe." (*Exotic Gardener*, p. 153. 1814.) Sweet (*Botanical Cultivator*, 1820) concurs in this opinion. See also Haynes *On Collecting and Forming Composts*, &c., 1821.

2796. *Preparation of composts.* The preparation requisite for the heavy and light composts for general enrichment, and of the above different earths, consists in collecting each sort in the compost-ground, in separate ridges of three or four feet broad and as many high, and turning them every six weeks or two months for a year, or a year and a half, before they are used. Peat earth or heath earth, being generally procured in the state of turves full of the roots and tops of heath, requires two or three years to rot ; but, after it has lain one year, it may be sifted, and what passes through a small sieve will be found fit for use. Some nurserymen use both these loams and peats as soon as procured, and find them answer perfectly for most plants ; but for delicate flowers, and especially bulbs, and all florists' flowers, and for all composts into the composition of which manures enter, not less than one year ought to be allowed for decomposition, and what is technically called sweetening. The French gardeners allow for their rich orange-tree composts from three to six years.

2797. *The compost ground* may be placed in any situation concealed from the general view, but at the same time exposed to the free action of the sun, air, and rain. Its size will depend on that of the garden, and on the sorts of culture for which the moulds are adapted. It should generally form a part of the parallelogram enclosure used as hotbed ground ; and, where there are hot-houses, both the hotbed and compost ground should be situated as near them as possible.

SECT. II. *Operations of Propagation.*

2798. *The operations of propagation are among the most curious and difficult in gardening. Plants are universally propagated by seed, but partially also by germs or bulbs, suckers, runners, slips, and offsets; and artificially by layers, inarching, grafting, budding, and cuttings.*

SUBSECT. 1. *Propagation by natural Methods.*

2799. *By seed.* Here the first consideration is to make sure of live seeds; for some lose their vitality very early after being gathered, while others retain it only for one or perhaps two seasons. The size of seeds requires also to be taken into consideration, for on this depends the depth which they require to be buried in the soil: the texture of their skin or covering must be attended to, for the same reason. On the form and surface of the outer coating of seeds sometimes depends the mode of sowing, as in the carrot, and on their qualities in general depends their liability to be attacked by insects. The nature of the offspring expected, and the proper climate, soil, and season, require also to be kept in view in determining how, where, when, and in what quantity, any seed must be sown. Such are the general considerations; their particular applications will occur hereafter.

2800. *By germs or bulbs.* These, whether cauline or radical, require in general to be planted immediately or soon after removal from the parent plant, in light earth, about their own depth from the surface. Matured bulbs may be preserved out of the soil for some months, without injury to their vitality; but infant bulbs are easily dried up and injured when so treated.

2801. *By offsets.* This mode is not very easily distinguished from the foregoing and following, and seems in a strict sense only applicable to young radical bulbs, which, when separated or taken off from the parent roots, are termed offsets.

2802. *By slips.* These are shoots which spring from the collar or the upper part of the roots of herbaceous plants, as in the auricula; and under-shrubs, as thyme, &c. The shoot, when the lower part from which the roots proceed begins to ripen, or acquire a firm texture, is to be dipped or drawn from the parent plant so far as to bring off a heel or claw of old wood, stem, or root; to which generally some roots, or rudiments of roots, are attached. The ragged parts and edges of this claw or rough section are then to be smoothed with a sharp knife, and the slip planted in suitable soil, and shaded till it strikes root afresh, or appears to have recovered from the effects of amputation.

2803. *By division of the plant.* This mode is adopted with many species, as most perennial grasses, the daisy, polyanthus, and a great variety of others. The plant is taken up, and the earth shaken from its roots; the whole is then separated, each piece containing a portion of root and stem, which may be planted without farther preparation.

2804. *By runners.* With certain species this is a very convenient and sure mode of propagation. All that is requisite is, to allow the plantlet on the shoot or runner to be well rooted before being separated from the parent. It may then be planted where it is finally to remain.

2805. *By suckers.* These are merely runners underground; some run to a considerable distance, as the robinia, narrow-leaved elm, sea-limegrass, physalis, &c.; others are more limited in their migrations, as the lilac, syringa, Jerusalem artichoke, saponaria, &c. All that is necessary is to dig them up, and cut off each plantlet with a portion of root; after which its top may be reduced by cutting off from one fourth to one half of the shoot, in order to fit it to the curtailed root, and it may then be planted, either in the nursing-department, or, if a strong plant, where it is finally to remain.

SUBSECT. 2. *Propagation by Layering.*

2806. *Layers* are indicated by nature; and we shall here point out the improvements of art, and their applications. The roots in *natural layers* are produced by the stimulus of the moist earth on which the shoots, from the nature of the tree or plant, or accidental causes, recline: art increases the natural stimuli, and adds others, especially that of diminishing the resources of the shoot in the parent plant, by incision, torsion, or fracture.

2807. *Season.* In general, the operation of layering in trees and shrubs is commenced before the ascent of the sap, or delayed till the sap is fully up; and thence the two seasons are early in spring or at midsummer. Autumn and winter are also resorted to for convenience in extensive concerns. The shoot, or extremity of the shoot, intended to become a new plant, is half separated from the parent, at a few inches' distance from its extremity; and, while this permits the ascent of the sap at the season of its rising, the remaining half of the stem, being cut through and separated, forms a dam or sluice to the descending sap; which, thus interrupted in its progress, exudes at the wound in the form of a granulous protuberance, which throws out roots. If the cut or notch in the stem does not penetrate at least half way through, some sorts of trees will not form a nucleus the first

season; on the other hand, if the notch be cut nearly through the shoot, a sufficiency of alburnum or soft wood is not left for the ascent of the sap, and the shoot dies. In delicate sorts it is not sufficient to cut a notch merely, because in that case the descending sap, instead of throwing out granulated matter in the upper side of the wound, would descend by the entire side of the shoot; therefore, besides a notch formed by cutting out a portion of bark and wood, the notched side is slit up at least one inch, separating it by a bit of twig, or small splinter of stone or pottsherd.

2808. *Manipulation.* Shoots, when layered, are often cut and mangled at random, or buried sufficiently, or so deep in the soil that they throw out but few roots; or not placed upright, by which they make unsightly plants. In order to give some sort of principle to go upon, it should be remembered, that the use of the notch is to prevent the heel, or part intended to throw out granulous matter, from being bruised, which it generally is by the common practice of performing this operation by one cut sloping upwards; and that the use of the slit is to render it more difficult for the descending sap to return from the extremity of the heel. In conformity with this idea, Knight recommends taking up the shoot after it has grown some time, and cutting off a ring of bark below the notch and slit, so as completely to hinder the return of the sap, and thereby force the shoot to employ it in forming roots. (*Hort. Trans.*, vol. i. p. 256.) In burying an entire branch or shoot, with a view to induce shoots to rise from every bud, notches alone are sufficient, without either slitting or ringing. The use of the splinter of wood, or bit of tile or pottsherd, is partly to prevent the union of the parts when the bent position of the shoot is not sufficient for that purpose; and partly, and in some cases principally, to act as a stimulus, like the bottom and sides of pots. On what principle it acts as a stimulus has not, we think, been yet determined; but its effects have long been very well known to gardeners. In all cases the layer must be held firmly in its place by hooked pegs. The operation of layering is performed on herbaceous plants, as well as trees; and the part to become the future plant is covered with soil about a third of its length.

2809. *Layering by twisting, ringing, piercing, and wiring* the shoot intended for the future plant, is also occasionally practised.

2810. *Piercing* is performed with an awl, nail, or penknife, thrust through two or three times in opposite directions at a joint; from which wounds first granulated matter oozes, and finally fibres are emitted.

2811. *Ringing* is cutting off a small ring of bark, by which, the return of the sap being prevented, it is, as it were, compelled to form roots. Care must be taken, however, that the ring does not penetrate far into the wood, otherwise the sap will be prevented from ascending in the first instance, and the shoot killed.

2812. *Wiring* is performed by twisting a piece of wire round the shoot at a joint, and pricking it at the same time with an awl on both sides of the wire. It is evident that all these methods depend on the same general principle; viz., that of permitting the ascent of the sap through the wood, and checking its descent by cutting off, or closing, the vessels of the bark.

2813. *Layers which are difficult to strike* may be accelerated by ringing. Ringing is an excellent method for making layers of hard-wooded plants strike root with greater certainty, and in a smaller space of time than is attained in any other way. The accumulated vegetable matter in the callus, which is formed on the upper edge of the ring, when brought into contact with the soil, or any material calculated to excite vegetation, readily breaks into fibres and roots. (*Hort. Trans.*, vol. iv. p. 558.)

2814. *In layering trees in the open garden*, whatever mode be adopted, the ground round each plant intended for laying must be dug for the reception of the layers; then, making excavations in the earth, lay down all the shoots or branches properly situated for this purpose; pegging each down with a peg or hooked stick; laying also all the proper young shoots on each branch or main shoot, fixing each layer from about three or four to six inches deep, according as they admit, and moulding them in at that depth, leaving the tops of every layer out of the ground from about two or three to five or six inches, according to their length, though some shorten their tops down to one or two eyes. Observe also to raise the top of each layer somewhat upright, especially tongue or slit layers, in order to keep the slit open. As the layering is completed, level in all the mould finely and equally in every part close about every layer, leaving an even, smooth surface, presenting only the tops of each layer in the circumference of a circle, and the stems or stools in the centre. Sometimes the branches of trees are so inflexible as not to be easily brought down for laying; in which case they must be plashed, making the gash or cut on the upper side; and when they are grown too large for plashing, or that the nature of the wood will not bear that operation, the trees may be thrown on their sides, by opening the earth about their roots, and loosening or cutting all those on one side, that the plant may be brought to the ground to admit of laying the branches.

2815. *Layering plants in pots.* When layers are to be made from green-house shrubs,

or other plants in pots, the operation should generally be performed either in their own pots, or in others placed near that of the stool to receive the layer.

2816. *General treatment.* After laying in either of the above methods, there is no particular culture requisite, except that of keeping the earth as much as possible of uniform moisture, especially in pots; and watering the layers in the open air in dry weather.

2817. *Management of stools.* When the layers are rooted, which will generally be the case by the autumn after the operation is performed, they are all cleared from the stools or main plants, and the head of each stool, if to be continued for furnishing layers, should be dressed; cutting off all decayed and scraggy parts, and digging the ground round each plant. Some fresh rich mould should also be worked in, in order to encourage the production of the annual supply of shoots for layering.

2818. *Chinese laying.* The Chinese method of propagating trees, by first ringing, or nearly so, a shoot, and then covering the ringed part with a ball of clay and earth covered with moss or straw, is obviously on the same general principle as layering; and is better effected in this country by drawing the shoot through a hole in a pot; ringing it to the extent of three fourths of its circumference, near the bottom or side of the pot, and then, the pot being supported in a proper position, and filled with earth, it may be watered in the usual way. Some plants difficult to strike, and for which proper stocks for inarching are not conveniently procured, are thus propagated in the nursery hot-houses.

2819. *Removal of the rooted layer or plantlet.* Though layers of trees completed early in spring, and of herbaceous plants after the season of their flowering, are generally fit to remove from the parent plant the end of the succeeding autumn; yet many sorts of American trees require two years to complete their roots. On the other hand, some sorts of roses and deciduous shrubs, if their present year's wood be laid down when about half grown, or about the middle of August, will produce roots, and be fit to separate the succeeding autumn.

SUBSECT. 3. Propagation by Inarching.

2820. *Inarching* may be described as a sort of layering, by the common or slit process, in which the talus, or heel intended to throw out fibres, instead of being inserted in the soil, is inserted in the wood, or between the wood and bark of another plant, so as to incorporate with it. Inarching evidently depends on the same general principles as layering; and all the difference is, that the granulated matter which exudes between the bark and the wood of the talus or heel, instead of throwing out fibres, unites with the wood of the stock or plant to which it is attached; forming a solid ligneous union, which, when the layer or shoot is separated from the mother plant, supplies it with nourishment as the fibres do the common layer. It is the most certain mode of propagation with plants difficult to excite to a disposition for rooting; and when all other modes fail, this, when a proper description of stock or basis is to be found, is sure to succeed. Professor Thouin (*Cours Complet d'Agriculture*, &c. art. *Grefre*) has enumerated thirty-seven varieties of inarching; but they may all be reduced to two; crown inarching, in which the head of the stock is cut off (*fig. 658. a*), and side inarching (*b* and *c*), in which the head of the stock is left on. With young hardy trees, the first mode is reckoned the best, as the whole effort of the stock is thereby directed to the nourishment of the



inarched shoot; the other is resorted to in propagating delicate trees, and for filling up blanks in branches, and other purposes.

2821. *Preparatory measures.* The stocks designed to be inarched, and the tree from

which the layer or shoot is to be bent or *arched* towards them, and put *in* or united, must be *placed* if in pots, or planted if in the open soil, near together. Hardy trees of free-growing kinds should have a circle of stocks planted round them every year in the same circumference, every other one being inarched the one year, and when removed, their place supplied by others; so that there will always be, by this practice, stocks of one year's standing ready to receive the shoot. If the branches of the tree be too high for stocks in the ground, they should be planted in pots, and elevated on posts or stands, or supported from the tree, &c.

2822. *Manipulation.* Having made one of the most convenient branches or shoots approach the stock, mark on the body of the shoot the part where it will most easily join to the stock; and in that part of each shoot pare away the bark and part of the wood two or three inches in length, and in the same manner pare the stock in the proper place for the junction of the shoot; next make a slit upwards in that part of the branch or shoot, as in layering, so as to form a beel, but more of a tongue shape than in layering, and make a slit downward in the stock to admit it. Let the parts be then joined, slipping the tongue of the shoot into the slit of the stock, making both join in an exact manner, and tie them closely together with bast. Cover the whole afterwards with a due quantity of tempered or grafting clay or moss. In hot-houses, care must be taken not to disturb the pots containing the plants operated on.

2823. *Seasons for the operation.* Inarching, like layering, is commonly performed in the spring; and, in general cases, the union is effected in four or five months, when the layer or inarched shoot may be separated from the mother plant. This must be done with a very steady hand, so as not to loosen or break out the adhering shoot, sloping it off downwards, close to the stock. If the head of the stock was not cut down at the time of inarching, it must now be cut off in a sloping direction close to the union; and all the old clay and bandage cleared away and replaced with new, to remain a few weeks longer till the adhesion is complete, when it may be finally removed. In some cases, however, the inarched shoot requires to remain two years, during the whole of which period, it should be carefully covered to exclude the air from the wounds; nor must the binding be removed more than once during that period for fear of disturbing the cicatrising parts.

2824. *Inarching a branch or shoot on the same tree* (*fig. 658. b*) is frequently a very convenient mode of filling up vacancies in trees; in which case it is generally performed without heading down. Knight adopted this practice on a peach-tree, for a very ingenious purpose, that of procuring returning or connected sap to swell and ripen the fruit. Inarching, like grafting, may be applied to various curious and useful purposes (*c, d*). Harte mentions that the hornbeam-hedges, in some parts of the Netherlands, were worked in the *loesenge* form (*d*), and that by removing the bark at each intersection, the whole had become united as if one tree. Some curious examples of inarching and grafting combined are to be seen in the *Jardin des Plantes*.

2825. *Inarching herbaceous vegetables* may, in almost all solid or sub-solid stalked plants, whether annual or of longer duration, be performed with equal certainty as in ligneous kinds. The vine of the cucumber may be inarched on that of the gourd, the love-apple on the potato, &c. (*Baron Tschoudi*.)

SUBJECT. 4. Propagation by Grafting.

2826. *Grafting* is a mode of propagation applicable to most sorts of trees and shrubs; but not easily to very small under shrubs, as heath, or herbaceous vegetables. It is chiefly used for continuing varieties of fruit-trees. A grafted tree consists of two parts, the scion and the stock; their union constitutes the graft, and the performance of the operation is called grafting. The scion is a part of the living vegetable, which, united or inserted in a stock or other vegetable of the same nature, identifies itself with it, and grows there as on its natural stem and roots.

2827. *The end of grafting is, 1st.* To conserve and multiply varieties and subvarieties of fruit-trees, endowed accidentally or otherwise with particular qualities, which cannot be with certainty transferred to their offspring by seeds, and which would be multiplied too slowly, or ineffectually, by any other mode of propagation. *2d.* To accelerate the fructification of trees, barren as well as fruit-bearing; for example, suppose two acorns of a new species of oak, received from a distant country; sow both, and after they have grown one or two years, cut one of them over, and graft the part cut off on a common oak of five or six years' growth; the consequence will be, that the whole nourishment of this young tree of five years' growth being directed towards nourishing the scion of one or two years', it will grow much faster, and consequently arrive at perfection much sooner than its fellow, or its own root left in the ground. A French author found the advantage of this practice in the case of a new species of ash, to be as five to one in point of height. (*Cours Complet d'Agriculture, &c., art. Greffe.*) The third use of grafting is to improve

the quality of fruits; the fourth to perpetuate varieties of ornamental trees or shrubs; and the fifth to change the sorts of fruit on any one tree, and renew its fruitfulness.

2828. *The theory of grafting may be reduced to the following particulars:—*

2829. *To graft or unite only varieties of the same species; species of the same genus; and by extension, genera of the same natural family. Unless this union of natures be attended to, the operation will not be successful.*

2830. *To observe the analogies of trees, as to the periods of the movement of their sap; in the permanence or deciduous duration of their leaves; and the qualities of the juices of their fruits, in order to estimate the probable advantage of grafting a fruit of any particular flavour on another of similar or different qualities.*

2831. *To unite exactly the inner bark of the scion with the inner bark of the stock, in order to facilitate the free course of the sap.*

2832. *To make choice of the proper season, and to perform the operation with celerity.*

2833. *Any scion will not succeed on any stock.* Professor Thouin observes, that the historians and poets of antiquity have written, and the moderns repeated on the faith of others, that every scion will take on any sort of stock, provided there be a resemblance in their barks. Thus Pliny, Varro, Columella, &c. speak of apples and vines grafted on elms and poplars; and Evelyn mentions, that he saw a rose grafted on an orange-tree in Holland. The ancients acknowledge, however, that such grafts were but of very short duration. "The result of numerous experiments which we have made," observes the professor, "proves that if any one of these grafts seems at first to succeed, they all perish more or less promptly."

2834. *Certain species of trees, and certain varieties of fruits, take more easily on some stocks than on others.* Sometimes the cause is known, and at other times we are ignorant of it. Thus the platanus-leaved maple will not receive the scions of any species of its genus; the reason of which may, perhaps, be deduced from its milky sap, which indicates an organisation different from its congeners. In like manner, the common walnut takes with difficulty on the late walnut; because the times of the motion of their sap do not coincide. But why certain varieties of pear succeed better on the quince than on the seedling; and others better on the seedling than on the quince, cannot so easily be accounted for. Such anomalies are frequent, and make part of the practical science of gardeners; of so much the more importance, because less subjected to general laws. (*Cours Complet, &c.*, art. *Greff.*)

2835. *Grafting may be performed on all herbaceous vegetables with solid stems.* Georgina roots are frequently grafted in this country, and sometimes the stems are grafted or inarched. Baron Tschoudi at Strasbourg, Soulange Bodin at Fromont, and other physiologists at Paris, have grafted melons on cucumbers, love-apples on potatoes, cauliflower on cabbages, &c., and made other similar unions, with perfect success. Many of them are detailed in *Essai sur la Greffe de l'Herbe, &c.*, by the Baron Tschoudi, 1819, and those of M. Soulange Bodin, in the *Annales de Fromont*, and those of the Hort. Soc. of Paris.

2836. *Grafting may be performed with the current year's shoot, or with shoots of several years' growth.* This is evident from the general principles of the art, as well as from experience. Knight, the Baron Tschoudi, and others, have grafted young shoots in leaf; and Professor Van Mons, at Brussels, has grafted an entire tree, 15 ft. high, on the stump of another of similar diameter. (Neill, in *Horticultural Tour*, p. 310.)

2837. *Influence of the stock.* The stock does not change the character of the species of tree which may be grafted on it; nor even that of the variety, if the connection between the stock and scion is intimate: but by a particular choice of stocks, the tree is often modified differently in the dimensions of its parts; in its general aspect; in the flavour and size of its fruit, though, perhaps, in a very slight degree; and in the duration of its existence.

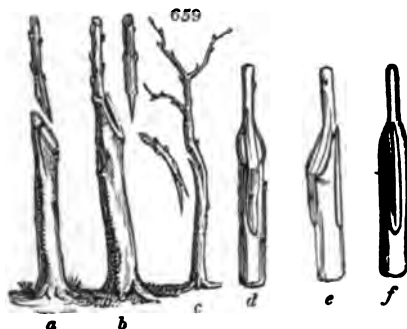
2838. *The nature of the fruit is to a certain extent affected by the nature of the stock.* Miller says decidedly, "that crab-stocks cause apples to be firmer, to keep longer, and to have a sharper flavour; and he is equally confident, that if the breaking pears be grafted on quince-stocks, the fruit is rendered gritty or stony, while the melting pears are much improved by such stocks. This, according to Neill, is scarcely to be considered as inconsistent with Lord Bacon's doctrine, 'that the scion overruleth the graft quite, the stock being passive only;' which, as a general proposition, remains true; it being evident that the scion, bud, or inarched shoot, is endowed with the power of drawing or forming from the stock that peculiar kind of nourishment which is adapted to its nature, and that the specific characters of the ingrafted plant remain unchanged, although its qualities may be partially affected." (*Ed. Encyc.*, art. *Hort.*)

2839. *Fruitfulness and precocity produced by grafting.* The effects produced upon the growth and produce of a tree by grafting, Knight observes, "are similar to those which occur when the descent of the sap is impeded by a ligature, or by the destruction of a circle of bark. The disposition in young trees to produce and nourish blossom-buds and

fruit, is increased by this apparent obstruction of the descending sap; and the fruit of such young trees ripens, I think, somewhat earlier than upon other young trees of the same age, which grow upon stocks of their own species; but the growth and vigour of the tree, and its power to nourish a succession of heavy crops, are diminished apparently by the stagnation in the branches and stock of a portion of that sap, which, in a tree growing upon its own stem, or upon a stock of its own species, would descend to nourish and promote the extension of the roots. The practice, therefore, of grafting the pear-tree on the quince-stock, and the peach and apricot on the plum, where extensive growth and durability are wanted, is wrong; but it is eligible wherever it is wished to diminish the vigour and growth of the tree, and where its durability is not thought important." He adds, "When great difficulty is found in making a tree, whether fructiferous or ornamental, produce blossoms, or in making its blossoms set, when produced, success will probably be obtained, in almost all cases, by building or grafting upon a stock which is nearly enough allied to the graft to preserve it alive for a few years, but not permanently. The pear-tree affords a stock of this kind to the apple; and I have obtained a heavy crop of apples from a graft which had been inserted in a tall pear-stock, only twenty months previously, in a season when every blossom of the same variety of fruit in the orchard was destroyed by frost. The fruit thus obtained was externally perfect, and possessed all its ordinary qualities; but the cores were black, and without a single seed; and every blossom had certainly fallen abortively, if it had been growing upon its native stock. The experienced gardener will readily anticipate the fate of the scion; it perished in the following winter. The stock, in such cases as the preceding, promotes, in proportion to its length, the early bearing and early death of the graft."

2840. *Species and varieties of grafting.* The chief modern writers on grafting are, Quintiney, Du Hamel, Rosier, and Professor Thouin, among the French; Mayer, Diederich, Christ, and Sickler, among the Germans; Clarici and P. Re, among the Italians; and Miller, Curtis, and Knight, among the English. Professor Thouin has refined so much on the subject, as to have produced or enumerated above forty modes of grafting, besides a great many kinds of budding and inarching, named chiefly after eminent ancient and modern botanists and gardeners, as Pliny, Quintiney, Miller, Adanson, &c. Most of these are, however, varieties of the ordinary species, and separated by such slender shades of difference, or so remotely connected with utility (as the *Greffé Banks*), that they do not appear of sufficient importance for admission here; and we shall, therefore, chiefly describe such varieties as have been long known and practised; which form the basis of all the others; and which every individual may vary according to his taste. The reader who would enquire further into the subject, may consult Curtis's *Lectures on Botany*, vol. iii., and *Nouveau Cours Complet d'Agriculture*, &c., tom. xvi. art. *Greffé*.

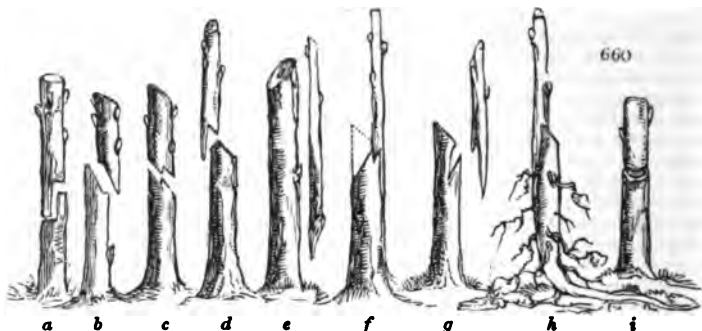
2841. *Whip-grafting* (fig. 659. a), or, as it is sometimes called, tongue-grafting, is



the most generally adopted in nurseries for propagating fruit-trees. To effect this mode in the best style, it is desirable that the top of the stock and the extremity of the scions should be nearly of equal diameter. Hence this variety admits of being performed on smaller stocks than any other. It is called whip-grafting, from the method of cutting the stock and scions, sloping on one side so as to fit each other, and thus tied together in the manner of a whip-thong to the shaft or handle. The scion and stock being cut off obliquely at corresponding angles, as near as the operator can guess, then cut off the tip of the stock obliquely or nearly horizontally; make now a slit nearly in the

centre of the sloped face of the stock downwards, and a similar one in the scion upwards. The tongue or wedge-like process, forming the upper part of the sloping face of the scion, is then inserted downwards in the cleft of the stock; the inner barks of both being brought closely to unite on one side so as not to be displaced in tying, which ought to be done immediately with a ribband of bast, brought, in a neat manner, several times round the stock; and which is generally done from right to left, when the scion is placed with the right hand; but from left to right, when it is placed with the left hand. The next operation is to clay the whole over an inch thick on every side, from about half an inch or more below the bottom of the graft, to an inch over the top of the stock, finishing the whole coat of clay in a kind of oval globular form, closing it effectually about the scion and every part, so as no light, wet, nor wind may penetrate; to prevent which is the

whole intention of claying. It may be added, that the whip-grafting of Lawson, and other old horticultural writers, was then practised without a tongue, which addition gave rise to the latter term. The French mode of whip-grafting differs from the English in their never paring more off the stock, however large, than the width of the scion (*fig. 660. c, f, g*). In both modes, the stock is sometimes not shortened down to the graft, but a few inches left to serve as a prop to tie the shoots proceeding from the scion; or even to admit of fastening the ligatures used in the operation more securely. In either case, if the graft has succeeded, this appendage is cut off at the end of the season.



2842. *Cleft-grafting* (*fig. 659. b*) is resorted to in the case of strong stocks, or in heading down and re-grafting old trees. "The head of the stock or branch (which we may suppose to be two or three inches in diameter) is first cut off obliquely, and then the sloped part is cut over horizontally near the middle of the slope; a cleft nearly two inches long is made with a stout knife or chisel in the crown downwards, at right angles to the sloped part, taking care not to divide the pith. This cleft is kept open by the knife. The scion has its extremity, for about an inch and a half, cut into the form of a wedge; it is left about the eighth of an inch thicker on the outer or back side, and brought to a fine edge on the inside. It is then inserted into the opening prepared for it; and the knife being withdrawn, the stock closes firmly upon it." If it be intended to graft any pretty large stocks or branches by this method, two or more scions may be inserted in each. The stock being prepared by cutting over as above, cleave it across in two places parallel and at a small distance apart, and insert a scion in each cleft: or by cutting or sawing the head off horizontally, and smoothing the section, a radiated series of clefts may be made, and scions inserted in each.

2843. *Crown-grafting* is another mode adopted for thick stocks, shortened branches, or headed down trees. It is sometimes called grafting in the bark or rind, from the scion being inserted between the bark and wood. This mode of grafting is performed with best effect, somewhat later than the others; as the motion of the sap renders the bark and wood of the stock much more easily separated for the admission of the scions. In performing the operation, first cut or saw off the head of the stock or branch, horizontally or level, and pare the top smooth; then cut one side of each scion flat and somewhat sloping, an inch and half long, forming a sort of shoulder at the top of the slope, to rest upon the crown of the stock; then raise the rind of the stock with the ivory wedge, forming the handle of the budding-knife (*fig. 358.*); so as to admit the scion between it and the wood two inches down; which done, place the scion with the cut side next the wood, thrusting it down far enough for the shoulder to rest upon the top of the stock; and in this manner may be put three, four, five, or more scions, in one large stock or branch. It is alleged, as a disadvantage attending this method in exposed situations, that the ingrafted shoots, for two or three years, are liable to be blown out of the stock by violent winds; the only remedy for which is tying long rods to the body of the stock or branch, and tying up each scion and its shoots to one of the rods.

2844. *Side-grafting* (*fig. 659. c*) resembles whip or tongue grafting, but differs in being performed on the side of the stock without bending down. It is practised on wall trees to fill up vacancies, and sometimes in order to have a variety of fruits upon the same tree. Having fixed upon those parts of the branches where wood is wanting to furnish the head or any part of the tree, slope off the bark and a little of the wood, and cut the lower end of the scions to fit the part as nearly as possible; then join them to the branch, tie them with bast, and clay them over.

2845. *Saddle-grafting* is performed by first cutting the top of the stock into a wedge-like form, and then splitting up the end of the scion, and thinning off each half to a

tongue shape; it is then placed on the wedge, embracing it on each side, and the inner barks are made to join on one side of the stock, as in cleft-grafting. This is a very strong and handsome mode for standard-trees when grafted at the standard height. It is also desirable for orange-trees, and rose-standards, as it makes a handsome finish, covering a part of the stock, which, by the other methods, long remains a black scar, and sometimes never becomes covered with bark. The stocks for this purpose should not be much thicker than the scions, or two scions may be inserted.

2846. *A local variety of saddle-grafting* (fig. 659. *d, e, f*) is thus described by Knight, as practised upon small stocks, and almost exclusively in Herefordshire. It is never attempted till the usual season of grafting is passed, and till the bark is readily detached from the alburnum. The head of the stock is then taken off by a single stroke of the knife obliquely, so that the incision commences about a diameter below the point where the medulla appears in the section of the stock, and ends as much above it, upon the opposite side. The scion, which should not exceed in diameter half that of the stock, is then to be divided longitudinally, about two inches upwards from its lower end, into two unequal divisions, by passing the knife upwards just in contact with one side of the medulla. The stronger division of the scion is then to be pared thin at its lower extremity, and introduced, as in crown-grafting, between the bark and wood of the stock; and the more slender division is fitted to the stock upon the opposite side. The scion consequently stands astride the stock, to which it attaches itself firmly upon each side, and which it covers completely in a single season. Grafts of the apple and pear rarely, if ever, fail in this method of grafting, which may be practised with equal success with young wood in July, as soon as that has become moderately firm and mature.

2847. *A subvariety of saddle-grafting* (fig. 661.), applicable to very slender shoots, is practised by Knight, who gives the following explanation of it:—As this mode has rarely “or never been properly executed,

it will be necessary that I describe the motion of the sap as I conceive it to be, at the period when grafts are most advantageously inserted. The graft first begins its efforts to unite itself to the stock just at the period when the formation of a new internal layer of bark commences in the spring; and the fluid, which generates this layer of bark, and which also feeds the inserted graft, radiates in every direction from the vicinity of the medulla, to the external surface of the alburnum. The graft is of course most advantageously placed when it presents the largest surface to receive such fluid, and when the fluid itself is made to deviate least from its natural course. This takes place most efficiently, when a graft of nearly equal size with the stock is divided at its base and made to stand astride the stock, and when the two divisions of the graft are pared extremely thin at and near their lower extremities, so that they may be brought into close contact with the stock (from which but little bark or wood should be pared off) by the ligature. I have adopted this mode chiefly in grafting cherry-trees, and I have rarely ever seen a graft fail, even where the wood has been so succulent and immature as to preclude every hope of success by any other mode.” (*Hort. Trans.*, vol. v. p. 147.)



2848. *Shoulder, or chink-grafting*, is performed with a shoulder, and sometimes also with a stay at the bottom of the slope. It is chiefly used for ornamental trees, where the scion and stock are of the same size (fig. 660. *a, b, c, d*).

2849. *Root-grafting* (fig. 660. *h*), is sometimes performed in nurseries on parts of the roots of removed trees, when the proper stocks are scarce; and in which case, the root of the whitethorn has been resorted to as a stock both for the apple and pear. In general, however, a piece of the root of the tree of the same genus is selected, well furnished with fibres, and a scion placed on it in any of the ordinary ways for small stocks. Thus united, they are planted so deep as to cover the ball of clay, and leave only a few eyes of the scion above ground. Some gardeners have thought, that in this way, the plant must preserve a near resemblance to the parent tree; but Abercrombie remarks, that though it is an expeditious way of obtaining a new plant, such a graft cannot be materially different from a cutting or layer.

2850. *A variety of root-grafting*, practised by Knight, is thus described.—“Transplanting, many years ago, some pear-stocks from a seed-bed, of which the soil was soft and deep, I found that the first emitted roots of many of them descended a foot or more perpendicularly into the earth, before they divided into any lateral ramifications: and as I did not like to replant the young trees, with such an inconvenient length of perpendicular root, I cut off about six inches from each. The amputated parts were then accurately fitted and bound, as in splice or whip-grafting, to scions of pear-trees, which were selected as nearly as possible of the same size; and the roots, with their attached branches, were deposited in the ground as cuttings, so deep, that the whole of the root, and about an inch of the scion, were covered. The soil was then drawn up with the hoe on each side of the plants, which were placed in rows, so that one bud only of each graft was above the soil, and another just within it. These grafts succeeded perfectly well, and I have subsequently repeated the same experiment with equal success upon the apple, the plum, and the peach. In the greater part of these experiments, the roots were perfectly cleansed from mould by washing, before they were fitted to the graft, and were then placed in wet moss, till a sufficient number were ready to be carried to the nursery: a common dibber only was employed in planting them; but the mould was washed into the holes with water, to close it well round the roots, and to supply the place of the clay used in other methods of grafting.” (*Hort. Trans.*, vol. i. p. 239.) A variation of this mode

consists in leaving that part of the tap-root not wanted with the removed tree undisturbed in the soil, and grafting on it there. Such root-grafts grow with uncommon vigour.

2851. *Terebration, or peg-grafting* (fig. 660. i), is an old method, in which the stock being cut off horizontally, a hole was bored in the centre of it; and the scion being selected to fit the stock, within an inch and a half of its lower end a circular incision was made, and the part between that and the end reduced, so as to fit the hole in the stock. This peg, filling the hole, was supposed to secure the graft from the effect of the winds.

2852. *Flute-grafting* may be described as a mode of budding by an entire ring of bark containing one or more buds; instead of by a shield, containing a single bud. As soon as the sap rises in the stock, it is headed down, and the bark removed, as shown in fig. 662, and a cylinder of bark being taken from the scion, it is put on, and made secure by matting. Where the stocks are small, this is one of the most certain modes of grafting; and though it is commonly practised in spring, there can be no doubt that it would succeed equally well in summer, at the usual season for budding. (See *Gard. Mag.*, vol. v. p. 425.)



2853. *Future treatment.* In a month after grafting, it may be ascertained whether the scion has united with the stock, by observing the progress of its buds; but, in general, it is not safe to remove the clay for three months or more, till the graft be completely cicatrised. The clay may generally be taken off in July or August, and at the same time the ligatures loosened where the scion seems to require more room to expand; a few weeks afterwards, when the parts have been thus partially inured to the air, and when there is no danger of the scion being blown off by winds, the whole of the ligatures may be removed. If the stock was not shortened down close to the graft or junction of the scion with the stock at the time of performing the operation, it may be done now, or as soon as the ligatures can be entirely dispensed with. In particular cases, a ligature round the graft, or a stake, or other prop, for the shoots of the scion, may be necessary for a year to come, to protect against winds; or a bandage of moss may be kept over the graft, to preserve moisture, and encourage the expansion of the parts, and complete filling up of the wound.

2854. *Choice and treatment of stocks.* The stocks on which the operation of grafting is performed, are most commonly the stems of young trees, raised from the seed, or from suckers, layers, or cuttings, reared for that purpose. For what are called dwarf-trees, the stock at the time of grafting must always be headed down within a few inches of the ground for the insertion of the scion; and for standards, the heading of the stock for the insertion of the scion may either be near the ground, the scion inserted accordingly, and one of the first shoots from it trained up to form a stem; or the scion inserted at the proper height. But if, as is the case with standard cherries, the stock is intended to form the stem, then it must be suffered to grow six or seven feet high, and be afterwards headed down at five or six feet for the reception of the scion. The French and Americans graft and bud their stocks much higher than is practised in Britain, which some consider to contribute to the durability of the tree. J. Wilmot is of opinion, that, by the opposite practice, the whole of the wild or proper stock, in garden-grounds where the soil is continually raised by manure, becomes buried in the soil, and reduced to a mere root, and then, he says, the tree begins to decline in vigour, and soon decays and dies. (*Hort. Trans.*, vol. i. p. 215.)

2855. *The species of stocks for fruit-trees* are divided into what are called *free-growing* and *dwarfing* stocks. The free-growing are such as naturally attain the full height of the species to be grafted on them, as the seedlings of the common apple, common pear, plum, and cherry. The dwarfing stocks are such as naturally form much smaller trees than the sorts to be grafted on them, and therefore have a tendency to diminish the magnitude of the adopted sorts; as the paradise and doucin, for apples; the quince, for pears; the bullace, for plums; and the perfumed and wild red cherry, for cherries.

2856. *The stocks for timber and ornamental trees* are generally some hardy species or variety of the same genus; sometimes, however, plants of a different genus, but of the same family, will answer. This, as already observed (2834.) is partly a matter of theory, and partly of experience.

2857. *Scions* are generally the young shoots of last summer's growth, and should be chosen from the outside lateral branches of healthy trees. The outside lateral branches are preferred, because in them the shoots are not so robust and apt to run to wood as in

the centre and top of the tree; nor so weak as those which are at its base, and under the shade and drip of the rest. Such shoots are uniformly found to be the best bearers, and to produce the truest specimen of the fruit of the tree on which they grow. An exception to this rule is to be found in the case of debilitated trees, where, of course, the scions should be taken from the strongest shoots in the centre of the tree. The middle part of each shoot makes always the best scion, for the same reasons as those given for choosing the shoots from the middle part of the tree; but long shoots, and especially where the scion is of a rare variety, may be cut into several scions of four or six inches in length, reserving not fewer than two, nor more than five eyes, to form the future head of the tree.

2858. *Preparation of scions.* Scions should be gathered several weeks before the season for grafting arrives; the reason is, that experience has shown that grafting may most successfully be performed by allowing the stock to have some advantage over the graft in forwardness of vegetation. It is desirable that the sap of the stock should be in brisk motion at the time of grafting; but by this time the buds of the scion, if left on the parent tree, would be equally advanced; whereas the scions, being gathered early, the buds are kept back, and ready only to swell out when placed on the stock. Scions of pears, plums, and cherries are collected in the end of January, or beginning of February. They are kept at full length, sunk in dry earth, and out of the reach of frost till wanted, which is sometimes from the middle of February to the middle of March. Scions of apples are collected any time in February, and put on from the middle to the end of March. In *July grafting* (2846.), the scions are used as gathered.

2859. *The materials used in grafting* are, a strong pruning-knife for cutting off the heads of the stocks previous to their preparation by the grafting-knife for the scion; a small saw for large stocks; and a penknife for very small scions; a chisel and mallet for cleft-grafting; bast-ribands as ligatures; and grafting-clay.

2860. *Grafting-clay* is prepared either from stiff yellow or blue clay, or from clayey loam or brick-earth; in either case, adding thereto about a fourth part of fresh horse-dung, free from litter, and a portion of cut hay, mixing the whole well together, and adding a little water; then let the whole be well beaten with a stick upon a floor or other hard substance, and, as it becomes too dry, apply more water, at every beating turning it over, and continuing beating it well at top till it becomes flat and soft. This process must be repeated, more or less, according as the nature of the clay may require to render it ductile, and yet not so tough as to be apt to crack in dry weather; for instance, it should be several times beaten the first day; and next morning repeat the beating, still moistening it with water, and by thus repeating the beating several times every day for two or three days, or every other day, at least, for a week, it will be in proper order for use; observing that it should be prepared a week at least before it is used; but if a month, the better, keeping it moist. Some recommend salt to be mixed with the clay, and others ashes or lime-rubbish, or drift-sand; the object in these cases being to prevent its cracking with the sun, which, however, the horse-droppings, if well incorporated, will, in general, fully prevent.

2861. *The grafting-clay of the French and Dutch*, Onguent de St. Fiacre (St. Fiacre being the patron saint of gardening), is composed of half cow-dung, free from litter, and half fresh loam, intimately incorporated. They prefer this to all others for excluding the external air from wounds of every description, and ridicule the idea of certain complex compositions. Boec (*N. C. d'Ag. &c.*, tom. v. art. *Englumen*) observes of a noted English composition for healing wounds, that it is so "complicated and ridiculous in the eyes of those who have any knowledge of chemistry or natural philosophy, that it is a matter of astonishment how it could be proposed in our age."

2862. *Substitutes for grafting-clay.* Abercrombie and various authors mention resinous substitutes for clay, the details of which are given in the first edition of Miller's Diet. These substitutes are recommended for small and delicate trees, as camellias, daphnes, &c.; and are composed of wax and pitch, pitch and tallow, tallow and oil, or a compound of turpentine, bees'-wax, and rosin, at first melted together, and afterwards heated as wanted; care being taken not to apply it too hot. A coating laid on with a brush, to the depth of a quarter of an inch, is said to be less liable to crack than clay; and, it is added, that when the full heat of summer arrives, the composition melts away of its own accord. This last circumstance, we must confess, appears a sufficient argument against its use, since its removal must depend on the weather, and not on the state of the graft. We have seen its use in Italy attended by such consequences. D. Powel, Esq. spreads it on shreds of brown paper; wraps these round the graft, and over them some best-ties. (*Hort. Trans.*, vol. v. p. 282.)

2863. *The use of compositions for covering grafts is threefold*; 1st. To prevent the extravasation of the sap from the wounds; 2d. The too sudden drying of the wood; and, 3d. The introduction of rain-water into the wound or cleft. It is evident, therefore, that whatever sort of clay or coating is adopted, much will depend on its immediate applica-

tion; and instantaneous repair, wherever it cracks or falls off. In addition to claying, some nurserymen cover the clay with a coating of moss, to preserve a moderate degree of moisture and tenacity; and others, in the case of dwarf-trees grafted close to the ground, earth up the grafts for the same purpose. These practices suit particular cases, but are not generally necessary. Earthing up is one of the best accompaniments to claying, and should seldom be omitted when it can be adopted.

SUBJECT. 5. *Propagation by Budding.*

2864. *Budding, or grafting by gems*, consists, in ligneous plants, in taking an eye or bud attached to a portion of the bark, of different sizes and forms, and generally called a shield, and transporting it to a place in another, or a different ligneous vegetable. In herbaceous vegetables the same operation may be performed, but with less success. It may also be performed with buds of two or three years' standing, and on trees of considerable size; but not generally so. The object in view in budding is almost always that of grafting, and depends on the same principle; all the difference between a bud and a scion being, that a bud is a shoot, or scion, in embryo. In all other respects, budding is conducted on the same principles as grafting.

2865. *A new application of budding* has been made by Knight. It is that of transferring "a part of the abundant blossom-buds from one tree to the barren branches of others." He tried this first on roses, and afterwards on the pear and peach, with much success. In this way also he considers that fruit might be produced on yearling trees, not as matter of utility (as in supplying barren trees with blossom-buds), but as a curious experiment.

2866. *Advantages of budding.* Budded trees are generally two years later in producing their fruit than grafted ones; but the advantage of budding is, that where a tree is rare, a new plant can be got from every eye, whereas by grafting it can only be got from every three or four eyes. There are also trees which propagate much more readily by budding than grafting; and others, as most of the stone-fruits, are apt to throw out gum when grafted. When grafting has been omitted or has failed in spring, budding comes in as an auxiliary in summer.

2867. *Season of budding.* The operation of common budding is performed any time from the beginning of July to the middle of August; the criterion being the formation of the buds in the axillæ of the leaf of the present year. The buds are known to be ready by the shield or portion of bark, to which they are attached, easily parting with the wood. The buds preferred are generally those on the middle of a young shoot, as being neither so apt to run to wood as those at the extremity, nor so apt to lie dormant as those at the lower end. In some cases, however, the buds from the middle and extremity of the shoots are to be rejected, and those taken which are at the base of the annual shoots, as Knight (*Hort. Trans.*, vol. iii. p. 135.) found in the case of the walnut-tree. Scallop-budding may be performed in spring, or at any season.

2868. *Stocks for budding* may, in general, be much smaller than for grafting, as the operation may be performed on the same year's shoot. But it may also be performed on shoots or stems of several years' growth; and in such, by inserting a number of buds, a complete tree may be formed at once. Scallop-budding may be performed on trees of considerable age.

2869. *Choice of buds.* For gathering the shoots containing the buds, a cloudy day or an early or late hour is chosen, on this principle, that the leaves being at these periods in a less active state of perspiration, suffer least from being separated from their parent plant. They are preserved fresh, and may be sent a great distance by inserting their ends in water or moist moss; though, in general, they should be used as soon after gathering as possible; indeed, as in grafting and inarching, the whole operation ought to be performed with the greatest celerity.

2870. *Kinds of budding.* Professor Thouin enumerates twenty-three species and varieties of budding; but we shall here describe only four, of which but one variety is in general use in Britain.

2871. *Shield-budding, or T budding* (*Fig. 663.*) is thus performed:—Fix on a smooth part on the side of the stock, rather from than towards the sun, and of a height depending, as in grafting, on whether dwarf, half, or whole standard-trees are desired; then, with the budding-knife, make a horizontal cut across the rind, quite through to the firm wood; from the middle of this transverse cut, make a slit downward, perpendicularly, an inch or more long, going also quite through to the wood. This done, proceed with all expedition to take off a bud; holding the cutting, or scion, in one hand, with the thickest end outward, and with the knife in the other hand, enter it about half an inch or more below a bud, cutting near half way into the wood of the shoot, continuing it with one clean slanting cut, about half an inch or more above the bud, so deep



as to take off part of the wood along with it, the whole about an inch and a half long (*fig. 663. a*); then directly with the thumb and finger, or point of the knife, slip off the woody part remaining to the bud: which done, observe whether the eye or gem of the bud remains perfect; if not, and a little hole appears in that part, it is improper, or, as gardeners express it, the bud has lost its root, and another must be prepared. This done, placing the back part of the bud or shield between your lips, expeditiously with the flat haft of the knife separate the bark of the stock on each side of the perpendicular cut, clear to the wood (*c*), for the admission of the bud, which directly slip down, close between the wood and bark, to the bottom of the slit (*d*). The next operation is to cut off the top part of the shield (*b*) even with the horizontal first-made cut, in order to let it completely into its place, and to join exactly the upper edge of the shield with the transverse cut, that the descending sap may immediately enter the bark of the shield, and protrude granulated matter between it and the wood, so as to effect a living union. The parts are now to be immediately bound round with a ligament of fresh bast (*e*), previously soaked in water, to render it pliable and tough, beginning a little below the bottom of the perpendicular slit, proceeding upward closely round every part, except just over the eye of the bud; and continue it a little above the horizontal cut, not too tight, but just sufficient to keep the whole close, and exclude the air, sun, and wet.

2872. *Shield-budding reversed*, or reversed *J* budding, differs from the former in having the transverse cut made at the bottom of the perpendicular slit, instead of at its top, and of course the shield is reversed in its position. This mode is represented as preferable to the other by such as contend that the sap rises in the bark equally with the wood; but as this opinion is now generally considered as exploded, the first, or *T* mode, may justly be considered as the most scientific mode of budding. Professor Thouin describes shield-budding reversed under the name of *Schnurwoogth*. The advantages attending it, he says, are, that it is not easily drowned with sap or gum; and the disadvantages, that it often fails when there is a scarcity of sap. It is practised occasionally in the orange-nurseries near Genoa, as may be seen in the plants imported to this country.

2873. *Scallop-budding* consists in paring a thin tongue-shaped section of bark from the side of the stock; and in taking a similar section from the shoot of buds, in neither case removing the wood. The section or shield containing the bud is then laid on the corresponding scallop in the stock; its upper edge exactly fitted, as in shield-budding, and at least one of its edges, as in whip-grafting. After this, it is tied in the usual way. The advantages of this mode are, that it can be performed when the wood and bark do not separate freely; on trees having very stiff, thick, suberose barks, and at any season of the year. Its disadvantages are, that it requires longer time to perform the operation, and is less certain of success. The French gardeners often bud their roses in this manner in spring; and if they fail, they have a second chance in July by using the common mode.

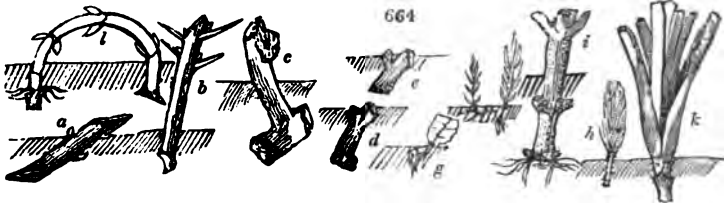
2874. *Budding with double ligatures* is a mode invented by Knight, and described by him (*Hort. Trans.*, vol. I. p. 194.) as "a new and expeditious mode of budding." The operations were performed in the manner first above described; but instead of one ligature, two were applied, one above the bud inserted upon the transverse section through the bark: the other, which had no farther office than that of securing the bud, was applied below in the usual way. As soon as the buds had attached themselves, the lower ligatures were taken off; but the others were suffered to remain. "The passage of the sap upwards was in consequence much obstructed, and the inserted buds began to vegetate strongly in July (being inserted in June); when these had afforded shoots about four inches long, the remaining ligatures were taken off, to permit the excess of sap to pass on; and the young shoots were nailed to the wall. Being there properly exposed to light, their wood ripened well, and afforded blossoms in the succeeding spring; and these would," he adds, "no doubt, have afforded fruit; but that, leaving my residence, I removed my trees," &c.

2875. *Future treatment*. In a fortnight at farthest after budding, such as have adhered may be known by their fresh appearance at the eye; in three weeks, all those which have succeeded will be firmly united with the stock, and the parts being somewhat swelled in most species, the bandage must be loosened, and a week or two afterwards finally removed. The shield and bud now swell in common with the other parts of the stock; and nothing more requires to be done till spring; when, just before the rising of the sap, the trees are to be headed down close to the bud, by an oblique cut, terminating about an eighth or a quarter of an inch above the shield. In some cases, however, as in grafting, a few inches of the stalk is left for the first season, and the young shoot is tied to it for protection from the winds.

2876. *The instruments and materials* for budding are merely the budding-knife (*fig. 357.*) and bast ligatures.

SUBSECT. 6. *Propagation by Cuttings.*

2877. *Propagation by cuttings* has been long known, and is abundantly simple when applied to such free-growing hardy shrubs as the willow (*fig. 664. a*) or the gooseberry (*b*); but considered as the chief mode of propagating most of the *Ericæ*, *Myrtæ*, *Proteacæ*, &c., it becomes one of the most delicate and difficult modes of continuing the



species, and fifty years ago was an operation known to very few of even the first-rate gardeners. It may be considered, as to the choice of cuttings, their preparation, their insertion in the soil, and their future management.

2878. *In respect to the choice of cuttings*, those branches of trees and shrubs which are thrown out nearest the ground, and especially such as recline, or nearly so, on the earth's surface, have always the greatest tendency to produce roots. Even the branches of resinous trees, which are extremely difficult to propagate by cuttings, when reclining on the ground, if accidentally, or otherwise, covered with earth in any part, will there often throw out roots; and the extremity of the lateral shoot will assume the character of a main stem, as may be sometimes seen in the larch, spruce, and silver fir. Cuttings, then, are to be chosen from the side shoots of plants, rather than from their summits or main stems; and the strength and health of side shoots being equal, those nearest the ground should be preferred. The proper time for taking cuttings from the mother plant is when the sap is in full motion; in order that, in returning by the bark, it may form a callus, or protruding ring of granular substance, between the bark and wood whence the roots proceed. As this callus, or ring of spongy matter, is generally best formed in ripened wood, the cutting, when taken from the mother plant, should contain a part of the former year; or in plants which grow twice a year, of the wood of the former growth; or in the case of plants which are continually growing, as most ever-green exotics, such wood as has begun to ripen, or assume a brownish colour. This is the true principle of the choice of cuttings as to time; but there are many sorts of trees, as willow, elder, &c., the cuttings of which will grow almost at any season; and even if removed from the mother plant in winter, when the sap is comparatively at rest. In these and other trees, the principle of life seems so strong, and so universally diffused over the whole vegetable, that very little care is requisite for their propagation. Cuttings from herbaceous plants are chiefly chosen from the low growths, which do not indicate a tendency to blossom; but they will also succeed in many cases, when taken from the flower-stems; and some rare sorts of florists' and border flowers, as the georgina, rocket, cardinal-flower, scarlet lychnis, wallflower, &c., are so propagated.

2879. *The preparation of the cutting* depends on, or is guided by, this principle; that the power of protruding buds or roots resides chiefly, and in most cases entirely, at what are called joints, or at those parts where leaves or buds already exist. Hence it is that cuttings ought always to be cut across, with the smoothest and soundest section possible, at an eye or joint: and as buds are in a more advanced state in wood, somewhat ripened, or fully formed, than in that which is still in a state of formation, this section ought to be made in the wood of the growth of the preceding season; or as it were in the point between the two growths. It is true, that there are many sorts of cuttings, which not only throw out roots from the ring of granulated matter, but also from the sides of every part of the stem inserted in the soil; whether old and large (c), or young and small (d, e), as willows, currants, vines, &c.: but as all plants which are difficult to root, as heaths (f), camellias, orange-trees, &c., will be found in the first instance, and for several years after propagation, to throw out roots only, from the ring of herbaceous matter above mentioned; to facilitate the formation of this ring, by properly preparing the cuttings of even willows and currants, must be an obvious advantage. It is a common practice to cut off the whole or a part of the leaves of cuttings; but the former is always attended with bad effects, as the leaves may be said to supply nourishment to the cutting till it can sustain itself. This is very obvious in the case of striking from buds (g), which, without a leaf attached, speedily rot and die. Leaves alone, as in *Bryophyllum calycinum*, will even strike root and form plants in some instances; and the same, as Professor Thouin observes, may be stated of certain flowers and fruits.

2880. *Cuttings which are difficult to strike* may be rendered more tractable by previous ringing; if a ring be made on the shoot which is to furnish the cutting, a callus will be created; which, if inserted in the ground after the cutting is taken off, will freely emit roots. A ligature would perhaps operate in a similar manner, though not so efficiently; it should lightly encircle the shoot destined for a cutting, and the latter should be taken off when an accumulation of sap has apparently been produced. The amputation in

the case of the ligature, as well as in that of the ring, must be made below the circles, and the cutting must be so planted as to have the callus covered with earth. (*Hort. Trans.*, vol. iv. p. 558.)

2881. *The insertion of the cuttings* may seem an easy matter, and none but a practical cultivator would imagine that there could be any difference in the growth between cuttings inserted in the middle of a pot, and those inserted at its sides. Yet such is actually the case; and some sorts of trees, as the orange, *Ceratonia*, &c., if inserted in a mere mass of earth, will hardly, if at all, throw out roots; while, if they are inserted in sand, or in earth at the sides of the pots, so as to touch the pot in their whole length, they seldom fail of becoming rooted plants. Knight found the mulberry strike very well by cuttings, when they were so inserted, and when their lower ends touched a stratum of gravel or broken pots; and Hawkins (*Hort. Trans.*, vol. ii. p. 12.), who had often tried to strike orange-trees, without success, at last heard of a method (long known to nurserymen, but which was re-discovered by Lucombe,) by which, at the first trial, eleven cuttings out of thirteen grew. "The art is, to place them to touch the bottom of the pot; they are then to be plunged in a bark or hot-bed, and kept moist."

2882. *The management of cuttings* after they are planted, depends on the general principle, that where life is weak, all excesses of exterior agency must have a tendency to render it extinct. No cutting requires to be planted deep, though such as are large (i) ought to be inserted deeper than such as are small (j, k). In the case of evergreens, the leaves should be kept from touching the soil (h), otherwise they will damp or rot off; and in the case of tubular-stalked plants, which are in general not very easily struck, owing to the water lodging in the tube, and rotting the cutting, both ends (l) may in some cases (as in common honeysuckle) be advantageously inserted in the soil, as, besides a greater certainty of success, there is a chance that two plants may be produced. Too much light, air, water, heat, or cold, are alike injurious. To guard against these extremes in tender sorts, the best means hitherto devised, is that of enclosing an atmosphere over the cuttings, by means of a hand or bell glass, according to their delicacy. This preserves a uniform stillness and moisture of atmosphere. Immersing the pot in earth (if the cuttings are in pots) has a tendency to preserve a steady uniform degree of moisture at the roots; and shading, or planting the cuttings, if in the open air, in a shady situation, prevents the bad effects of excess of light. The only method of regulating the heat is by double or single coverings of glass or mats, or both. A hand-glass placed over a bell-glass will preserve, in a shady situation, a very constant degree of heat. What the degree of heat ought to be, is generally decided by the degree of heat requisite for the mother plant. Whatever degree of heat is natural to the mother plant when in a growing state, will, in general, be most favourable to the growth of the cuttings. There are, however, some variations, amounting nearly, but not quite, to exceptions. Most species of the *Erica*, *Georgina*, and *Pelargonium* strike better when supplied with rather more heat than is requisite for the growth of these plants in green-houses. The myrtle tribe and camellias require rather less; and in general it may be observed, that to give a lesser portion of heat, and of every thing else proper for plants in their rooted and growing state, is the safest conduct in respect to cuttings of ligneous plants. Cuttings of deciduous hardy trees taken off in autumn, should not, of course, be put into heat till spring, but should be kept dormant, like the mother tree. Cuttings of succulents, like geraniums, will do well both with ordinary and extraordinary heat.

2883. *Piping is a mode of propagation by cuttings*, and is adopted with herbaceous plants having jointed tubular stems, as the *Dianthus* tribe; and several of the grasses, and tree arundo, might be propagated in this manner. When the shoot has nearly done growing, which generally happens after the blossom has expanded, its extremity is to be separated at a part of the stem where it is nearly, or at least somewhat indurated or ripened. This separation is effected by holding the root end between the finger and thumb of one hand, below a pair of leaves, and with the other, pulling the top part above the pair of leaves, so as to separate it from the root part of the stem at the socket formed by the axillæ of the leaves, leaving the stem to remain with a tubular or pipe-looking termination. These pipings, or separated parts (k), are inserted without any further preparation in finely sifted earth, to the depth of the first joint or pipe, gently firmed with a small dibber; they are then watered, a hand-glass placed over them, and their future management regulated on the same general principles as that of cuttings.

SECT. III. Operations of Rearing and Culture.

2884. *Operations of rearing and cultivation* are various; and some of those which are of the simplest kind, as stirring the soil, cutting, sawing, weeding, &c., have been already considered as garden labours on the soil and on plants; we here, therefore, confine ourselves to the more complex processes of sowing, planting, watering, transplanting, pruning, thinning, training, and blanching.

SUBSECT. 1. *Sowing, Planting, and Watering.*

2885. *Sowing* is the first operation of rearing. Where seeds are deposited singly, as in rows of beans or large nuts, they are said to be planted; where dropped in numbers together, to be sown. The operation of sowing is either performed in drills, patches, or broad-cast. Drills are small excavations formed with the draw-hoe, generally in straight lines parallel to each other; and, in depth and distance apart, varying according to the size of the seeds and future plants. In these drills, the seeds are strewn from the hand of the operator; who, taking a small quantity in the palm of his hand and fingers, regulates its emission by the thumb. Some seeds are very thinly sown, as the pea and spinage; others thick, as the cress and small salading. For sowing by *bedding-in*, see *Bedding-in planting* (2905.), and *Cyfling* (2123.).

2886. *Patches* are small circular excavations made with the trowel; in these, seeds are either sown or planted, thicker or thinner, and covered more or less, according to their natures. This is the mode adopted in sowing in pots, and generally in flower-borders.

2887. In *broad-cast sowing*, the operator scatters the seed over a considerable breadth of surface, previously prepared by digging, or otherwise minutely pulverised. The seed is taken up in portions in the hand, and dispersed by a horizontal movement of the arm, to the extent of a semicircle; opening the hand at the same time, and scattering the seeds in the air, so that they may fall as equally as possible over the breadth taken in by the sower at once, which is generally six feet; that being the diameter of the circle in which his hand moves through half the circumference. In sowing broad-cast on the surface of beds, and in narrow strips or borders, the seeds are dispersed between the thumb and fingers by horizontal movements of the hand in segments of smaller circles.

2888. *Dry weather is essentially requisite for sowing*, and more especially for the operation of covering in the seed; which in broad-cast sowing is done by treading or gently rolling the surface, and then raking it; and in drill-sowing, by treading in the larger seeds, as peas, and covering with the rake: smaller seeds, sown in drills, are covered with the same implement without treading.

2889. *Planting, as applied to seeds*, or seed-like roots, as potatoes, bulbs, &c., is most frequently performed in drills; or in separate holes made with the dibber; in these, the seed or bulb is dropped from the hand, and covered with or without treading, according to its nature. Sometimes planting is performed in patches, as in pots or borders, in which case the trowel is the chief implement used.

2890. *Quincunx* is a mode of planting in rows, by which the plants in the one row are always opposed to the blanks in the other; so that when a plot of ground is planted in this way, the plants appear in rows in four directions.

2891. *Planting, as applied to plants already originated*, consists generally in inserting them in the soil of the same depth, and in the same position as they were before removal, but with various exceptions. The principal object is to preserve the fibrous roots entire, to distribute them equally around the stem among the mould or finer soil, and to preserve the plant upright. The plant should not be planted deeper than it stood in the soil before removal, and commonly the same side should be kept towards the sun. Planting should, as much as possible, be accompanied by abundant watering, in order to consolidate the soil about the roots; where the soil is dry, or not a stiff clay, it may be performed in the beginning of wet weather in gardens; and in forest-planting, on dry soils, in all open weather during autumn, winter, and spring.

2892. *Watering* becomes requisite in gardens for various purposes; as aliment to plants in a growing state, as support to newly transplanted plants, for keeping under insects, and cleaning the leaves of vegetables. One general rule must be ever had in mind during the employment of water in a garden; that is, never to water the top or leaves of a plant when the sun shines. A moment's reflection will convince any one that this rule is agreeable to the laws of nature; for during rain the sun's rays are intercepted by a panoply of fog or clouds. All watering, therefore, should be carried on in the evening or early in the morning, unless it be confined to watering the roots; in which case, transplanted plants, and others in a growing state, may be watered at any time; and if they are shaded from the sun, they may also be watered over their tops. Watering over the tops is performed with the *rose*, or dispenser, attached to the spout of the watering-pot, or by the syringe or engine. Watering the roots is best done with the *rose*; but in the case, of watering pots in haste, and where the earth is hardened, it is done with the *naked* spout. The compartments of gardens are sometimes watered by a leathern tube and muzzle attached at pleasure to different pipes of supply; but this depends on local circumstances, and, in general, it may be observed that the great increase of labour occasioned by watering compartments renders the practice very limited. In new-laid turf, or lawns of

a loose porous soil and too mossy surface, the water-barrel (fig. 498.) may be advantageously used.

SUBJECT. 2. *Transplanting.*

2893. *Transplanting* is the next operation of rearing, and consists in removing propagated plants, whether from seeds, cuttings, or grafts, according to their kinds, and other circumstances, to a situation prepared to receive them. The uses of transplanting ligneous plants are chiefly to increase the number of fibrous roots, so as to prepare or fit young subjects for successful removal from the places where they are originated to their final destination; but in herbaceous vegetables it is partly used to increase the proportion of fibrous roots in plants, relatively to their ramose roots, by which it is found the size and succulency of their leaves, flowers, and fruit are increased. Transplanting involves three things: first, the preparation of the soil to which the plant is to be removed; secondly, the removal of the plant; and, thirdly, the insertion in the prepared soil.

2894. *The preparation of the soil* implies, in all cases, stirring, loosening, mixing, and comminution; and, in many cases, the addition of manure or compost, according to the nature of the soil and plant to be inserted, and according as the same may be in the open ground, or in pots or hot-houses.

2895. *The removal of the plant* is generally effected by loosening the earth around it, and then drawing it out of the soil with the hand; in all cases avoiding as much as possible breaking, or bruising, or otherwise injuring the roots. In the case of small seedling plants, merely inserting the spade, and raising the portion of earth in which they grow, will suffice; but in removing larger plants, it is necessary to dig a trench round, or on one side of the plant. In some cases, the plant may be lifted with a ball or mass of earth, containing all or great part of its roots, by means of the trowel or *transplanter* (fig. 311.); and in others, as in the case of large shrubs or trees, it may be necessary to cut the roots at a certain distance from the plant, one year before removal, in order to furnish them with young fibres, to enable them to support the change. In pots, less care is necessary, as the roots and ball of earth containing them are, or may be, preserved entire.

2896. *Inserting the removed plant* in the prepared soil is performed by making an excavation suitable to the size of the plant, with the dibber, trowel, or spade; placing the plant in it to the same depth as before its removal; then covering its roots with earth firmly, but not harshly or indiscriminately, pressed to it; and, lastly, adding water. There are various modes of insertion, according to the age and kind of plant, tools employed, object in view, &c., of which the following are the principal species and varieties.

2897. *Of spade planting* there are a variety of different sorts, known by the names of hole planting, trench planting, trenching-in planting, slit or crevice planting, holing-in planting, drill planting, bedding-in planting, furrow planting, &c. All these modes are almost peculiar to nursery-gardening.

2898. *Hole planting* is the principal method practised in the final planting of all sorts of trees and shrubs in the open ground; and is performed by opening round holes for the reception of each plant somewhat larger than its roots, and then inserting the plant according to the general principles of planting (2891.).

2899. *Trench planting* is practised in nurseries, in planting out seedlings of trees, and plants in rows, also for box-edgings, small hedge-plants, asparagus, &c. It is performed by opening a long narrow trench with a spade, making one side upright, placing the plants against the upright side, and turning in the earth upon their roots.

2900. *Trenching-in planting* is practised in light pliable-working ground, for planting young trees in nurseries, thorn-hedges, &c. It is performed by digging a trench one spit wide, by a line; and planting from one end of the trench towards the other, as the trench is being dug. Thus, the line being set and the plants ready, with your spade begin at one end, and standing sideways to the line, throw out a spit or two of earth, which forming a small aperture, another person being ready with the plants, let him directly insert one in the opening, whilst the digger proceeds with the digging, and covers the roots of the plants with the earth of the next spit. Another aperture being thereby also formed, place therein another plant, and so on.

2901. *Another method of trenching-in planting* sometimes used for planting certain roots, such as horseradish sets, potatoes, &c., is performed by common trenching, placing a row of sets in each trench or furrow. The horseradish should be planted in the bottom of the open trench, if not above twelve inches deep, turning the earth of the next over them; and the potato-sets placed about four or six inches deep, and covered also with the earth of the next trench.

2902. *Slit planting.* This method is performed by making slits or crevices with a spade in the ground, at particular distances, for the reception of small trees and shrub-plants. It is practised sometimes in nurseries, in putting out rows of small plants,

suckers, &c. from about a foot, or eighteen inches, or two feet high, and that have but small roots: it is also sometimes practised where very large tracts of forest-trees are to be planted by the most expeditious and cheapest mode of performance; the following is the method:—A line is set, or a mark made accordingly; then having a quantity of plants ready, for they must be planted as you proceed in making the slits, let a man, having a good clean spade strike it into the ground with its back close to the line or mark, taking it out again directly, so as to leave the slit open: he then gives another stroke at right angles with the first; then the person with the plants inserts one immediately into the second-made crevice, bringing it up to the line or mark, and directly pressing the earth close to the plant with his foot; proceed in the same manner to insert another plant, and so on. A man and a boy, by this method, will plant ten or fifteen hundred, or more, in a day.

2903. *Holing-in planting.* This is sometimes used in nurseries in light loose ground; and sometimes in planting potatoes, &c. in pliable soils. The ground being previously dug or trenched, and a line placed, proceed thus:—Let one man, with his spade, take out a small spit of earth, and in the hole so formed let another person directly deposit a plant; then let the digger take another spit at a little distance, and turn the earth thereof into the first hole over the roots; then placing directly another plant in this second opening, let the digger cover it with the earth of a third, and so on.

2904. *Drill planting.* This is performed by drawing drills with a hoe, from two to five inches deep, for the reception of seeds and roots, and is a commodious method of planting many sorts of large seeds, such as walnuts, chestnuts, &c.; sometimes also broad beans, but always kidney-beans and peas: likewise of planting many sorts of bulbous roots, when to be deposited in beds by themselves. The drills for all of these purposes should be drawn with a common hoe, two or three inches deep, though for large kinds of bulbous roots four or five inches deep will be requisite, and the seeds and roots should always be covered the depth of the drills.

2905. *Bedding-in planting.* This is frequently practised for planting the choicer kinds of flowering bulbs, such as hyacinths, &c., also for the larger seeds of trees, as acorns, large nuts, and other kinds of seeds, stones, and kernels, and is performed by drawing the earth from off the tops of the beds, some inches in depth, in the manner of *cuffing*, then planting the seeds or roots, and covering them over with the earth, drawn off for that purpose. The following is the mode of performance:—The ground must be previously dug or trenched, raked, and formed into beds three or four feet wide, with alleys between bed and bed; then with a rake or spade trim the earth evenly from off the top of the bed into the alleys, from two or three to four inches deep for bulbous roots; and for seeds one or two inches, according to what they are, and their size; then, if for bulbous roots, draw lines along the surface of the bed, nine inches' distance, and place the roots, bottom downward, along the lines, six or eight inches apart, thrusting the bottom into the earth. Having thus planted one bed; then with the spade let the earth that was drawn off into the alley be spread evenly upon the bed again over the roots or seeds, being careful that they are covered all equally of the above depth, and rake the surface smooth. This method is also practised in nurseries, for sowing such seeds as require great accuracy in covering, as the larch, pine, and fir tribes; and, indeed, for most other tree-seeds.

2906. *Furrow planting.* This is performed by drawing furrows with a plough, in which sets or plants are placed, and covered, also with the plough. It is sometimes practised for planting potato-sets in fields; and has been practised in planting young trees, for large tracts of forest-tree plantations, where the cheapest and most expeditious method was required; but it can only be practised advantageously in light pliable ground. It is thus performed:—A furrow being drawn, one or two persons are employed in placing the sets or plants in the furrow, whilst the plough following immediately with another furrow, turns the earth thereof in upon the roots of the plants.

2907. *Dibble planting.* This is the most commodious method for planting most sorts of fibrous-rooted seedling plants, slips, off-sets and cuttings both of herbaceous and shrubby kinds; and likewise for some kinds of seeds and roots, such as broad beans, potato-sets, Jerusalem artichokes, and horseradish-sets, bulbous roots, &c. It is expeditiously performed with a dibble or setting-stick; therewith making a narrow hole in the earth for each plant or root, inserting one in each hole as you go on, &c.

2908. *Trowel planting.* This is performed with a garden-trowel, which, being made hollow like a scoop, is useful in transplanting many sorts of young fibrous-rooted plants with balls of earth about their roots, so that they may not be checked by their removal.

2909. *Planting with balls.* By removing a plant with its roots firmly attached to a surrounding ball of earth, it continues in a growing state, without receiving any, or but very little, check from its removal. This mode is often practised, more particularly with the more delicate and choicer kinds of exotics, trees, shrubs, and herbaceous plants; and occasionally with many of the fibrous-rooted flowery plants, both annuals and perennials, even in their advanced growth and flowering state, when particularly wanted to supply any deficient compartments, or when it is intended to remove any sort of tree or plant out of the proper planting season, as very late in spring, or in summer. The most difficult tribe of plants to transplant, when in a growing state, are bulbous roots; these succeed with difficulty, even when removed with balls attached.

2910. *Planting by mudding-in (schacklmen)* is a German practice in planting fruit-trees; particularly suitable to the dry sandy soils of that country, and sometimes adopted in similar situations in this country. The pit being dug out, the mould in its bottom is watered and stirred so as to form a mass of mud about half the depth of the pit; the tree is then inserted, and its roots worked up and down in the mud so as to spread them as much as possible equally through it. More mud, previously prepared, is poured in till the pit is full, which is then covered with dry earth, raised round the stem, but hollowed in the middle, so as to form a basin round its stem, and finally covered with litter (*mulched*), and, if a standard, it is fastened to a stake to protect it from winds. Diel, a scientific German author already mentioned (761.), assures his readers, that trees planted in this way in spring thrive better in cold situations than those planted in the ordinary way in the preceding autumn; and, that though it occasions considerable trouble, it should never be neglected either in spring or autumn. He found it also particularly useful in the case of planting fruit-trees in pots. (*Obst. Orange, &c.*, vol. ii.) Pontey, alluding to this mode, says "planting in a puddle occasions the soil speedily to become so firm as to be not only too hard for the roots of the plant to spread, but also so as perfectly to exclude water." (*Rural Improver*, p. 38.)

2911. *Planting by firing with water* is an excellent variety of the last species. It has been successfully practised by Pontey, and is thus described by him:—The hole being made, and the tree placed in it in the usual manner, the root is then slightly covered with the finer part of the soil; the tree being at the same time shaken, as is common, to settle the earth among its roots. Water is then applied by a common garden watering-pot, by pouring it upon the soil with some force, in order to wash it close to and among the roots of the plant. This can only be done effectually, by elevating the pot as high in the hands as can

be conveniently used, after first taking off the rose. It will be obvious, that for such purposes a large pan with a wide spout is to be preferred. The hole is then filled up with the remainder of the soil, and that again consolidated with water as before, which usually finishes the operation. The foot is never applied except in the case of bad roots, which sometimes occasion the plants to be left a little leaning. In such cases, the application of the foot slightly, once or twice, after the soil has become somewhat firm (which generally happens in less than an hour), sets the tree upright, and makes it so firm as to require no staking. (*Rural Improver*, p. 88.)

2912. *Panning, mulching, and staking.* Panning is an almost obsolete phrase, applied by Switzer, and writers of his day, to the operation of forming a hollow or basin round trees, for the purpose of retaining water when given them by art. *Mulching* consists in laying a circle of litter round the roots of newly planted trees, to retain the natural humidity of the soil, or to prevent the evaporation of artificial watering. *Staking* is the operation of supporting standard trees, by tying them with straw, or other soft ties, to poles or stakes inserted firmly in the ground close to the tree.

2913. *Planting edgings.* Edgings are rows of low-growing plants, as box, daisy, &c. planted in lines along the margins of walks and alleys, to separate them from the earth and gravel. They should always be planted before either the gravel or substratum are deposited. To perform the operation, the first thing is to form the surfaces for the edgings, in planes corresponding with the established slopes or levels of the borders, or other parts of the garden; observing, that a line crossing the walk at right angles, and touching both of the prepared surfaces, must always be a horizontal line, whether the walk be on a level or slope. Suppose a walk 150 feet long on a gentle declivity, and that the level or height of both ends are fixed on; then by the operation of the boring-pieces, any number of intermediate points is readily formed to the same slope, and the spaces between these points are regulated by the eye, or by the application of the straight-edge. The earth, so formed into a regular slope, need not exceed a foot in breadth, on which the line being stretched, half is to be cut down, with a face sloping towards the walk; and against this sloping or nearly perpendicular face, the box is to be laid as thin and regular as practicable, and every where to the same height, say one inch above the soil. The box is to be previously prepared by separation, and by shortening the roots and tops. This is one of those operations, on the performance of which with accuracy, much of the beauty of kitchen-gardens depends.

2914. *Planting verges.* Verges are edgings of turf, generally two feet broad or upwards. The turves being cut in regular laminæ, with the edges or sides of each turf perpendicular, and the two ends oblique in the same slope, they are to be placed so as the one may fit exactly to the other. They are next to be beaten with the beetle, afterwards watered, and again beaten or rolled till they become very nearly level with the gravel; and finally a line applied to their edges, and the *raser* (*fig. 354.*) used to cut them off perpendicularly. If the turf is from loamy soil, this is readily effected; but, if from sandy soil, then it must be cut very thin, and placed on good earth or loam, according to circumstances. Verges are sometimes, though rarely, formed of chamomile, strawberries, dwarf thyme, &c., and of these the wood-strawberry and chamomile produce abundant crops.

2915. *Transplanting or laying down turf.* Turfing, as this operation is commonly called, consists in laying down turf on surfaces intended for lawn, in parterres or pleasure-grounds. The turf is cut from a smooth firm part of an old sheep-pasture, free from coarse grasses; in performing this operation, the ground is first crossed by parallel lines about a foot asunder; and afterwards intersected by others, three feet asunder, both made with a line and the turf-raser. Afterwards, the turf-spade or turfing-iron is employed to separate the individual turves, which are rolled up, and conveyed to the spot where they are to be used. It is to be observed, that, in this case, all the sides of each turf are bevelled; by which means, when they are laid down exactly as they were before being taken up, their edges will fit, and in some degree lap over each other; whereby, after rolling, a more compact surface will be formed. The surface on which the turves are to be laid, ought previously to be either dug or trenched, so as to be brought to one degree of consistency, and then rolled, so as it may not afterwards sink; the turves being laid so as to fit, are to be first beaten individually, and then watered and rolled till the whole is smooth and even.

2916. *In transplanting plants in pots,* the general practice is to begin with the smallest-sized pot, and gradually to transplant into others larger, as the plant advances, and as the object may be to produce a large or a small plant. In the case of balsams and tender annuals, this may require to be done three or four times a month, till the plant has attained its full size; in the case of heaths, not more than once a year, or seldomer.

2917. *The operation of potting* is thus performed:—Having the pots and mould ready for the reception of the intended plants, observe, previous to planting them, to place some pieces of tile, potsherds, oyster-shells, or gravel, over the hole at the bottom of the pot, both to prevent the hole from being clogged and stopped with the earth, and the earth from being washed out with occasional watering; and also to prevent the roots of the

plants from getting out. Having secured the holes, place some earth in the bottom of each pot, from two or three to five or six inches or more in depth, according to the size of the pot, and the roots of the plant. This done, insert the plant in the middle of the pot, upon the earth, in an upright position; if without a ball of earth, spread its roots equally every way, and directly add a quantity of fine mould about all the roots and fibres, shaking the pot to cause the earth to settle close about them; at the same time, if the roots stand too low, shake it gently up, as you shall see occasion: having filled the pot with earth, press it gently all round with the hand to settle it moderately firm in every part, and to steady the upright posture of the plant, raising the earth, however, within about half an inch, or less, of the top of the pot. It will soon settle lower, and thereby leave a void space at top, which is necessary to receive occasional waterings. As soon as the plant is thus potted, give directly a moderate watering to settle the earth more effectually close about all the roots, and promote their shooting into the new earth; repeating the waterings as occasion requires.

2918. *Transplanting potted plants from one pot to another* is called *shifting*; and is performed with the whole ball of earth contained in the pot entire, so as to preserve the plant in a growing state.

2919. *The method of removing plants out of their pots with balls* is generally easily effected. Sometimes in small plants it is performed by turning the pot upside down, and striking the edge against the side of a bench, or edge of the boards of a wheelbarrow, or the like, when the ball comes out entire; or occasionally, a plant that is very well rooted, and whose numerous fibres surround the outside of the ball, will readily quit the pot by drawing it by the stem. But if, by either of the above methods, the ball will not readily quit the pot, thrust a narrow thin slip of wood down all round the pot, when the ball will come out by the process of striking the edge of the pot, with the greatest facility. Sometimes, however, the bellied form of the pot, and the luxuriance of the roots which circulate between the pot and earth, prevent the possibility of removing the ball entire; in which case, either that circumstance must be dispensed with, or the pot be broken.

2920. *In replanting in larger pots*, the first step regards the management of the numerous fibres which surround the outside ball. When these are not numerous, the general practice is to leave them untouched; but when they are so abundant as to form a sort of matted coat, like the inside of a bird's nest, all round, then the practice is to trim the greater part of them off close to the ball, both on the sides and bottom, together with some of the outward old earth of the ball; then having the pots of proper sizes, larger than the former ones, and having secured the holes at bottom, and put in some fresh compost, deposit the plant with its entire ball in the pot, taking care that it stands in the centre, erect, and of the same depth as before. Then fill up all the interstices round the ball with fresh mould, pressing it down, and ramming it round the sides with a broad stick, adding more mould gradually, and raising it so as to cover the old ball, and finish with a moderate watering, to settle the new earth close in every part.

2921. *Transplanting with balls is to be avoided in the case of diseased plants*, unless it be evident that the disease has no connection with the roots. Very frequently, however, the diseases of plants in pots arise from the want of a proper vent for the water, and from their having had too much given them; hence, in transplanting such plants, it is eligible to shake them entirely free from earth, in order to examine the roots, and to trim off all decayed and other bad parts; then having a fresh pot, and some entire new compost, to replant as already directed.

2922. *In potting plants from the open ground*, or beds of earth on dung, or otherwise; if they have been previously pricked out at certain distances, and have stood long enough to fix their roots firmly, they may be moved into pots with balls, by the proper use of the trowel, transplanter, or hollow spade. Seedlings, however, cannot often be raised with balls, and are therefore planted in the smallest-sized pots first, and gradually removed into larger ones with their balls entire.

2923. *Plants in pots are never shifted directly from small into large pots*, but always into a size only one gradation larger than that in which they were. Experience proves that this is the best mode; and also that plants, in general, thrive best in small pots. The reason seems to be that, in large pots, the roots are apt to be chilled and rotted by the retention of more water than is requisite for their well-being.

SUBJECT. 3. *Pruning.*

2924. *The amputation of part of a plant with the knife*, or other instrument, is practised for various purposes, but chiefly on trees, and more especially on those of the fruit-bearing kinds. Of two adjoining and equal-sized branches of the same tree, if the one be cut off; that remaining will profit by the sap which would have nourished the other, and both the leaves and the fruits which it may produce will exceed their natural size. If part of a branch be cut off which would have carried a number of fruits, those which remain will

set or fix better, and become larger. On the observation of these facts is founded the whole theory of pruning.

2925. *The objects of pruning* may be reduced to the following:—promoting growth and bulk; lessening bulk; modifying form; promoting the formation of blossom-buds; enlarging fruit; adjusting the stem and branches to the roots; renewal of decayed plants or trees; and removal or cure of diseases.

2926. *Pruning for promoting the growth and bulk of a tree* is the simplest object of pruning, and is chiefly employed by nursery-men with young trees of every description. The art is to cut off all the weak lateral shoots, that the portion of sap destined for their nourishment may be thrown into the strong ones. In some cases, besides cutting off the weak shoots, the strong ones are shortened, in order to produce three or four shoots instead of one. In general, mere bulk being the object, upright shoots are encouraged rather than lateral ones; excepting in the case of trained trees, where shoots are encouraged at all angles, from the horizontal to the perpendicular, but more especially at the medium of 45° . In old trees, this object is greatly promoted by the removal, with the proper instruments, of the dead or already scaling off outer bark.

2927. *Pruning for lessening the bulk of the tree* is also chiefly confined to nursery-practice, as necessary to keep unsold trees of a portable size. It consists in little more than what is technically called *heading down*, that is, cutting off the leading shoots within an inch or two of the main stem; leaving, in some cases, some of the lower lateral shoots. Care is taken to cut to a leaf-bud (§ 2697.); and to choose such bud from among the side, upper, or under buds of the shoot; according as the succeeding year's shoots may be wanted, in radiated lines from the stem, or in oblique lines in some places, to fill up vacancies. It is evident that this unnatural operation, persisted in for a few years, must render the tree knotty and unsightly; and in stone-fruits, at least, it is apt to generate canker and gum.

2928. *Pruning for modifying the form of the tree* embraces the management of the plant from the time of its propagation. Almost every tree has a different natural form, and in botanic and landscape gardening it is seldom desirable to attempt altering these by pruning, or by any other operation. But in rearing trees planted for timber, it is desirable to throw the timber produced, as much as possible, into long compact masses; and hence pruning is employed to remove the side branches, and encourage the growth of the bole or stem. Where this operation is begun when the trees are young, it is easily performed every two or three years, and the progress of the trees under it is most satisfactory; when, however, it is delayed till they have attained a timber size, it is, in all cases, much less conducive to the desired end, and sometimes may prove injurious. It is safer in such cases to shorten or lessen the size of lateral branches, rather than to cut them off close by the stem; as the large wounds produced by the latter practice either do not cicatrise at all, or not till the central part is rotten, and has contaminated the timber of the trunk. In all cases, a moderate number of small branches, to be taken off as they grow large, are to be left on the trunk, to facilitate the circulation of the sap and juices. Where timber-trees are planted for shelter or shade, unless intermixed with shrubs or copse, it is evident that pruning must be directed to clothing them from the summit to the ground with side branches. In avenues and hedge-row trees, it is generally desirable that the lowest branches should be a considerable distance from the ground; in trees intended to conceal objects, as many branches should be left as possible; and in others, which conceal distant objects desired to be seen, or injure or conceal near objects, the form must be modified accordingly. In all these cases, the superfluous parts are to be cut off with a clean section, near a bud or shoot if a branch is shortened, or close to the trunk if it is entirely removed; the object being to facilitate cicatrisation.

2929. *Pruning fruit-trees.* One of the principal objects of pruning is to increase the bearing of fruit-trees. These may be divided into standards and wall-trees; the former including dwarf and half-standards; and the latter, dwarf and riders.

2930. In *pruning to form standards* (*arbres à plein-vent*, Fr.), the first thing to be determined on after the plant has been received from the nursery and planted, is, whether the stem is to be tall (*haute-tige*), or short (*basse-tige*); and the next, if the head is to be trained in any particular form, as a cone, globe, semi-globe, radiated pyramid, &c., or left to assume its natural shape. If a cone or pyramid be determined on, a leading upright shoot must be carefully preserved, and the side shoots kept at regular distances from each other, being equally extended, as far as practicable, on both sides of the main stem, and keeping always in view the ultimate figure. If a globe is to be produced, no shoot must be permitted to take the lead, but a number encouraged to radiate upwards from the graft; and these should be kept as regular as possible, both in regard to distance from each other, and of their extremities from the centre of the globe. If the tree is to be left to its natural shape, which, in our opinion, is by far the best mode, it will, in the apple, pear, cherry, and most other fruit-trees, assume something of the conical shape, at least for some years; but whatever shape it has a tendency to assume, that shape must not be counteracted by the pruner, whose operations must be chiefly negative, or directed to thinning out weak and crowded shoots, and preserving an equal volume of branches on one side of the tree as on the other; in technical language, preserving its balance. Knight's directions for this mode of pruning, both in his *Treatise on the Apple and Pear*, and in different papers in the *Horticultural Transactions*, are particularly valuable. For the apple and all standard trees he recommends that the points of the external branches should be every where rendered thin and pervious to the light; so that the internal parts of the tree may not be wholly shaded by the external parts; the light should penetrate deeply into the tree on every side; but not any where through it. When the pruner has judiciously executed his work, every part of the tree, internal as well

as external, will be productive of fruit; and the internal part, in unfavourable seasons, will rather receive protection than injury from the external. A tree thus pruned will not only produce much more fruit, but will also be able to support a much heavier load of it, without danger of being broken; for any given weight will depress the branch, not simply in proportion to its quantity, but in the compound proportion of its quantity and of its horizontal distance from the point of suspension, by a mode of action similar to that of the weight on the beam of the steelyard; and hence ten pounds' weight at the extremity of a branch fifteen feet long, will depress it more than 150 pounds would if suspended within one foot's distance of the trunk. Every tree will, therefore, support a larger weight of fruit without danger of being broken, in proportion as the parts of such weight are made to approach nearer to its centre. Hitt recommends that the shape or figure of standards should be conical, like the natural growth of the fir-tree: and this form, or the pyramidal or sub-cylindrical (*en garonville*, Fr.) is decidedly preferred by the French, and universally employed both by them and the Dutch.

2931. *In pruning to form dwarf-standards* (*basse-tiges*, Fr.), the plants being received from the nursery, furnished with shoots of one year's growth, are to be cut down to three or four buds, which buds will throw out other shoots the following year, to form the bush or dwarf. If these buds throw out, during the second year, more than can grow the third year without crossing or intermixing with each other, then the superfluous shoots must be cut off; but if they are too few to form a head regularly balanced, or, in other words, projecting equally beyond the stem on all sides, then one or more of the shoots in the deficient part must be cut down to three or four eyes, as before, to fill up by shoots of the third year the vacancies in the bush. In this way must the tree be treated year after year, cutting away all cross-placed branches and crowded shoots, till at last it shall have formed a head or bush, globular, oblong, or of any other shape, according to its nature; observing, in every form, to keep all the shoots so far distant from each other as not to exclude the sun's rays, air, or rain, from the blossoms and fruit.

2932. *In natural dwarfs or bushes* (*arbres en buisson*, Fr.), the branches are permitted to advance in their natural mode of growth, being only thinned, or shortened, or deprived of supernumerary side shoots, as already described.

2933. *Pruning half-standards* is conducted exactly on the same general principles as pruning dwarfs; the only difference between them being, that in the one case the bush or head is close to the ground, and in the other it is elevated from it three or four feet. Of the common hardy fruit-trees, it may be observed, that the apple, plum, quince, medlar, and mulberry form a forked irregular head, and the pear and cherry a more regular cone or distaff, with lateral branches proceeding from an upright stem. The French are particularly expert in pruning their pear-trees into this last form, assisted sometimes by a rod to train the central shoot.

2934. *Various other modes of pruning fruit-trees to make them assume particular shapes* have been practised. All forms, however, which require constraint, as being contrary to the natural shape of the bush and tendency of the branches, can only be maintained by continual exertion in counteracting nature; and trees so constrained and cut generally throw out such a superfluity of useless wood, as greatly to lessen their tendency to produce blossom buds. It is true, that these useless shoots may be shortened to spurs every year by pruning; but the spurs thus formed will only bear shoots, and not blossoms; and, in a few years, will present a deformed mass of knots.

2935. *Pruning, for the modification of fruit-trees trained on walls* (*en espalier*, Fr.), or *on espaliers* (*en contre-espalier*, Fr.), depends on the principle of training which may be adopted. The selection being made of such shoots as are requisite for carrying on the form of the training tree; the others are to be cut off, first on the general principles recommended for all cutting (2696.); and secondly, according to the particular nature of the tree. All trees which are much cut or constrained have a tendency to throw out over-luxuriant shoots at particular parts of the branches where the sap is suddenly checked; such shoots seem to employ the great body of the sap, and thus divert it from performing its functions in the other parts of the branch or tree. The largest of these shoots, the French term *gourmands*, or gluttons; and the lesser ones, which have their leaves very distant and the wood slender, with hardly any appearance of buds in the axillæ of the leaves, they term water-shoots. As soon in the growing season as the character of both these sorts of shoots, especially of the latter, is known, they ought to be pinched off, with the exception of some cases, at the discretion of an intelligent pruner, where the gourmand may fill up a vacancy, supply the place of a decaying branch, or otherwise be so situated as to assist in forming the tree. This chiefly happens when they are thrown out on the sides of wall-trees, so as to admit of being checked by a horizontal or oblique position in training. What are called fore-right and back shoots, or such as are thrown out nearly at right angles to the training surface, ought to be rubbed or pinched off, as ill adapted for training, or being applied to the training surface; but with the same exceptions as for gourmands. Where the grand object is fruit, however, it is well remarked by Marshall (*Introd. to Gard.*), "that in this matter, the end in view is not to be sacrificed to fanciful precision."

2936. *Pruning to promote the formation of blossom-buds* depends on the nature of the tree. The peach and nectarine, for example, produce their blossoms on the preceding year's wood; consequently the great art of pruning a peach-tree is to have a regular distribution of young wood over every part of it. This the tree has a natural tendency to effect itself, and all that is required from the pruner is, when these shoots are too abundant, to rub them off in the summer pruning; and, where they are too few, to cut or shorten some of the less valuable branches or shoots in the winter pruning. In apples, pears, plums, cherries, quinces, and medlars, the blossoms are chiefly produced

on short leafy protuberances, called *spurs*, which form themselves naturally along the sides of the shoots. The apricot produces blossoms on the last year's wood, and on spurs and small twigs from the shoots of the second year preceding. The production of bearing or blossom buds is sometimes promoted by cutting out weak wood, by which what remains is strengthened; and shortening or stopping the shoots of the vine in summer is believed by many to have the same effect. The rose, syringa, spiræa frutex, and many shrubs, produce their blossoms in the wood of the present year; and to give vigour to such plants, it is desirable, when blossoms are wanted in these shrubs, to cut down both old and new wood.

2937. *Pruning for the enlargement of the fruit* is effected either by diminishing the number of blossom-bearing branches, or shortening them; both which operations depend on the nature of the tree: the mode of shortening is particularly applicable to the vine, the raspberry, and to old kernel-fruit-trees.

2938. *Pruning for adjusting the stem and branches to the roots* is almost solely applicable to transplanted trees; in which it is an essential operation, and should be performed, in general, in the interval between removal and replanting, when the plant is entirely out of the ground. Supposing only the extremities of the fibres broken off, as is the case in very small plants and seedlings, then no part of the top will require to be removed; but if the roots have been broken or bruised in any of their main branches or ramifications, then the pruner, estimating the quantity of root of which the plant is deprived by the sections of fracture and other circumstances, peculiar and general, will be able to form a notion of what was the bulk of the whole roots before the tree was disturbed. He may then state the question of lessening the top to adjust it to the roots thus:—As the whole quantity of roots which the tree had before removal, is to the whole quantity of branches which it now has or had; so is the quantity of roots which it now has, to the quantity of top which it ought to have. In selecting the shoots to be removed, regard must be had to the ultimate character the tree is to assume; whether a standard, or trained fruit-tree, or ornamental bush. In general, bearing-wood and weak shoots should be removed; and the stronger lateral and upright shoots, with leaf or shoot eyes, left.

2939. *Pruning for renewal of the head* is performed by cutting over the stem a little way, say its own thickness, above the collar, or the surface of the ground. This practice applies to old osier-beds, coppice-woods, and to young forest-trees. Sometimes also it is performed on old or ill-thriving fruit-trees, which are headed down to the top of their stems.

2940. *Pruning for curing disease* has acquired much celebrity since the time of Forsyth, whose amputations and scarifications for the canker, together with the plaster or composition which he employed to protect the wounds from air, are treated of at large in his *Treatise on Fruit Trees*. Almost all vegetable diseases either have their origin in the weakness of the individual, or induce a degree of weakness; hence to amputate a part of a diseased tree is to strengthen the remaining part, because the roots remaining of the same force, the same quantity of sap will be thrown upwards as when the head and branches were entire. If the disease be constitutional, or in the system, this practice may probably, in some cases, communicate to the tree so much strength as to enable it to throw it off; if it be local, the amputation of the part will at once remove the disease, and strengthen the tree.

2941. *For the removal of diseases*, whole branches, the entire head, single shoots, or merely the diseased spot in the bark or wood, may require to be cut off. In the removal of merely diseased spots, care must be taken to remove the whole extent of the part affected with a part of the sound wood and bark; and, in like manner, in amputating a diseased shoot or branch, a few inches or feet of healthy wood should be taken away at the same time, to make sure of removing all contamination.

2942. *Pruning the roots of trees*. What effect it would have on the roots of trees, if they could be exposed to view, and subjected to pruning and training, as well as the branches, it is not easy, in many cases, to determine; but where they are diseased, or growing on soil with an injurious substratum, could the pruning-knife be applied to their descending and diseased roots annually, the advantages would be considerable. The practice of laying bare the roots of trees to expose them to the frost, and render the tree fruitful, is mentioned by Evelyn and other writers of his time; but in doing so, it does not appear that pruning was any part of their object. The pruning of roots can therefore only take place, according to the present state of things, in the interval between taking up and replanting; as such roots are generally small, and some of them broken or injured, all that the pruner has to do, is to facilitate the healing of the ends of broken roots by a more perfect amputation; and in fruit-trees, he may shorten such roots as have a tendency to strike too perpendicularly into the soil. The form of the cut in either case is a matter of less consequence than in the shoot; but, like it, it ought in general to be made from the under side of the shoot, that only one section may be fractured, and that

the removed section may be the fractured one; and also that water or sap may rather descend from than adhere to the wound. The chief reason for this practice, however, is the facility of performing it, for a section directly across, as if made with a saw, will, in roots, heal as soon, if not sooner, than one made obliquely; but to make such a section in even small roots would require several distinct cuts, whereas the oblique section is completed by a single operation. The Genoese gardeners, in pruning the roots of the orange-trees, always make a section directly across, which, in one year, is in great part covered by the protruding granulated matter. (See 2698.)

2943. *The roots of trees might be completely pruned, if done by degrees; say that the roots extend in every direction in the form of a circle; then take a portion, say one eighth, of that circle every year till it is completed, and remove the earth entirely from above and under the roots; then cut off the diseased parts, or those roots which penetrate into bad soil, and laying below them such a stratum as to be impenetrable in future, intermix and cover them with suitable soil.*

2944. *Pruning herbaceous plants, or what is called trimming, consists generally in thinning the stems to increase the size and flowers of those which remain; but it may also be performed for all the purposes before-mentioned; and for some other purposes, such as the prolongation of the lives of annuals by pinching off their blossoms, strengthening bulbous roots by the same means, increasing the lower leaves of the tobacco-plant by cutting over the stem a few inches above ground, &c. In trimming the roots of herbaceous plants, the same general principles are adopted as in pruning the roots of trees. In transplanting seedlings, the tap-root merely requires to be shortened; and in most other cases, only bruised, diseased, or broken roots are cut off, and fractured sections smoothed.*

2945. *The seasons for pruning trees are generally winter and midsummer; but some authors prefer spring, following the order of the vegetation of the different species and varieties. According to this principle, the first pruning of fruit-trees begins in February with the apricot, then the peach, afterwards the pears and plums, then the cherries, and lastly the apples, the sap of which is not properly in motion till April. Some have recommended the autumn and mid-winter; but though this may be allowable in forest trees, it is certainly injurious to tender trees of every sort, by drying and hardening a portion of wood close to the part cut, and hence the granulous matter does not so easily protrude between the bark and wood, as in trees where those parts are furnished with sap. For all the operations of pruning, therefore, which are performed on the branches or shoots of trees, the best period appears to be that immediately before, or commensurate with, the rising of the sap.*

2946. *Summer pruning commences with disbudding, or the rubbing off of the buds, soon after they have begun to develop their leaves in April and May; and is continued during summer by pinching off or shortening such as are farther advanced. It is obviously, to a certain extent, guided by the same general rules as winter or general pruning; but the great use of leaves in preparing the sap being considered, summer pruning wisely conducted will not extend farther than may be necessary to maintain as much as possible an equilibrium of sap among the branches; to prevent gourmands and water-shoots from depriving the fruit of proper nourishment, and to admit sufficient air and light to the fruit. Most authors are of opinion that the other objects of pruning will be better effected by winter operations. Summer pruning is chiefly applicable to fruit-trees, and among these to the peach; but it is also practised on forest and ornamental trees when young, and is of great importance in giving a proper direction to the sap in newly grafted trees in the nursery.*

2947. *Thinning the branches of individual trees may be considered as included in pruning. In herbaceous vegetables, or young trees growing together in quantities, it consists in removing all such as impede the others from attaining the desired bulk, form, or other properties for which they are specially cultivated; and it is generally performed in connection with weeding or hoeing.*

SUBJECT. 4. Training.

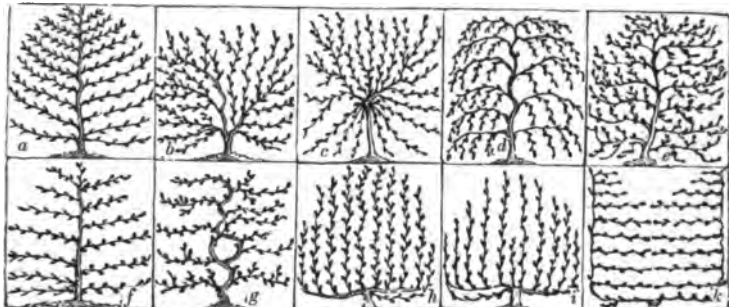
2948. *By training is to be understood the conducting of the shoots of trees or plants over the surface of walls, espalier rails, trellises, or on any other flat surface. It is performed in a variety of ways, according to the kind of tree, the object in view, and the particular opinions of gardeners.*

2949. *The object of training is, either to induce a disposition to form flower-buds in rare and tender trees or plants; to mature and improve the quality of fruits which would not otherwise ripen in the open air; or to increase the quantity and precocity of the fruit of trees which mature their fruit in the open air. Such are the principal objects of training: which are effected by the shelter and exposure to the sun of the surface to which the trees are trained, by which more heat is produced, and injuries from severe weather better guarded against; by the regular spreading of the branches on this surface,*

by which the leaves are more fully exposed to the sun than they can be on any standard; and by the form of training, which, by retarding the motion of the descent of the sap, causes it to spend itself in the formation of flower-buds.

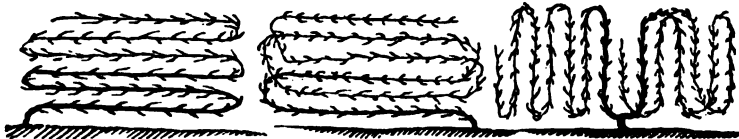
2950. *The leading modes of training woody-stemmed trees* are the fan, horizontal, and vertical (*fig. 665. a, f, h.*). To which may be added the wavy or curvilinear. Their varieties are, the herring-bone fan (*a*), the irregular fan (*b*), the stellate fan (*c*), the drooping fan (*d*), the wavy fan (*e*); the horizontal with screw stem (*g*), and with double stem (*h*); and the vertical, with screw or wavy shoots (*i*); and with upright shoots (*j*). Hayward proposes a sort of wavy training, little different from that of the wavy fan; but which is certainly superior to some of the other of the above modes in principle, as it has no tendency to constrain the shoots, or to produce an irregular distribution or exhibition of the sap in gourmands, &c. (*Science of Horticulture*, 8vo. 1818.)

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2951. *Trees with flexible stems*, such as the vine and other climbers, admit of three other varieties of training (*fig. 666.*); which, as vines bear the sweetest fruit at the greatest distance from the root, is particularly suitable for them.

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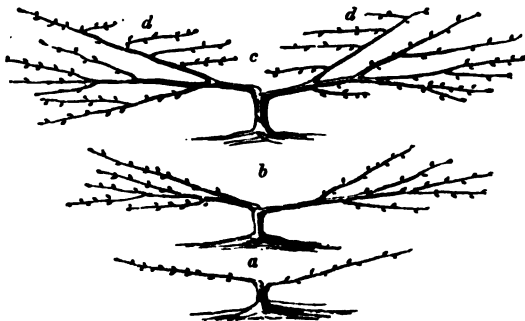


2952. *Fan training*, as the name imports, directs the spreading out of all the branches like the spokes of the fan: it is reckoned of universal application, and peculiarly suitable for peaches and other stone-fruits.

2953. *Stellate training* refers chiefly to standards trained on walls, or what by some are called riders. The summit of the stem being elevated six or eight feet from the ground by its length, the branches are laid in like radii from a centre.

2954. *The open fan* (*fig. 667.*) is a mode of training described by Professor Thouin, and exemplified in the *Jardin des Plantes*. It does not appear to differ much from a mode described by Knight, which he applied to the peach, and considers, with a little variation, applicable, even with superior advantages, to the cherry, plum, and pear-tree. This form, he adds, "might with much advantage be given to trees whilst in the nursery; and perhaps it is the only form which can be given without

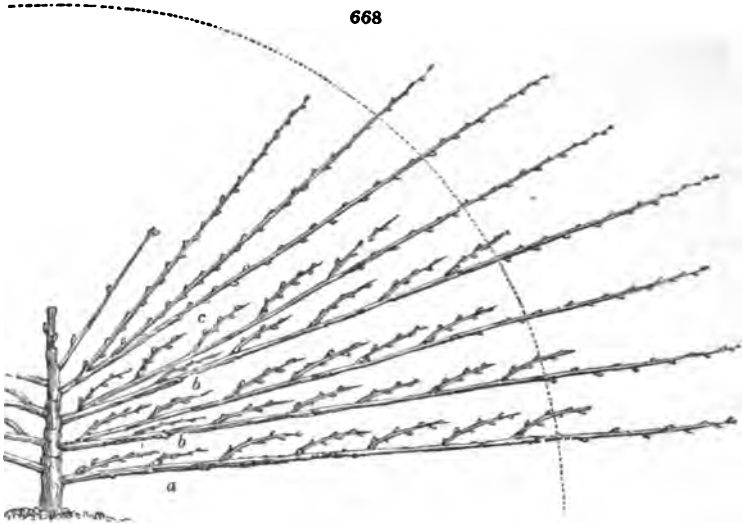
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subsequent injury to the tree." There is nothing very peculiar in this form the first and second year of training (*a*, *b*), after being headed down; but in the third year (*c*), the reversing of the lateral shoots (*d*), becomes a characteristic.

2955. *Seymour's mode of fan training* (*fig. 668.*) has been chiefly applied to peach and nectarine trees, and to morello cherries. This mode is the invention of Mr. John

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Seymour, gardener to Miles Stapleton, Esq. of Carleton Hall, Yorkshire; and has been practised by Mr. Seymour, and his sons, for upwards of thirty years. According to this mode, there are a certain number of leading shoots, which must be produced as the tree advances. These shoots are trained along a line, marked or imagined on the wall, from the origin of the shoot on the main stem, to any point beyond its extreme length. The distance of the leading shoots from one another is regulated by a semicircular line, at about ten feet from the stem; the spaces between the shoots on that line being ten inches. The shoots produced the first year after planting a tree, one year old from the bud, or graft, are one upright shoot, and two side shoots. In the second spring, the upright shoot is cut to three buds, and the side shoots are shortened to force them to push out lateral shoots, which are to be laid in at about a foot asunder, for future bearing, as at *a*, in the figure. In the course of the winter or spring of the third year, the side shoots are shortened to eleven or twelve inches, as at *b*, in the figure, in order to get two principal leading shoots from each side shoot; the first about three inches from the stem, and the other at the end of the shortened shoots; the object being to double the number, or nearly so, of the leading shoots. In the course of three years, or nearly so, the side shoots may be shortened to about fourteen inches, as at *c*, by which means three shoots will be produced from one, and the wall very speedily furnished. (*Gard. Mag.*, vol. ii. p. 296.)

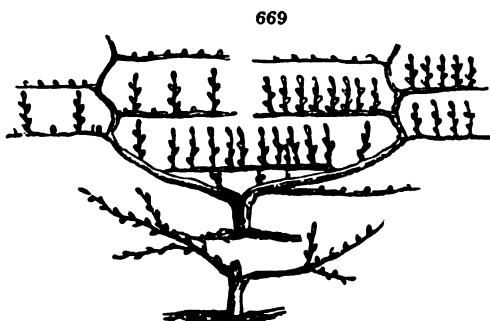
2956. *Horizontal training* is that in which, from a main stem, lateral branches are led out horizontally on each side, and is more especially adapted for pear-trees.

2957. *Horizontal training with the screw stem* is chiefly applicable to pears and apples; and the use of the screw is to cause buds to push at proper places for the horizontal shoots. Where this is not adopted, the annual heading down of the vertical shoot is resorted to, by which the same effect is produced; but the tree requires in this case a longer period to fill the wall. It may be effected either with one or two main stems; but, in general, the latter mode is preferable (*fig. 669.*), as distributing the sap or vigour of the tree more equally.

2958. *Perpendicular training* is performed by leading one horizontal shoot from each side of the stem, and within a foot or eighteen inches of the ground; the shoots which proceed from these are led up perpendicularly to the top of the wall; sometimes such shoots are trained in the screw or serpentine manner, particularly in vines and currants, which bear remarkably well in this form. This is the original mode of training practised by the Dutch, and is still more common in Holland and Flanders than any where else.

2959. *Oblique training* is a species of vertical training, in which the lateral shoots are trained obliquely to the main stem. It is particularly adapted for cherries. Thoun

remarks, that the shoots should not be raised above an angle of forty-five degrees, unless



in the case of a very weak shoot, which, for one season, may be led perpendicularly; nor lowered below the horizontal line, unless in the case of an excessively strong gourmand or water-shoot. The angle of forty-five degrees, indeed, is recommended by the French writers, as the best for all shoots of fruit trees to assume, whether by the training against walls, or the pruning of standards. See the articles *Espalier* and *Treille* in *Cours Complet d'Agriculture*, &c.

2960. *Wavy or curvilinear training*, Hayward considers as combining "all the grand requisites stated to be produced" by the modes recommended by other writers on fruit-trees. "The stems (*fig. 670. a*) being two principal branches through which the sap



will flow in equal portions from the root, to the length of three feet, before it is permitted to form collaterals; the same effect will be produced as if the whole sap were to pass up the single stem of a standard of six feet; trees of which description, it is justly observed by Bradley, 'make fruit-branches in such plenty, that hardly any barren shoots are to be found upon them.' The whole of the sap will, by this mode of training, be expended in profitable and increasing production, and the same square of walling will be furnished with more bearing wood, in three years, than can possibly be done by any other mode; and than can be effected by the common mode of practice, in less than eight or ten years."



2961. *Training dwarfs*. About a century ago, when dwarfs were in the greatest vogue, they were trained into regular geometrical shapes, without the least regard to the natural shape or tendency of the branches of the tree. In the works of Quintiney and Arnaud d'Andilly are described concave, conical, fusiform, spiral, and other dwarfs.

2962. *Concave or cup-shaped dwarfs* (*arboresjia boomen*, Dut.; *en gobelet* or *en tonnoir*, Fr.) are trained concave or hollow in the middle, having all the branches ranged circularly around the stem, in an ascending direction, so as to form the heart of the tree hollow or concave.

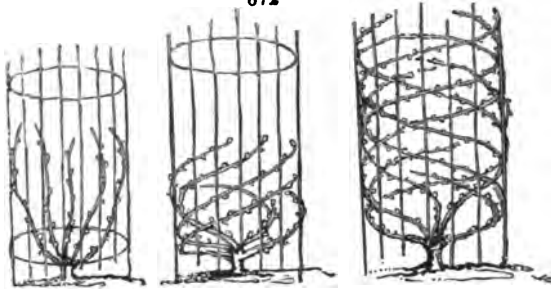
2963. *Conical or pyramidal dwarfs* taper like a cone or pyramid from the base to the summit. When pyramidal trees are so pruned that the horizontal branches form stages above one another, they are termed chandelier-like, or *en girandole*.

2964. *Fusiform* (*en quenouille*, Fr.) or *convex dwarfs* are trained so as to be somewhat spindle-shaped in the middle, or like a full distaff. A variety of this mode of training (*fig. 671.*), practised in the gardens of the Horticultural Society at Chiswick, is effected by having the points of all the shoots tied down.

2965. *Horizontal dwarfs* have all the branches trained in a flat position, parallel to the surface of the earth.

2966. *Spiral dwarfs* (fig. 672.) have the branches trained spirally round stakes, which stakes are to be afterwards removed.

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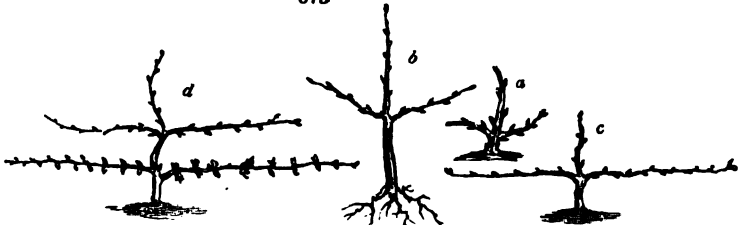
2967. *Fan dwarfs* (*palmettes*, Fr.) have the branches spread out like the hand, or like an open fan.

2968. *Crown or umbrella-headed standards* (*kroon boomen*, Dut.) are a sort of half-standard, formed by the Dutch, chiefly on dwarfing stocks. The stems are six or seven feet high, and terminate in a few branches, which stretch out on all sides horizontally: this position being given by inclining them downwards by ties.

2969. *Balloon-headed standard-trees* have been formed by a mode of training adopted by the late J. Brookhouse, Esq. at Warwick. The trees were apples, six feet high in their stems, from the tops of which, the branches of three or four years growth, extended outwards and nearly horizontally in all directions, from five to six feet from the centre. Round the tree, at about three feet from the stem, and at two feet from the ground, was placed a hoop, fastened to stakes, and towards this hoop the ends of the branches were directed by worsted cords fastened to their extremities, and to the hoop. The general outline of a tree thus treated has much resemblance to that of a balloon; and the cords, which are attached all round to the hoop in a slanting direction inwards, increase the similitude.

2970. *Preparatory training.* Nearly the same routine is gone through when the trees are young, for all the different modes of training. The shoots of grafted trees newly received from the nursery (fig. 673. *a*) are not shortened by the best modern practitioners: at the end of the first season, the side branches are left at an elevated angle (*b*), to encourage them to throw out laterals; afterwards they are brought down (*c*, *d*) to an oblique or nearly horizontal position, and each shoot placed in its final position, as it increases in size.

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2971. *Materials used in training.* The operation of training on walls is performed chiefly by means of nails and shreds; on trellises by bast ties; and on espalier rails most commonly by osier-twigs. The bast, after being applied, is gently twisted round with the finger and thumb, in order that it may run into a firm knot without tearing and weakening the ligament. The osier tie is made fast by twisting the two ends, somewhat in the manner done by reapers in tying up sheaves of corn, and well known in the nurseries. But the most difficult operation of training consists in the proper use of nails and shreds on a wall; in which business, as Marshall has observed, "ingenuity will evince itself in neatness and symmetry." When a shoot requires some constraint to retain it in its position, the pressure must always be against the shred, and never against the nail. Of both nails and shreds there should be two sizes used; the larger for strong, and the smaller for weak shoots. Trees trained to boards can hardly have nails too small; and those trained to stone or old brick walls generally require a larger size.

2972. *Shreds* should be adapted to the strength of the branches, and the distance of the buds from each other; so that with strong shoots having their buds wide apart, such broad shreds may be used as would make weak shoots unsightly, and spoil them by covering the buds; many a well-cut tree has been made disgusting, merely by irregular

and dangling shreds. A uniformity of colour can hardly be accomplished, but a regularity of size may; scarlet, if all alike, looks best, and white the worst. The general width of shreds should be from half an inch to three quarters; and the length from two inches to three; having some wider, longer, and stronger, for large branches. In the disposition of shreds, some must have their ends turned downwards, and some upwards; as best suits for bringing the shoots to their proper place and straight direction. Though some pruners observe a sort of alternate order, yet the ends hanging chiefly down will look best. Use no more shreds and nails than is absolutely necessary to make good work, as the effect is rude and injurious. As nails are apt to break out pieces of the wall in drawing, it is a good way to give the nail a tap to drive it in a little; this loosening it from its rust, makes it come out easier, and so saves a wall from large holes, which is a material thing. (*Introd. to Gard.*)

2973. *Herbaceous training* is performed by means of poles, rods, branches, and pegs. Plants that twine and grow high are furnished with high poles, on which to twine themselves, as the *tamus*, *convolvulus*, &c. Plants with tendrils, as the pea, the *bryonia*, &c., are furnished with branches or spray; through which the plant springing up attaches itself by its tendrils, and is thus better exposed to the sun and air, and not so liable to rot as when it lies on the ground. Props or poles are used for supporting and leading upright, tall, slender, growing plants, as the *georgina*, *tree-lupin*, and the like. Creeping and trailing plants, as the melon, gourd, &c., are generally trained in the stellate manner on the ground by means of pegs; sometimes also on walls and trellises.

SUBSECT. 5. *Blanching.*

2974. *Blanching* is an operation of culture performed by earthing the stems of plants, by tying up their leaves, or by covering them with utensils from the light.

2975. *Blanching by earthing* is performed on the celery, chardoon, asparagus, &c. In the case of annuals, the earth is generally drawn up so as to press on the leaves of the plant as it advances in growth; in the case of perennials, a covering of loose earth is generally placed over them before the growing season, through which the stalks shoot up, and are blanched.

2976. *Blanching by tying together the leaves* is sometimes performed on lettuce, cabbage, endive, &c. The plant being nearly in its most leafy state, the head or fasciculus of leaves is gathered together, and tied up with bast ribands. By this operation two effects are produced: the inner leaves, as they grow, being excluded from the light, are blanched; and being compressed in proportion to the growth, which takes place after tying up the head, the fasciculus becomes both tender and solid.

2977. *Blanching by overlaying* is merely the laying down of tiles, slates, pieces of boards, &c. on endive and other salading, when nearly full grown; and of which, being thus excluded from the sun, the future growth is colourless. Covering by the following mode is preferable.

2978. *Blanching by covering with utensils* is a recent invention applied to seakale, rhubarb, asparagus, &c. and consists in placing over them the utensils already described as appropriated to this purpose. (2264.)

SECT. IV. *Operations for inducing a State of Fruitfulness in barren and unblossoming Trees and Plants.*

2979. *Various means have been tried to induce fruitfulness*, with different degrees of success. Almost every description of fruit tree, if planted in a thin stratum of rich loam on a dry and impervious subsoil, will come into bearing in regular course, according to its nature; but it too frequently happens that the stratum of soil is too deep, or the roots penetrate into the subsoil, or by some means, not always obvious, acquire the power of throwing much superfluous sap into the tree, which then spends itself in leaves and branches, instead of blossoms. Similar circumstances produce similar effects in ornamental trees and shrubs, whether in the open air, or in artificial climates. Attempts are known to have been made, for upwards of a century and a half, to cause such trees to produce blossoms, attended with different degrees of success; but the practice was carried on empirically, without any knowledge of the reason or principle which operated in producing the desired end, till its true rationale was given by Du Hamel, in his *Physique des Arbres*, 1758.

2980. *Laying bare the roots of trees* is mentioned by Evelyn as conducive to fertility. *Transplanting the tree frequently*, by Van Osten. *Boring a hole in the trunk, and driving in an oaken plug*, is mentioned by the same author as the "old way." Every one must have observed that trees partially blown out of the ground, or with the earth washed or otherwise removed from their roots in banks or river-sides, or with their trunks or roots broken, bent, or mutilated in any way, are always more fruitful than others; and this, we conceive, has suggested the various modes of artificial mutilation.

Mutilation, both in plants and animals, is attended by a sort of premature maturity; and maturity in all living things is the period of reproduction.

2981. *Cutting the roots of trees* is an old practice, generally performed in winter or spring, but sometimes in summer. In the beginning of July, 1811, Beattie, gardener at Scone, had a border on the south wall, of 400 feet long, trenched to the depth of from two and a half to three feet: in doing this, he had the opportunity of cutting the roots of all the trees, as the work went on, which he did so completely, that they might be said to hang by the nails and shreds, with a ball of earth of about two feet from the stem of each tree. Beattie says, he acted on the principle of depriving the tree of the means of containing such a great quantity of sap; thereby preventing it from growing so much to wood, and of course inclining it to become fruitful. (*Caled. Mem.*, vol. i. 272.) Nicol suggests the same expedient, in his *Forcing and Fruit Gardener*, 4th edit. p. 240.

2982. *Cutting notches* in the stem or branches has been tried on many occasions, on the same principle as cutting the roots.

2983. *Partial decortication* is the removal of the bark already scaling off, covered with mosses and lichens, or carbonised by the action of the atmosphere. It is only applicable to old trees, or trees of a certain age; and the effect is, to increase the vigour of the tree, and thus promote the production of young wood and blossom-buds. It was recommended by Arnaud d'Andilly, in 1650, and has been practised for several years, by Forsyth, Lyon, and various others, on standard trees; and by King, a commercial gardener, at Teddington, on the vine.

2984. *Stripping off pieces of the bark* from the stem and branches is said by Marshall to check the luxuriance, and promote the fruitfulness, of pear trees. (*Introd. to Gard.*, &c. 4th edit. p. 156.)

2985. *Ringing the stem and branches*, circumcision, or excision, &c. was known to the Romans, and is mentioned by Virgil, Columella, &c. Among the moderns, it seems to have been revived by Du Hamel in the beginning of the eighteenth century, more especially in 1733, when he perfectly succeeded in rendering trees fruitful, and has given an account of his experiments in the *Mémoires de l'Académie des Sciences*, for 1738. The subject has since been taken up by Suriray Delarue, and by Lancy; the former of whom has given an excellent history and rationale of the practice, in the *Journal Physico-Économique* for 1803. It is also ably treated in the *Cours Complet d'Agriculture*, &c., art. *Bourrelet*. The effect of ringing has been perfectly well known and acted on in Holland and Germany since Du Hamel's time, as any one may be assured of by the perusal of the works of Christ, Diederich, and Diel; and it is remarkable that, so late as 1815, A. Hempel, a clergyman of Saxony, should have published an account of his practice in ringing, as new. The use of ringing would be, in all probability, introduced into England soon after Du Hamel's experiments were published; but though it has been known and occasionally practised by some gardeners for upwards of half a century, it seems not to have been generally known, either in 1817, when judging from a paper of Dr. Nöthen, the subject was considered new in the Horticultural Society; or in the end of last century, when Dr. Darwin, in his *Notes to Phytologia*, vol. i. p. 383, describes the practice, and accounts for its effects. It is now frequently practised, both for the purpose of inducing blossoms on trees, or rendering them productive; and for accelerating the maturity and increasing the size of fruits. The former has been termed production-ringing, and the latter maturation-ringing. (*Hort. Trans.*, vol. iv. p. 557.) Production-ringing should be performed in the spring, and will produce its effects in the following year; maturation-ringing when the plants are in blossom, and it will show its effects the same season.

2986. *Maturation-ringing*. Ringing has been found not only to induce blossom-buds, but, where these prove fertile, to increase the size and accelerate the ripening of fruits. In a paper read before the Horticultural Society in 1806, Williams, of Pitmans, describes a mode of making annular excisions in the bark of vines. These were made rather less than a quarter of an inch in width, that the exposed wood might be covered again with bark by the end of autumn. "Two vines of the white Frontinac, in similar states of growth, being trained near to each other on a south wall, were selected for trial; one of these was experimented on (if I may use the term); the other was left in its natural state, to form a standard of comparison. When the circle of bark had been removed about a fortnight, the berries on the experimented tree began evidently to swell faster than those on the other, and by the beginning of September showed indications of approaching ripeness; while the fruit of the unexperimented tree continued green and small. In the beginning of October, the fruit on the tree that had the bark removed from it was quite ripe, the other only just began to show a disposition to ripen, for the bunches were shortly afterwards destroyed by the autumnal frosts. In every case in which circles of bark were removed, I invariably found that the fruit not only ripened earlier, but the berries were considerably larger than usual, and more highly flavoured. The effects thus produced, I can account for only by adopting Knight's theory of the downward circulation of the sap through the bark. It is not of much consequence in what part of the tree the incision is made; but, in case the trunk is very large, I should then recommend that the circles be made in the smaller branches."

2987. *The operation of maturation-ringing* should be deferred till the flowers are fully expanded, or rather till they are passing into fruit, or even till the fruit is set. The sap, being interrupted in its descent by the annular incision, is held in the bough, and thus the fruit gains a more ready and uninterrupted supply of nourishment; the consequence of which is not only an increase of size, but earlier maturity. This operation, besides, may be serviceable in ripening the seeds of plants, which otherwise would not be perfected; for as the fruit is sooner ripened, so the seeds will likewise be sooner matured. When the influence of ringing is limited to three or four months, as in the case of maturation-ringing, it is obvious that the ring need not be so broad as when it is to be extended to a longer period; from which it follows that maturation-ringing, as it keeps the bark separated for a shorter period, will do less injury to the health of the branch than the other mode. (*Hort. Trans.*, vol. iv. p. 557.)

2988. *Ringing is said to force young trees to show fruit*, before they otherwise would do. That ringing may have some effect in this way, we think highly probable; but by no means so much as is ascribed to it by Hempel. Trees must arrive at their age of puberty, like animals, before they can propagate their species. Abundance of food and heat will, no doubt, induce a degree of precocity in the subjects of both kingdoms; and, as ringing gives in effect abundance of food to the particular part above the excision, it must have some effect, but it has not been proved to have much. Ringing will produce blossoms in all plants, herbaceous or shrubby, propagated by extension, that is, originated otherwise than from seed, at any age; but its effects on young trees raised from seed, or in causing blossoms on any description of tree

to set, are much less certain; though, in all cases where they do set, the size of the fruit will be greatly enlarged for the first year or two.

2989. *In performing the operation of ringing*, a ring of outer and inner bark, not larger than the tree can fill up in stone-fruit in one, and in kernel-fruit in two, or at most three years, is cut clean out with a knife, or the ringing shears. (Fig. 384.) If larger, the tree becomes too much excited to fruitfulness, and the part of it separated from the root by the ring dies, while the stem and parts adjoining the root become too luxuriant. When the rings are made so wide as that the barks cannot unite for two or three years, the result, says the author of the article *Bonsaies*, in *N. C. d'Agriculture*, &c. will be to "accelerate the production of blossoms, and the setting of fruit, and to augment their size during the first year; and then, during the following years, to make them languish, and at last die." "There is a pear tree," Sabine observes, "against one of the walls in the kitchen-garden, belonging to his majesty, at Kew, which underwent the operation of ringing about fifteen years ago. The part operated on was near the root; and, as it was a principal arm, about one half of the whole tree became influenced by the operation. This half has uniformly borne fruit, the other half has been nearly barren. The portion of stem which was laid bare is about six inches wide, and it has not been again covered by bark. That part just above the ring is considerably larger than the part below it. The ends of the branches appear in much decay, and there are but very few young shoots thrown out from the sides; whilst, on the other part of the tree, the shoots, as usual, proceed from the extremities, as well as from the sides of the main branches. I apprehend, from the present appearance of the whole, that the portion of the tree which, by the separation of the bark, has been deprived in a great measure of supply from the root, cannot survive many years."

2990. *Renewal of the soil about fruit trees* has been found by Hay, of Newliston, near Edinburgh, in the case of peaches; and Maher, of Arundel, in the case of figs, and by various others, to renew the fruitfulness of trees. There may be two reasons given for this, both of which may be concerned in the effect: the first is, the exhaustion of the soil generally; and the second is, its exhaustion of the particular sort of food preferred by the kind of tree. Though we are not so certain that every species of tree requires, to a certain extent, a particular sort of food, as we are that herbaceous vegetables, as wheat, oats, &c. do; yet analogy renders the fact highly probable. At any rate, it is clear that a renewal of soil must always be conducted with reference to the state of the plants; a poor, limy, sandy soil may be substituted for one where the luxuriance of the plants shows that it is too rich; and a rich loamy one for one of an opposite description, where the plants are unthriving, &c.

2991. *Bending down the branches* has been found conducive to fruitfulness; and is accounted for on the same principle as ringing. It has been well exemplified by Mayer (*Hort. Trans.*, vol. I.), in fixing clay balls to the extremities of the shoots of young apple trees after midsummer, which, depressing them, stagnated the sap, and induced the production of abundance of flower-buds.

2992. *To induce the production of blossoms in herbaceous plants*, any or all of the above modes may be adopted with most species; but, on a large scale, the first object is to place the plants in a soil neither too poor nor too rich. A dry soil, not deep, and resting on a dry firm bottom, is most favourable to fruitfulness, especially when joined to abundance of air and light. In perennials, the effect can only be produced the second year, as in trees; but in annuals, it will be immediate: in the former class, however, where the defect is want of nourishment, the effect may take place even the first year. Knight induced the production of blossoms on an early variety of potato, by depriving the plant of its tubers, as soon as they made their appearance; by which means, the nourishment which would have been devoted to their enlargement was employed by the plant in the production of blossoms, as the remaining mode which it had of propagating its species. The reverse of the practice is found proportionally to increase the bulk of the tubers, and has become an important point of practice in potato culture. The Dutch, as Darwin informs us, were the first to adopt this mode in the culture of bulbous-rooted flowers. In general, it may be stated, that the art of producing blossoms in perennial herbaceous plants consists in permitting them to have abundance of leaves, fully exposed to the light and air the preceding year; and in not cutting them over when in a state of growth, as is too frequently done, but in letting them first begin to decay. By this means, healthy vigorous buds and roots are prepared for exertion the following year.

2993. *General estimate of these practices*. All these operations may be resorted to occasionally as expedients; but the only permanent and general mode of inducing fruitfulness is by supplying judicious soil, exposure, and pruning.

SECT. V. *Operations for retarding or accelerating Vegetation.*

2994. *To overcome difficulties* is the last stage in the progress of art. After civilised man has had every thing which he can desire in season, his next wish is to heighten the enjoyment by consumption at extraordinary seasons. The merit here consists in conquering nature; and in gardening this is done by *cold-houses* and *hot-houses*; and by excluding or increasing the effects of the sun in the open air. The origin of these practices is obviously derived from the fact, that heat is the grand stimulus to vegetation; and its comparative absence, the occasion of torpor and inactivity.

SUBSECT. 1. *Operations for retarding Vegetation.*

2995. *Retarding by the form of surface* is effected by forming beds of earth in an east and west direction, sloping to the north at any angle at which the earth will stand; here

salading may be sown in summer, and spinach, turnips, and such crops as shoot rapidly into flower-stems during hot weather.

2996. *Retarding by shade.* The simplest mode of retarding vegetation is, by keeping plants constantly in comparative shade in the spring season. This is either to be done by having them planted in the north side of a wall or house, or sloping bank, hill, or other elevation; or by moving them there in pots; or by placing a shade or shed over or on the south side of the vegetables to be retarded. Where the object of retarding vegetation is to have the productions in perfection later in the season, the first method is generally resorted to; but where vegetation is only retarded in order that it may burst forth with greater vigour when the shades are removed, then either of the others is preferable. Trees on an east and west espalier-rail, shaded from the sun from February to the middle of May, will be later of coming into blossom, and therefore less likely to have their blossoms injured by frost.

2997. *Retarding by the cold-house, or ice-cold chamber* adjoining ice-houses, is more particularly applicable to plants in pots, especially fruit-trees, and might be made a practice of importance. Vegetation may in this way be retarded from March to September, and the plant removed at that season, by proper gradations, to a hot-house, will ripen its fruit at mid-winter. It is even alleged by some gardeners, who have had experience in Russia, that the vegetation of peach trees may be so retarded an entire year; and that afterwards, when the plant is removed into spring or summer heat, in the January of the second year, its vegetation is most rapid, and a crop of fruit may be ripened in March or April, with very little exertion on the part of the gardener. The earliest potatoes are obtained from tubers which have been kept two seasons; that is, those are to be planted which have been produced the season before the last; or, the produce of summer 1833, in December 1834.

2998. *Retarding the ripening of fruits by excluding oxygen.* M. Bérard, of Montpellier, in an essay on the ripening of fruits, which gained the prize of the French Academy of Sciences in 1821, found that the loss of carbon is essential to the ripening of fruits; that this carbon combines with the oxygen of the air, and forms carbonic acid: and that, when the fruit is placed in an atmosphere deprived of oxygen, this function becomes suspended, and the ripening is stopped. Hence it results, that most fruits may be preserved during a certain period, by gathering them a few days before they are ripe, and placing them in an atmosphere free from oxygen. The most simple process for effecting this consists in placing at the bottom of a bottle, a paste formed of lime, sulphate of iron, and water; then introduce the fruit so as they may rest detached from the bottom of the bottle and from each other, and cork the bottle and cover it with cement. Peaches, plums, and apricots have been kept in this way for a month; pears and apples for three months. Afterwards they will ripen perfectly by exposure to the air. (*Journal R. Inst.*, vol. xi. p. 396.)

SUBJECT. 2. *Operations for accelerating Vegetation.*

2999. *Accelerating by the form of surface* consists in forming beds or banks in an east and west direction, and sloping to the south, forming an angle with the horizon, the maximum of which, in garden-soils, cannot exceed 45 degrees. On such beds early-sown crops, as radishes, peas, turnips, &c. will come much earlier, and winter-standing crops, as lettuce, broccoli, &c., suffer less from severe weather, than those on a level surface. The north side of such beds or ridges may be used for retarding vegetation, as leeks, borecoles, &c. (2995.)

3000. *Acceleration by shelter*, and exposure to the sun, is the simplest, and probably only primitive mode of accelerating the vegetation of plants; and hence one of the objects for which walls and hedges are introduced in gardens. A May-duke cherry, trained against a south wall, and another tree, of the same species, in the open compartment of a sheltered garden, were found, by the late J. Kyle, of Moredun, near Edinburgh, on an average of years, to differ a fortnight in the ripening of their fruit. In cold, damp, cloudy seasons, they were nearly on a par; but in dry, warm seasons, those on the wall were sometimes fit to be gathered three weeks before the others. It may be here remarked, that though, in cloudy seasons, those on the wall did not ripen before the others; yet their flavour was, in such seasons, better than that of the others, probably from the comparative dryness of their situation. Corn and potatoes on the south and north sides of a hill, all other circumstances being equal, ripen at about the same relative distances of time.

3001. *Accelerating by soils* is effected by manures of all sorts, but especially by what are called hot and stimulating manures and composts, as pigeons' dung for cucumbers, blood for vines; and, in general, as to soils, lime-rubbish, sand, and gravel seem to have the power of accelerating vegetation to a much greater degree than rich clayey or loamy soils, or bog or peat earth.

3002. *Accelerating by previous preparation of the plant* is a method of considerable im-

portance, whether taken alone, or in connection with other modes of acceleration. It has long been observed by cultivators, that early ripened crops of onions and potatoes sprout, or give signs of vegetation, more early next season than late-ripened crops. The same of bulbs of flowers which have been forced, which re-grow much earlier next season, than those which have been grown in the open air. It was reserved to Knight, however, to turn this to account in the forcing of fruit trees, as related in a paper, accompanied, as usual, by what renders all the papers of that eminent horticulturist so truly valuable, — a rationale of the practice.

3003. *The period which any species or variety of fruit will require to attain maturity*, under any given degrees of temperature, and exposure to the influence of light in the forcing-house, will be regulated, to a much greater extent than is generally imagined, by the previous management and consequent state of the tree, when that is first subjected to the operation of artificial heat. Every gardener knows that, when the previous season has been cold, and cloudy, and wet, the wood of his fruit trees remains immature, and weak abortive blossoms only are produced. The advantages of having the wood well ripened are perfectly well understood; but those which may be obtained, whenever a very early crop of fruit is required, by ripening the wood very early in the preceding summer, and putting the tree into a state of repose, as soon as possible after its wood has become perfectly mature, do not, as far as my observation has extended, appear to be at all known to gardeners; though every one who has had in any degree the management of vines in a hot-house must have observed the different effects of the same degrees of temperature upon the same plant, in October and February. In the autumn, the plants have just sunk into their winter sleep: in February, they are refreshed, and ready to awake again; and whenever it is intended prematurely to excite their powers of life into action, the expediency of putting those powers into a state of rest, early in the preceding autumn, appears obvious. (*Hort. Trans.*, vol. ii. p. 368.) Knight placed some vines in pots, in a forcing-house, in the end of January, which ripened their fruit in the middle of July; soon after which, the pots were put under the shade of a north wall in the open air. Being pruned and removed in September to a south wall, they soon vegetated with much vigour, till the frost destroyed their shoots. Others, which were not removed from the north wall till the following spring, when they were pruned and placed against a south wall, “ripened their fruit well in the following season in a climate not nearly warm enough to have ripened it at all, if the plants had previously grown in the open air.” Peach trees, somewhat similarly treated, unfolded their blossoms nine days earlier, “and their fruit ripened three week earlier” than in other trees of the same varieties. (*Hort. Trans.*, vol. ii. p. 372.) Pots of grapes which had produced a crop previously to midsummer, were placed under a north wall till autumn; on the 12th of January, they were put into a stove, and ripened their fruit by the middle of April. (*Hort. Trans.*, vol. iv. p. 440.)

3004. *By thus inducing a state of rest in plants in pots, say vines or peaches, in August, and placing them immediately in the cold room till the beginning of January, which is allowing four months of a winter to them; they would, in all probability, produce very early crops of grapes with less forcing than would be required for such as ripen their wood in October.* Such pots might be placed in pine and other stoves, where a certain degree of heat is kept up at any rate, and might be contrived to produce a succession of fruit, in the manner practised by W. Marsland of Stockport, by a vineyard in pots, which pass in regular succession through his pine-stoves, and furnish ripe grapes the whole year. A state of rest is readily induced by withholding water from plants under cover; and in the open air by covering trees, and a portion of the surface or border around or before them, with canvass or oilcloth, to throw off the autumnal and part of the winter rains.

3005. *Accelerating by housing*, such as removing plants in pots and boxes, to sheds or rooms in the night, and exposing them in fine weather to the sun, was practised by the gardener of Tiberius, to procure early cucumbers; and by those of Louis XIV. to force peas. (*Bérard.*) Parkinson and Gerarde describe the practice as applied to raising cucumbers and melons in this country.

3006. *Accelerating by artificial heat in walls* is a very frequent and useful practice. In general it is accompanied by protecting-covers of canvass or netting (2344.): but some gardeners, as Trotter of Alva, a very high and exposed situation on the Ochil hills, never cover their hot-walls; but in ripening the wood in autumn, and in saving the blossom and setting the fruit in spring, keep up such fires as will repel the frost, and evaporate the wet that might fall on the wall. “No danger,” Trotter observes, “is to be apprehended from the severity of the spring months, even when exposed to all sorts of weather; every kind of covering being superseded by the genial heat of the wall.” This he has long experienced, even in England, but especially in Scotland, to be “the best preservative of the blossom of young fruits.” (*Caled. Mem.*, vol. ii. p. 113.)

3007. *Accelerating by flued borders* has been occasionally attempted, but can never succeed by fire heat; by tubes of steam, perhaps, something might be done, but the heat can always be more economically applied by means of pits or frames, placed on raised beds of mould, with arches, or some similar contrivance, underneath. (See a description of a flued border in Keil's *Treatise on the Peach Tree*, 8vo. 1780.)

3008. *Accelerating by covering with glass cases, of different sizes and descriptions, probably succeeded to housing.* The Romans are supposed to have hastened the ripening of grapes and peaches, by placing them under talc cases (73.); and a French author, Bérard, informs us, that the origin of forcing the vine arose from one Gordon observing that a shoot which had entered his room-window through a crevice, ripened its fruit some time before those branches of the same tree which remained in the open air. The practice of forcing peaches in Holland is said to have originated from a gardener near Haarlem putting hot-bed lights against his walls to ripen peaches in a bad season. By a mere covering of glass, without any description of bottom heat, or any auxiliary mode of acceleration, almost all fruits and flowers which grow in the open air in this country, may be forwarded from one fortnight to one month, according to the season. Fruits may, by the facile means thus afforded of covering and protection, be retained in a ripe and plump state from one to three months; so that, in general, it may be observed, that cold frames, as they are called, and mere glass cases, will double the ordinary time of enjoying hardy fruits; and certainly they greatly increase the flavour of such as ripen late, and especially of the peach and of the vine.

3009. *Accelerating by glass cases and artificial heat combined* is effected by hotbeds, pits, and hot-houses.

3010. *Accelerating by the common hotbed* is an ancient, general, but still somewhat precarious and unmanageable mode. The heat being produced by a fermenting mass of vegetable matter, over which is placed the earth containing the plants, it becomes difficult to regulate any excess of heat; and the plants are sometimes, in the empirical phrase, *burnt*. When, however, the heat declines, it is readily renewed by linings, or a surrounding layer of dung. To remedy the defects of the common hotbed, and prevent the possibility of burning the plants, by interposing a stratum of air between the dung and the mass of earth which contains them, is the object of the vaulted pit and M'Phail's frame (fig. 548.); to which there is no other objection, than that of the greater original cost. These structures actually save dung, and are more agreeable to the eyes of those who value order and neatness, than dung-beds.

3011. *Accelerating by means of walled pits* is very similar to that of forcing by hot-beds; with the advantages of having more room between the surface of the beds and the glass for the tops of shrubs, and of the glass having a better slope; but with the disadvantages of a chance of burning in the first instance, and no power of increasing the bottom heat when it once declines. Bark is generally used to lessen the first evil, as it does not ferment so powerfully as dung; and the second is remedied by a surrounding flue. Such pits are much used in all the branches of garden-culture. Henderson, of Brechin, proposes to lay on the surface of beds of tan, or on hot-beds, pits, pineries, &c., fine drifted river or sea sand, three inches deep. "This covering," he says, "possesses many advantages. It will extirpate the slater or woodlouse (*Oniscus Asellus*), as the nature of the sand prevents the insect from concealing itself from the rays of the sun. In dung hotbeds, it keeps down the steam. To fruit, it affords a bed as warm and as dry as tiles or slates. This covering also retains the moisture in the earth longer than any other, and is itself sooner dry. It gives the houses a clean, neat appearance, and, though it cannot be expected to remove the infection, where already introduced, will be found a powerful preventive of that great evil, mildew."

3012. *Accelerating by means of hot-houses* is the masterpiece of this branch of culture, and is but of modern invention, being unknown till the end of the 17th century. Improvement in the form as well as management of these buildings has, as in every other case, been progressive; and there are now a great choice both of the forms adopted, the materials used in the construction of these forms, and the mode of producing artificial heat.

3013. *There are two leading modes of accelerating plants in hot-houses*: the first is, by placing them there permanently, as in the case of the peach, vine, &c., planted in the ground; and the second is, by having the plants in pots, and introducing or withdrawing them at pleasure. As far as respects trees, the largest crops, and with far less care, are produced by the first method; but, in respect to herbaceous plants and shrubs, whether culinary, as the strawberry and kidneybean; or ornamental, as the rose and the pink, the latter is by far the most convenient method, and it is also the best adapted for affording very early crops. (3003.) Where large pots are used, the peach, cherry, fig, &c., will produce tolerable crops. Knight has observed, that "vines and other fruit trees, when abundantly supplied with water and manure in a liquid state, require but a very small quantity of mould;" and he adds, "A pot containing two cubic feet of very rich mould, with proper subsequent attention, is fully adequate to nourish a vine; which, after being pruned in autumn, occupies twenty square feet of the roof of a hot-house; and I have constantly found that vines in such pots, being abundantly supplied with food and water, have produced more vigorous wood, when forced very early, than others of the same varieties, whose roots were permitted to extend beyond the limits of the house." (*Hort. Trans.*, vol. ii. p. 373.)

3014. *When trees are planted for a permanency within, or close to the outside of, a hot-house, the soil requires to be prepared of depth and quality according to the nature of the tree; and a principal consideration is to form, if such does not naturally exist, a sub-soil, which shall be impenetrable to the roots.* The depth of soil on such a substratum need not in general be great, provided it be rich. Formerly a depth of three or four feet was recommended; but Hayward proposes to have his fruit-tree borders only fifteen or eighteen inches deep; which is conformable to an observation of Hitt, that the finest crop of peaches he had ever seen, grew on trees which were nourished from a border not more than one foot deep, with a compact rock below. Nicol allows from twenty-four to thirty inches of soil. Knight is of opinion that "a large extent and depth of soil seem to be no farther requisite to trees than to afford them a regular supply of water, and a sufficient quantity of organisable matter;" and, he thinks, "the rapid growth of plants of every kind, when their roots are confined in a pot to a small quantity of mould, till that becomes exhausted, proves sufficiently the truth of this position." (*Hort. Trans.*, vol. ii. p. 127.)

3015. *The operations of forcing chiefly respect the admission of air, the supply of heat, of light, and of water.* The grand effect is produced by heat, and the great art is just to supply as much as will harmonise with the light afforded by the sun and the nature of the species of plant to be forced. All the operations of nature are gradual; and a good gardener will always follow these as the safest examples. He will never be anxious to apply artificial heat before buds have naturally swollen; he will then increase the temperature gradually for some weeks; he will, in particular, guard against any sudden decrease of warmth, it being most necessary, towards success, to continue the course of vegetation uninterrupted, through foliation, inflorescence, and fructification.

3016. *Heat and light.* An error in hot-house culture in general, of very considerable importance, and which has prevailed till lately, consists in not adjusting the heat of art to the light of the sun. In cloudy weather, and during night, the artificial atmosphere is kept hot by fires, and exclusion of the external air; while in clear days, and during sunshine, fires are left off, or allowed to decline, the external air is admitted, and the atmosphere within is reduced to the temperature of that without. As heat in nature is the result of the shining of the sun, it follows that when there is most light, there is most heat; but the practice in forcing is very generally the reverse. "A gardener, in forcing," Knight observes, "generally treats his plants as he would wish to be treated himself; and consequently, though the aggregate temperature of his house be nearly what it ought to be, its temperature, during the night, relatively to that of the day, is almost always too high." In one of Knight's forcing-houses, in which grapes are grown, he always wishes to see its temperature, in the middle of every bright day in summer, as high as 90°; "and after the leaves of the plants have become dry, I do not object to ten or fifteen degrees higher. In the following night, the temperature sometimes falls as low as 50°; and so far am I from thinking such change of temperature injurious, I am well satisfied that it is generally beneficial. Plants, it is true, thrive well, and many species of fruit acquire their greatest state of perfection in some situations within the tropics, where the temperature in the shade does not vary in the day and night more than seven or eight degrees; but in these climates, the plant is exposed during the day to the full blaze of a tropical sun, and early in the night it is regularly drenched with heavy wetting dews; and consequently it is very differently circumstanced in the day and in the night, though the temperature of the air in the shade at both periods may be very nearly the same. I suspect," he continues, "that a large portion of the blossoms of the cherry and other fruit trees in the forcing-house often proves abortive, because they are forced by too high and uniform a temperature, to expand before the sap of the tree is properly prepared to nourish them. I have, therefore, been led, during the last three years, to try the effects of keeping up a much higher temperature in the day than in the night. As early in the spring as I wished the blossoms of my peach trees to unfold, my house was made warm during the middle of the day; but towards night it was suffered to cool, and the trees were then sprinkled, by means of a large syringe, with clear water, as nearly at the temperature at which that usually rises from the ground, as I could obtain it; and little or no artificial heat was given during the night, unless there appeared a prospect of frost. Under this mode of treatment, the blossoms advanced with very great vigour, and as rapidly as I wished them, and presented, when expanded, a larger size than I had ever before seen of the same varieties. Another ill effect of high temperature during the night is, that it exhausts the excitability of the tree much more rapidly than it promotes the growth, or accelerates the maturity, of the fruit; which is, in consequence, ill supplied with nutriment, at the period of its ripening, when most nutriment is probably wanted. The muscat of Alexandria and other late grapes are, owing to this cause, often seen to wither upon the branch in a very imperfect state of maturity; and the want of richness and flavour in

other forced fruit is, I am very confident, often attributable to the same cause. There are few peach-houses, or indeed forcing-houses of any kind in this country, in which the temperature does not exceed, during the night, in the months of April and May, very greatly that of the warmest valley in Jamaica in the hottest period of the year: and there are probably as few forcing-houses in which the trees are not more strongly stimulated by the close and damp air of the night, than by the temperature of the dry air of the noon of the following day. The practice which occasions this cannot be right; it is in direct opposition to nature." (*Hort. Trans.*, vol. ii. p. 130.)

3017. *Air.* Knight considers that gardeners often and widely err, "by too freely admitting the external air during the day, particularly in bright weather. Plants generally grow best, and fruits swell most rapidly, in a warm and moist atmosphere; and change of air is, to a very limited extent, necessary or beneficial. The mature leaves of plants, and, according to Saussure, the green fruits (grapes at least), when exposed to the influence of light, take up carbon from the surrounding air, whilst the same substance is given out by every other part of the plant; so that the purity of air, when confined in close vessels, has often been found little changed at the end of two or three days by the growth of plants in it. But even if plants required as pure air as hot-blooded animals, the buoyancy of the heated air, in every forcing-house, would occasion it to escape and change as rapidly, and indeed much more rapidly, than would be necessary. It may be objected, that plants do not thrive, and that the skins of grapes are thick, and other fruits without flavour, in crowded forcing-houses; but in these it is probably light, rather than a more rapid change of air, that is wanting. When fruits approach to maturity, such an increase of ventilation as will give the requisite degree of dryness to air within the house, is highly beneficial; provided it be not increased to such an extent as to reduce the temperature of the house much below the degree in which the fruit has previously grown, and thus retard its progress to maturity. The good effect of opening a peach-house, by taking off the lights of its roof, during the period of the last swelling of the fruit, appears to have led many gardeners to overrate greatly the beneficial influence of a free current of air upon ripening fruits; for I have never found ventilation to give the proper flavour or colour to a peach, unless that fruit was at the same time exposed to the sun without the intervention of glass; and the most excellent peaches I have ever been able to raise, were obtained under circumstances where change of air was as much as possible prevented, consistently with the admission of light (without glass) to a single tree."

3018. *Water.* The supplies of water given to plants should be regulated by the supplies of heat, the nature of the plant, its state in regard to growth, and the object for which it is cultivated. Abundance of heat should generally be succeeded by copious waterings, unless the nature of the plant, as its succulency, or its dormant state in regard to growth, render that improper. Plants cultivated for their fruits should be less watered during the ripening season than such as are grown for their effect; a dry atmosphere being most conducive to flavour. The succulent shoots of trees, Knight observes, always appear to grow most rapidly, in a damp heat, during the night; but it is rather elongation than growth, which then takes place. The spaces between the bases of the leaves become longer, but no new organs are added; and the tree, under such circumstances, may with much more reason be said to be drawn, than to grow; for the same quantity only of material is extended to a greater length, as in the elongation of a wire.

SECT. VI. *Operations to imitate warm Climates.*

3019. *The imitation of warm climates by hot-houses* must not be confounded with the art of forcing the vegetables of temperate climates into the premature production of their flowers or fruit. The former was the first object for which hot-houses were erected; and conservatories, green-houses, and plant-stoves existed in this country before any description of forcing-house; even pineries are of subsequent introduction to botanic and ornamental hot-houses. The various climates and constitutions of plants require atmospheres of different degrees of temperature and moisture: but experience has proved, that the plants of every warm country in the world may be grown in one or other of the three following descriptions of hot-houses:—1. *The green-house*, of which the varieties, are the Sinarium, or house for Chinese plants; the Conservatory, in which the plants are inserted in the soil without pots; the Cold-frame for bulbs, and Heathy for Cape plants, &c. 2. *The dry stove*, for succulent plants, or such as require a dry atmosphere; and 3. *The moist or bark stove*, for pines, palms, and the tropical plants which require the highest degree of heat, and an atmosphere moist in proportion.

3020. *Treatment common to the three species of artificial climates.* In general, hot-house exotics are kept in pots; but in some cases, fruit-bearing plants, as the orange; plants with large roots, as the strelitzia; and luxuriant creepers, as the different passifloras, are planted in the ground. The soils are, of course, very various, and can only be treated of with advantage under each species, tribe, or family. There are none of them, however, that will not thrive either in bog earth, sand, or loam, or a mixture of these. For pines,

oranges, and large-blossomed plants, rotten leaves or old cow-dung are added with advantage, and to some of these, as to the orange and pine-apple, liquid manures are frequently applied. Gardeners in general are averse to the application of any thing rich to the soil of exotic plants which are not cultivated for their fruit; a prejudice evidently contrary to analogy, and originating, in all probability, in the circumstance, that it is in general desirable to keep exotic plants small; both for want of room in ordinary-sized houses, and by that means to induce a flowering state. Now, however, when the facilities of hot-house building by wrought and cast iron admit of covering several acres of ground with a glass roof at 50 or 100 feet, or at any distance from the surface; and when the mode of heating by hot water or by steam readily admits of keeping such a space at any required temperature, all exotic plants, where expense is not an object, may be planted in ground which has been duly prepared, cultivated, and manured, like a shrubbery, where they may be allowed to attain their natural size. Such a house or scene may be watered after Loddiges' method, already described (§ 2558.), and its temperature regulated, if desired, by the ingenious machine of Kewley. (fig. 517.) With the exception of temperature, the operations in imitation of artificial climates are the same as those for forcing; we shall, therefore, confine ourselves to indicating the temperature of its three leading departments.

3021. *The green-house* is freely exposed to the influence of our atmosphere when the open air is not colder than 48° of Fahrenheit, and when winds and rains do not prevent the opening of the roofs or other means of ventilation. "As long as the weather continues fair without frost," says Abercrombie, "open the green-house windows in the daytime an hour after sunrise, and close at the same time before sunset. Never admit air by the door or sashes in foggy or damp weather, or when bleak cutting winds prevail. The admission of air in the middle of a clear frosty day will not hurt the plants, if counteracted by fire heat. Admit air freely when the external temperature is at 42° by Fahrenheit, or above; admit it guardedly when between 35° and 42°; but not at all when under 35° before the furnace is employed." Green-house plants are generally placed in the open air during the five mildest months in the year; either by taking off the roofs of the houses when these are movable; or by removing the pots, and placing them in the open garden.

3022. *Dry-stoves* are opened night or day in the summer seasons, but only during sunshine in winter and spring; beginning, as in the forcing-houses, by opening the top sashes or ventilators first, by which the external air descends and cools down the temperature, partly by mixing with the internal air, and partly by forcing it out. Afterwards, when the temperature of the atmosphere is above 50°, the lower or front sashes or ventilators may be opened; by which means a regular circulation or breeze is promoted in every part of the house, if a detached house; and in most parts of it, if forming part of a range of connected houses.

3023. *Moist or bark stove.* The range of temperature which bark-stove plants can endure "is from 63° to 81° of Fahrenheit, the instrument being in the middle of the house, at a considerable distance from the furnace, and out of reach of the sun's rays." According to Abercrombie, the temperature by artificial heat of the bark-stove "is 58° min., 70° max. When meridian summer is felt, the temperature must keep pace with the increase of heat in the atmosphere; and therefore will ascend, through all the intermediate degrees, to 75°, 80°, 85°, 90°, 95°, and even 100°. The maximum heat in the house, in July and August, may in general be kept down to 90°, by free admissions of air, and by evaporation from the water given to the plants; although the force of the season will sometimes prevail to 95° and 100°." M^r Phail, however, found that pines will bear without injury 130°, and he considers that no plant whatever will be injured by 120°. "It is not uncommon to give air to a hot-house only through the day, and to shut it up close at night, perhaps even increasing the temperature in the evening. Judicious horticulturists reverse the practice. Knowing, for example, that, in the West Indies, chilly and cold nights usually succeed to the hottest days, they rather imitate nature, by shutting up the house during the day, and throwing it open at night. This practice, however, can only be followed in our climate in the summer and autumn seasons." (Neill, in *Ed. Encyc. art. Hort.*) This opinion is in unison with Knight's, who considers excess of heat during the night as in all cases highly injurious to the fruit trees of temperate climates, and not at all beneficial to those of tropical climates; "for the temperature of these is in many instances low during the night. In Jamaica, and other mountainous islands of the West Indies, the air upon the mountains becomes, soon after sunset, chilled and condensed, and in consequence of its superior gravity, descends, and displaces the warm air of the valleys; yet the sugar-canes are so far from being injured by this sudden decrease of temperature, that the sugars of Jamaica take a higher price in the market than those of the less elevated islands, of which the temperature of the day and night is subject to much less variation." (*Hort. Trans.*, vol. ii. p. 131.)

SECT. VII. *Operations of Protection from Atmospheric Injuries.*

3024. *The injuries which plants may receive from the atmosphere* are as various as its changes. Many vegetables which flourish in Britain in the open air during the summer season, require protection during some or all of the other seasons of the year. Some also, from the state of their health, or other circumstances, require to be protected from the direct rays of the sun, from excessive rains, winds, frosts, and even from heat and evaporation. From these and other evils the gardener protects his plants by opaque coverings or shelters of different kinds; and by transparent covers or glass cases, and by other operations and processes.

3025. *Protecting by fronds and frond-like branches* is performed by sticking in the footstalks of the fronds of any of the ferns, but especially of the *Pteris aquilina*, branches of fir, whin, or broom, or of any other evergreens, between the branches of wall-trees and the wall; so that the frond or leafy branches may project, and either retard the blossom by excluding the sun, as is often done in Denmark and Sweden; or protect it from the frost and winds, as is generally the object in Britain. This is a very simple and economical protection for myrtles, camellias, and other tender botanical plants, trained to walls, or even growing in the open ground as stools, and also for fruit trees. Mr. A. Gorrie (*Caled. Mem.*, vol. i. p. 276.) formed a frame for the more commodiously containing the branches of spruce and silver firs, and other evergreens; and applied frames so clothed to his fruit-tree walls, on the principle of retarding the blossom. The success was equal to, and even beyond, his expectations. He covered them on the 20th of February, and removed the frames on the 1st of June. During this period, the frames were opened every fine day, but always shut at night. Adjoining were some trees of the same kinds, which were covered night and day, during the above period, with a woollen net. The shoots of these trees were infected with the *curl*, or wrinkled leaf; a disease peculiar to peach trees in exposed situations; while those protected by the frames of branches were perfectly healthy; and, what is remarkable, though retarded nearly four weeks in the period of their blossoming, the fruit ripened one week sooner.

3026. *The advantage of using frames in covering by fronds and branches* is, that the screens or protecting frames can be removed in the daytime; whereas, by attaching the fronds to the trees, they must, in general, remain till they have effected their object. It is easy to conceive that trees so treated must often suffer from want of light; and accordingly Nicol, on the whole, rather disapproves of it. "It is," he says, "a common practice, to screen the blossoms of wall-trees by sticking twigs of larch, or of evergreens, as firs or laurels, between the branches and the wall, in such a manner as to overhang the blossoms where thickest; and some, instead of these, use the leaves of strong ferns. These last are certainly fitter for the purpose than the former mentioned, as being lighter, and less liable to hurt the blossoms, when dashed by the wind against them; but all are objectionable, on account of their shading the bloom too much, and too constantly, from the sun and light, by which it is rendered weak, and the fruit produced often drops away before attaining any considerable size; so that all the trouble taken goes for nothing, as there would probably have been as good a crop, had the trees been left to take their chance."

3027. *Protecting by straw ropes* is effected by throwing the ropes in different directions over the trees, and sometimes depositing their ends in pails of water. It is a Dutch practice, and appears to have been first made known in this country by Dr. Anderson, in his *Recreations*, &c., in 1804. James Laird appears to have tried it successfully on wall-trees, and on potatoes and other herbaceous vegetables. His method is as follows:—"As soon as the buds of the trees become turgid, I place poles against the wall, in front of the trees, at from four to six feet asunder; thrusting their lower ends into the earth, about a foot from the wall, and fastening them at the top with a strong nail, either to the wall or coping. I then procure a quantity of straw or hay ropes, and begin at the top of one of the outer poles, making fast the end, and pass the rope from pole to pole, taking a round turn upon each, until I reach the end; when, after securing the end well, I begin about eighteen inches below, and return in the same manner to the other end, and so on, till I have reached to within eighteen inches or two feet of the ground. I have also found straw ropes to be very useful in protecting other early crops from the effects of frost, as peas, potatoes, or kidneybeans, by fixing them along the rows with pins driven into the ground. Old herring-nets, and branches of evergreens, are not so efficacious as straw ropes; which, besides being much cheaper, may be obtained in every situation."

3028. *Protecting by nets* is effected by throwing either straw, hay, bast, hempen or woollen nets over standard trees, the extreme shoots of which will support the net; or by throwing similar nets over hooped beds, or hooped single plants of herbaceous vegetables; by fixing them over the fruit trees trained against a wall (*fig. 518.*); or by placing them

over tender flowers and botanic plants, as auricula and hydrangea, &c., by means of net frames or portable cases.

3029. *The ordinary way of applying nets*, Nicol observes, "is to hang them over the trees, close to the branches; the flower-buds and spurs often sticking out beyond the net. Instead of being hung on in so unmeaning a manner, they should be placed out, at the distance of fifteen or eighteen inches from the tree; being kept off by hooked sticks with their butts placed against the wall, and at the distance of about a yard from each other. In order to make these stand firmly, the net should be first stretched tightly on, and be fastened on all sides. By further stretching it, to the extent of fifteen or eighteen inches, over the hooked ends of the sticks, it will be rendered so firm that no wind will displace it; and the sticks will also be made quite fast at the same time. If the nets were doubled, or trebled, and put on in this way, they would be the more effectual a screen; as the meshes or openings would, in that case, be rendered very small." Woollen nets are deemed the best, and are now in general use in Scotland. Bast nets are used in Sweden, and straw nets at the Duke of Buccleugh's garden at Dalkeith. "In screening with nets of any kind," Nicol observes, "they are always to be let remain on night and day, till all danger of frost be over; the trouble of putting them properly on being considerable, and there being no necessity for repeating such trouble, as they will in no wise injure the health of the trees, being incapable of shading them very much."

3030. *Protecting by canvass or bunting screens* is effected either by placing movable canvass cases over or around detached trees; portable hand-cases over herbaceous plants; tents or open sheds over the florists' flowers; or frames or sheets against trees trained on walls. In all cases, they should be kept clear of the tree or plant, either by extended, forked, or hooked sticks, or hooping, or any other obvious resource. "For hot-walls," Nicol observes, "they should be placed about the distance of a foot at top, and of eighteen inches at bottom. In using canvass or bunting screens, in either of the above-mentioned forms, the trees are always to be exposed to the free air and light, in good weather, through the day; screening only at night, and on bad days; applying them from the time the buds begin to open, till the fruit is fairly set, or till any fear of further danger from the effects of frost be past."

3031. *Protecting by mats* is the commonest of all modes for bushes, beds, and single herbaceous plants. Sometimes also screens of mats sewed together, or bound in frames, are applied to fruit trees, either singly or in frames, or on hooks and pegs. Nicol considers that they are "in no way so good, effectual, or ultimately so cheap screens as those of canvass."

3032. *Protecting by straw and litter* is effected in herbaceous plants by laying it round their roots, as in the artichoke, asparagus, &c.; or covering the tops of seedlings, which was formerly done, in cultivating the cucumber and melon, and is still practised by market-gardeners in raising radishes and other tender salad. Straw is also formed into coverings of various sorts for frames; screens for projecting from walls; and cones for bushes, herbaceous plants, and beehives.

3033. *Protecting by oiled paper frames* is effected on exactly the same plan and principle as that by bunting or canvass screens. "Frames covered with oiled paper have been successfully employed at Grangemuir garden in Fifeshire. The frames are of wood, inch and half square, with cross bars mortised into the sides. To give support to the paper, strong packthread is passed over the interstices of the frames, forming meshes about nine inches square. Common printing (or unsized) paper is then pasted on; and when this is quite dry, a coating of boiled linseed-oil is laid on both sides of the paper with a painter's brush. These frames are placed in front of the trees, and made movable, by contrivances which must vary according to circumstances. If the slope from the wall be considerable, a few triangular side frames may be made to fit the spaces. At Grangemuir, the frames are not put up till the blossoms be pretty well expanded; till which time they are not very apt to suffer from spring frosts or hail showers. In this way, it may be remarked, there is much less danger of rendering the blossom delicate by the covering, than if it were applied at an earlier period. The paper frames, if carefully preserved when not in use, will endure for a good many years, with very slight repairs."

3034. *Protecting copings* and horizontal shelters, mentioned by Miller and Laurence, are used chiefly with a view of preventing the perpendicular cold. They are projected generally from the top, but in lofty walks also from the middle, and remain on night and day during the cold season. When there is only a temporary coping, it is recommended by Miller and others to be hinged, and to have strings hanging down from every board on each side of the wall, so as the board may be projected, or thrown back, so as to rest on the top of the wall at pleasure.

3035. *Protecting by transparent covers* is effected with small plants, by placing over them a hand or bell glass; with larger ones, by either portable bell or curvilinear-shaped portable cases, and with considerable shrubs or fruit-trees by movable cases or glass sorts. For culinary seedlings, herbaceous plants in pots, and young trees of delicate sorts, timber frames with glass covers are used; or the plants are placed in pits dug in the ground, over which sashes are laid. In whichever way transparent protections are used, they must be partially or wholly removed, or otherwise opened, in fine weather, to admit a change of atmosphere, and a free current to dry up and destroy the appearance of what are called damps; and also to harden and prepare such plants for the removal of the covers.

3036. *Transparent screens* are made by placing sashes not in use on edge, and thus forming as it were glass walls or partitions; which, applied to green-house plants, set out in the open air, have the effect of producing shelter without shade, and at the same time of admitting the fall of rain on the plants. Many plants receive sufficient protection by being placed near to the south side of a wall, hot-house, or other building; or under a tree or bush during the winter months, without any covering or guard whatever.

SECT. VIII. *Operations relative to destructive Animals, Diseases, and other Casualties of Plants and Gardens.*

3037. *The casualties of gardens* arise from human enemies, from animals, and from vegetable diseases. Against the first, the law acts as the best safeguard; the second may be overcome, either totally or partially, by a knowledge of the habits and economy of the different species of vermin usually found in gardens, applied to their destruction; and the third, by a strict attention to the state and kind of the seed or germ of the future plant, and the soil and treatment which it receives, after being put in the ground.

SUBSECT. 1. *Of the Animals most injurious to Gardens.*

3038. *The quadrupeds which are hurtful to gardens* are either domesticated or wild. The first may be excluded by fences; but the latter must be destroyed. The only wild quadrupeds which infest enclosed gardens are hares, field mice, and rats; and for catching or destroying these, there are various well-known methods. The rat or mouse trap used by the gardeners near Paris is an earthen vessel or jar, with a narrow mouth, but much belled: this is sunk in the earth, and the entrance covered over by a few leaves or twigs. Mice are frequently very destructive in green-houses and conservatories, by gnawing and devouring bulbs. Some years ago, in the Liverpool Botanic Garden, an extensive and valuable collection of Cape bulbs, which the intelligent curator, Mr. Shepherd, had long been justly proud of, was destroyed by mice. Open gardens and plantations are exposed to other quadruped enemies, as the mole, hare, rabbit, and field mice. The common mole-trap, and the mode of setting it, are known to every countryman; and many others have been invented which have been more or less successful: but the best method of getting rid of moles, is by digging up their nests in spring; the heaps of earth over these nests being easily distinguished from the common molehills by their size. Hares and rabbits are both very destructive to plants in general, but are particularly injurious to plantations, from their habit of barking trees; from this, however, they may be deterred by smearing the stem with cow-dung, ordure, tar, coal liquor, or grease of any kind. The long and short-tailed field mice (which, of late years, have created so much injury in the royal forests) are never found in gardens; they will be treated of at large, when we enumerate those animals peculiarly destructive to plantations.

3039. *Birds are both injurious and beneficial to gardens.* To understand this, we must draw a distinction between those which feed upon fruits, seeds, and insects, and those whose food is insects only. The former comprise the sparrow, chaffinch, greenfinch, bullfinch, and other hard-billed species; which, although they occasionally devour insects, are well known to be very injurious to fruit trees. None of these birds habitually eat or pick off the buds, as some suppose, but all regale upon the ripe fruit. Sparrows, in some situations, are prone to scratch up, and otherwise destroy, young seeds in the first stage of their growth. Yet even these birds, for the services they perform in diminishing the number of snails, slugs, and caterpillars, in our gardens, are more beneficial than hurtful, and ought therefore to be preserved. Their injurious habits may be counteracted in spring and autumn, or during the seasons of preserving seed, and of gathering fruit, by scares of different sorts, such as mock men or cats, mock hawks or crows, miniature windmills, lines with feathers, &c.; but the most certain expedients are setting boys to watch, or carry about a wooden clapper during seed-time, and covering fruit trees with mats or netting, so soon as their produce begins to ripen. Lines of black worsted, fastened to projecting nails fixed in the walls, have also a very good effect in protecting wall fruits. The birds, taking these lines for twigs, light upon them; and the worsted turning round by the grasp, as well as sinking by the weight, the bird falls; and, if he attempts it a second time, falling in the like manner, he is deterred for the future. The frugivorous birds will thus be preserved; and, while they are prevented from doing injury to the fruit, their beneficial services will be secured. With regard to the insectivorous birds, generally so termed, those usually seen in gardens are the following:—1. Hedge Sparrow (*Accentor modularis Csw.*), 2. the Robin, 3. the Blackbird, 4. the Thrush (*Mérula viscivora Sw.*), 5. the Whitethroat (*Sylvia cinerea L.*), 6. the Blackcap (*Sylvia atricapilla L.*), 7. the Wren (*Troglodytes europæus*), 8. the Flycatcher (*Muscicapa Griseola*), and the different species of Tom-tits (*Parianæ Sw.*). The habits of these are so very different, some being injurious, and others beneficial, that the gardener should learn to discriminate them accurately.—The first, or Hedge Sparrow, is one of the most innocent and peaceful inhabitants of the garden; he hops about, picking up the minute seeds of annuals, whether of weeds or of flowers, which lie upon the surface; he never, we believe, attacks the fruit trees, and his presence is therefore always desirable.—The Robin is generally thought a purely insectivorous bird, while its familiarity with man; and his confiding disposition, prepossesses us all in his favour. But sadly will those gardens suffer in which these little thieves are plentiful. The young robins leave the nest pre-

cisely at the same time in June that the currants begin to ripen ; and, leaving the woods and hedges where they were reared, they flock to the gardens, and commence a sly but most destructive system of plunder. If they are numerous (as is unfortunately the case at Tittenhanger Green), not a bunch of currants will be found whole, even during its progress of ripening. The best berries are picked off, and, as the others begin to reach maturity, they serve for a succeeding repast. What is no less provoking than singular is this, that these impudent little birds will not be scared. The usual arts of feathers, windmills, &c., have been repeatedly but vainly tried ; no sooner are the robins driven from the bush, than they skulk a few yards under the surrounding plants, and return to the tree immediately you have left it. With more than half an acre of kitchen-garden, thickly planted all round with currant and gooseberry bushes, we have actually been obliged, for five years, to purchase these fruits, when ripe, from the neighbouring market. After trying various methods, our only effectual resource is that of covering up the trees with thin cotton, old muslin dresses, and similar fabrics, sufficiently pervious to admit air and heat ; the ordinary brick traps, set close to the trees, and baited with currants, entice many, and may be resorted to with advantage.—But the robins are not the only destroyers of our small fruits ; the Blackcaps, Whitethroats, and even the Bullfinches, join in the plunder : the two former, more especially, are fully as destructive as the robins ; and currants, strawberries, and raspberries rapidly disappear, at the very time we expect them to come on the dessert. Bullfinches are particularly fond of raspberries, and we suspect that the Greenfinch joins in the robbery.—No sooner are the currants nearly exhausted, than the gooseberries begin to ripen, and then, being too large for the soft-billed birds, are attacked by Blackbirds and Thrushes. These wary birds are at first more easily scared, but they soon become familiar with men of straw, or paper windmills, and even the gun has but a temporary effect in frightening them away. In such country situations the only effectual remedy is to cover or mat up the bushes, and although these coverings, for a large garden, are at first somewhat expensive, they will, with proper care, last for several years.—The Wren and the Flycatcher never touch fruit, and may safely be omitted in the general procription. We are disposed, also, to consider the Tom-tits as more beneficial than injurious to fruit trees, seeing that, as their chief food is insects, they destroy more caterpillars than buds. P. Musgrave, of Mayfield, near Edinburgh, is of the same opinion. (*Cal. Mem.*, vol. iii. p. 333.)

3040. *Insects are the most numerous, as well as the most destructive, foes to which gardens are exposed.* The species are so many, and their devastation so varied, that, without some acquaintance with their scientific classification, and a correct knowledge of their habits and economy, their operations can neither be understood nor effectually counteracted. It is, therefore, the duty, not only of the intelligent agriculturist, but also of the gardener, to acquire both these branches of information. The first may be learned from books ; but the second can only be gained by attention to the insects themselves, to the particular changes they undergo, and to the effects they produce. The generality of gardeners are deplorably ignorant on this subject ; and hence arises the misapplication of remedies, the consequent destruction of plants and fruits, and the persecution of birds, and even insects, that are beneficial to gardening operations. The scientific acquaintance with entomology that a gardener should acquire may be confined to a general knowledge of the changes which insects pass through, from the egg to the perfect state ; the different appearances which the various tribes assume, before they reach their final development ; and the several orders or divisions under which they are then classed. He will thus be enabled to know whether any particular larva or grub belongs to a beetle, a moth, or a wingless insect. It will, therefore, be our object to make this knowledge attainable without much study ; and to communicate it in popular language.

3041. *Insects are distinguished from vertebrated animals* (as quadrupeds, birds, fish, and reptiles) by being destitute of a backbone, and furnished with more than two feet ; and from worms (*Vérmes Lin.*) by possessing feet. We speak now of insects in their perfect state ; before that, many species, while larvae or grubs, have no feet. The generality of insects are furnished with six feet, but some few have a greater number, as the wood-louse, centipede, crab, &c.

3042. *Nearly all insects are oviparous, or produced from eggs* (fig. 674.) ; but some are hatched within the body (as in the viviparous flesh-fly), and the young are produced in a living state : the generality of insects deposit their eggs in secure places, either above or beneath the earth : many are sometimes laid together. They seldom increase in size, before they are hatched, and the young immediately provide for their own sub-

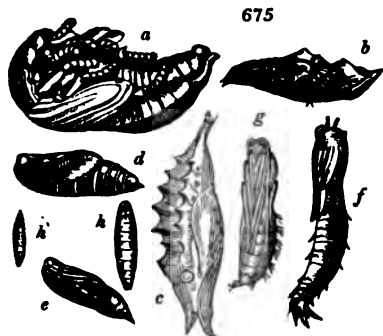


sistence. The forms of the eggs of insects are much diversified: as examples of these, in their natural as well as magnified size, we refer to those of the *Phalaena nupta* (fig. 674. b.), brown-tailed moth (c), currant moth (d), common gooseberry moth (e), cabbage butterfly (f), spider (g), house cricket (h), and cockchafer (i). The eggs of snails and slugs (a) are known from those of insects by being much larger; they are of a bluish white colour, with a considerable degree of transparency, and are found in small clusters beneath the ground. The period required for the hatching eggs is very uncertain; in some species this process takes place in a few days, while with others it is not accomplished until the following year.

3043. *But the larva, or caterpillar, correctly speaking, is the first state of insects.* The forms which distinguish the different tribes are numerous and varied; but none are provided with wings. They are known in common language by the names of grub, caterpillar, palmer-worm, maggot, and wireworm. These names, if confined to particular tribes, may be retained with advantage: thus, caterpillars should be understood as applicable only to the larvæ of lepidopterous insects, as butterflies, hawk-moths, and moths, and certain hymenopterous insects of the same form. Palmer-worms are usually hairy caterpillars of the moth tribe, and therefore this name may be disused. Grubs are the larvæ of beetles; they are generally thick, fat, and misshapen; of a whitish colour (from their always living in other bodies), and are provided with a distinct head, strong jaws, and three pair of feet. The grub of the cockchafer (fig. 683. b.) and of the insect called the wireworm (fig. 684. a) are good examples of these larvæ. Maggots are soft, and semitransparent; generally produced by flies (*Muscæ*), or two-winged insects (Diptera); they move along by the action of the body on the ground, without the use of feet: their heads are very small; and many species, such as the maggots found in putrid animal substances, cheese, &c., live by suction. The larvæ of bees, ants, &c. are also popularly called maggots. The name of wireworm has been improperly applied to the larvæ (fig. 684. b.) of the crane flies, *Tipulidæ* (fig. 688. a, c), of which there are numerous species; they resemble maggots, but are much more slender, and generally reside among the roots of grass and aquatic vegetables: as pupæ (fig. 684. c), they have the general form of those belonging to lepidopterous insects. The larvæ of some tribes, as the locust and the grasshopper, differ very little from the perfect insect, except in being destitute of wings, the rudiments of which only are discernible: while the spider, and a few other wingless insects, emerge from the egg in their perfect state. As examples of the most usual appearance of larvæ, we may cite the grubs of the cockchafer (fig. 683. b); and of the nut beetle (c, d) and of the bacon beetle (f), in the same figure; the caterpillar of the cabbage (fig. 678. a) and of the turnip butterfly (d); the maggot of the common fleshfly (fig. 689. c, d), the cheese fly or hopper (h), and of the gadflies (fig. 687. c, i).

3044. *In their larva state all insects feed voraciously,* and are, consequently, at this period of their lives, the most destructive to vegetables: yet they do not attack all plants indiscriminately; many, indeed, confine themselves to one particular species, without which they die; others will eat the leaves of two or three plants only; while some few are general feeders. Hence it is that the larvæ of insects found in flower-gardens are generally different from those of the fields, and even from such as infest kitchen-gardens; and orchards, again, are subject to a different race. The smaller species are generally the most injurious, as they make use of many curious devices to escape observation: some penetrate the heart of the young shoot, or eat their way into the bud; many conceal themselves with great skill, by rolling up the leaves in which they have taken up their residence, and securing the terminal openings by a slender web; others, again, spin themselves a silken case, attaching to the outside small particles of dead leaves or other substances, and thus live in security. These are more particularly the habits of lepidopterous insects, all of which may be known by having two descriptions of feet; those towards the head being horny and pointed, while the rest are thick and soft, and are called *false* feet.

3045. *The pupa or chrysalis is the next state of insects.* When the larva is full fed, it retires either into the earth, or to some secure situation, where its metamorphosis takes place in a few hours. The pupæ are as various in their forms and in their situations as the larvæ. Those of the beetle tribes are found in the earth, or in other substances; they have usually the rudiments of feet, and of other parts which become fully developed only in the perfect state. The pupæ of butterflies are entirely naked; and are either suspended by the tail, or attached to trees, walls, &c., by a strong transverse thread. Moths, on the contrary, pass this period of their existence either enveloped in a bag or cocoon of their own spinning, or the chrysalis is found naked and buried in the ground. The pupæ of flies and other two-winged insects are usually smooth, oval, and affixed externally or internally to those bodies which have given sustenance to the larvæ. The duration of the chrysalis varies according to the species; there are many insects



which undergo such a trifling change that it is scarcely perceptible. In general, however, the pupæ are torpid, inactive, and incapable of receiving nourishment. As examples of the most common forms, we give those of the cockchafer (*Ag.* 675. *a*), the turnip butterfly (*b*), the peacock butterfly (*c*), the currant moth (*d*), the gooseberry moth (*e*), the crane-fly (*Tipula cornicina*, *f*), *Phryganea rhombica* (*g*), *Musca pumilionis*, natural size and magnified (*h h*).

3046. *The imago, or winged form, is the last stage.* An insect arrives at maturity, in regard to corporeal bulk, in the larva state, and never increases in size after it emerges from the chrysalis; but it is only in the imago state that all its

organs are fully developed, and that it becomes a perfect being, exhibiting those characters which point out its station in nature. The habits and economy of perfect insects, no less than their external appearance, are, in most cases, totally different from those which belong to the previous stages of their existence. The caterpillar, furnished with strong jaws for devouring foliage, is changed into an insect, without any organs adapted for mastication, and which lives only by sucking the nectar of flowers.

3047. *The duration of the lives of insects is extremely variable.* The majority, in all probability, are annual; emerging from the egg, and passing through their metamorphoses within the year. Yet there are many facts to prove that certain families (particularly among the beetles) are long-lived. The late Mr. Marsham detected a foreign coleopterous insect in a piece of wood, which formed a desk that had been in his family for near twenty years: now, in this case, the larva must have been imported in the wood, and, not being disturbed by the joiner, must have remained the greater part of this time in the larva and pupa states before it ate its way out as a perfect beetle. The greater proportion of moths are biennial; passing the winter underground in the chrysalis state. Butterflies are mostly annual; although some few survive the winter, and appear early in the spring. The transitory life of the *Ephémère*, or day-fly, is proverbial; the perfect insect, indeed, of some species exists but for a few hours, and seems born only to provide for a continuation of its species; yet in the larva state it enjoys an aquatic life of two or three years. Bees are supposed to live a considerable time, and the same may be said of those spiders which take up their residence in cellars and other dark abodes.

3048. *The sexes of insects are commonly two; but neuters are to be found among those hymenopterous insects which live in large societies, as the bee, ant, &c.*

3049. *Insects are the most numerous of those organised beings which move upon the earth.* The number of species known to inhabit Great Britain alone falls little short of 10,000, and probably some hundreds still remain undiscovered. By this calculation, it appears that there are more than six insects to one plant. "Now, though this proportion, it is probable, does not hold universally; yet if it be considered how much more prolific in species tropical regions are to our chilly climate, it may perhaps be regarded as not very wide of a fair medium. If, then, we reckon the phanerogamous vegetables of the globe, in round numbers, at 100,000 species, the number of insects would amount to 600,000. If we say 400,000, we shall perhaps not be very wide of the truth; and it is probable that more than three fourths of this number remain undiscovered." (*Kirby and Spence, Int. to Ent.*, vol. iv. p. 477.)

3050. *On the arrangement or classification of insects.* Having gained a general knowledge of those forms and appearances which insects assume before they reach their perfect state, the student should next make himself acquainted with their classification, and finally with the nomenclature of such as are most interesting. The first may be acquired by an attentive perusal of the following characters; but to ascertain the name of a species, or to know whether any particular insect has been described, recourse must be had to those who have made entomology their particular study. The *Gardener's Magazine* and the *Magazine of Natural History* are always open to communications of this nature.

3051. *All insects are divided into two primary groups, which are either apterous (not winged), or winged.* 1. Apterous insects are those which in no period of their existence are ever furnished with wings; as the spider, centipede, ring-worm, crab, flea, &c. They undergo little or no metamorphosis; that is, they come from the egg, or from the body of the parent, nearly in the same form which they are destined always to preserve. 2. Winged insects (*Ptilota*, *Aristotle*), on the other hand, undergo the changes

we have already described; they are first larvæ, then pupæ, and finally become provided with four wings capable of flight. These are called perfect insects, and comprise all butterflies, bees, wasps, beetles, dragon flies, &c. Ants, likewise, enter into this great division, for although the majority of those which we see are without wings, still they are only the neuters or imperfect ants, the true males and females being each furnished with four wings.

3052. *Between the Apterous (A'ptera) and the four-winged classes of insects is another division, which constitutes the passage from one to the other; these compose the Linnæan order of Diptera, or flies. The wings of these insects are only two, as in the common house-fly. Their metamorphosis very much resembles that of the Hymenóptera, or of wasps and bees, into which order they insensibly blend.*

3053. *As nearly all the insects which relate to agricultural or gardening operations, belong to the class of Ptilôta, or four-winged insects, we shall confine our elementary notices to these only, pointing out the leading divisions, and defining them in such language as can be understood by the most unscientific reader.*

3054. *The primary divisions of the Ptilôta were long supposed to depend upon the mode in which the perfect insect took its food, whether by suction or by mastication. Hence arose the theory of M. Clairville, by whom the first were termed Haustellâta, and the latter Mandibulâta. A celebrated entomologist of our own country brought this arrangement into general adoption some years ago, by the splendid effort he made to prove that these divisions were natural. But science is never stationary; many of the assumptions upon which this theory reposed for its greatest strength have since proved fallacious. Entomologists, without attempting to recombine these facts which time has confirmed with others of more recent discovery, have nevertheless begun to suspect that M. Clairville's system is artificial; and a more intimate acquaintance with the subject, founded upon extensive analysis, has convinced us that this supposition is fundamentally true. We accordingly abandon the divisions of Haustellâta and Mandibulâta as founded in error, and shall now proceed to define the five orders under which all the Ptilôta, or perfect insects, are naturally arranged. These orders were well known, not only to Linnæus, but in a great measure to Aristotle, and are named by the former as follows:—1. Lepidóptera, 2. Hymenóptera, 3. Hemiptera, 4. Coleóptera, and 5. Neuróptera.*

3055. *Lepidóptera.* This well-known and beautiful order is characterised by four wings, thin, membranaceous, and covered with a fine powdery substance; this, on being magnified, is shown to consist of innumerable minute scales, lying one upon another like those on fishes. Lepidopterous insects are known in common language by the names of butterfly, hawkmoth, and moth. These are, in fact, natural divisions, and comprehend many thousands of species. Few lepidopterous insects are injurious to the agriculturist; but a great number devour, in their caterpillar state, the leaves of trees in the garden, the orchard, and the plantation. A few of these will be noticed under the particular tribes to which they belong.

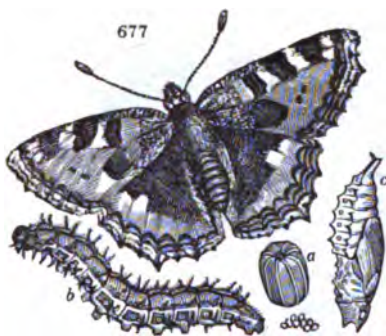
3056. *Butterflies (Papilionida).* The insects of this numerous and splendid tribe are well characterised by flying only during the middle of the day, and by their antennæ terminating in a small knob. In their caterpillar state, they all feed upon the leaves of plants; and when they change into chrysalides, either suspend themselves by the tail in some retired situation, or attach themselves to some object by means of a strong transverse thread; but they never spin a cocoon, or undergo their metamorphosis in the ground. Many species of this beautiful tribe are found in Britain, and several may be so far domesticated as to become ornamental to our gardens and plantations. To assist those who are disposed to try this interesting experiment, we subjoin a description of the different caterpillars from which they are produced, and which may be frequently met with, by searching for them, at the proper season, upon the plants they eat.

3057. *Caterpillars not injurious to cultivated vegetables, but which may be introduced in gardens, are of the following butterflies:—1. Swallow-tail butterfly (Pap. Machaon). (Pg. 676.) This caterpillar is green, but each segment of the body has a black transverse band, relieved by small, round, reddish spots: its natural food is umbelliferous plants, particularly the fennel and carrot; it emerges from the egg towards the end of May, and continues to feed until the end of June or the beginning of July; it is then about two inches long, and changes into a greenish chrysalis, and in the following month the perfect insect comes forth. These produce another brood, by depositing eggs which are hatched in August, and the caterpillars are full fed in September. The chrysalis of these remains dormant during the winter, and the perfect insect issues forth in the following May. This is the most beautiful, and one of the rarer British species: it is, however, plentiful in Hampshire, near the New Forest, and occurs both at Bristol, and at Beverley in Yorkshire; so that the young larvæ could be easily procured by any entomologist residing near those places, and sent to any part of the kingdom that might be desired.—2. The Brimstone Yellow butterfly. This caterpillar is pale green, with a whitish stripe on each side, and a reddish brown head; and when full fed, it measures*



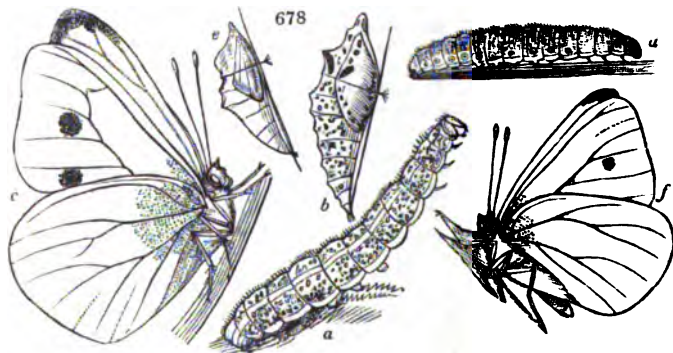
one inch and a half in length: the eggs are to be found in April on the buckthorn or wild rose. In the middle of June, these caterpillars change into pupæ; and the butterflies appear in August. There is a second brood, which pass the winter in the chrysalis state, and appear on the wing in March.—3. The Orange-tip butterfly. The caterpillar of this species is entirely of a pale green colour, very much resembling that of the turnip butterfly, but without the small eye-like spots observable on the sides of that species. It feeds on the *Cardamine impatiens*, *Brassica campestris*, *Turritis glabra*, &c., preferring the seeds, and becomes full fed in July, when it is rather less than an inch and a half long: it remains in the chrysalis state during winter, and the butterfly appears the first week in the following May.—4. *Atalanta*, or Scarlet Admirable, butterfly. The caterpillar is blackish brown; rather less than two inches long, when full grown; and is covered with little spiny prickles. It is produced from the egg about the middle of June, and immediately begins to enclose itself in a leaf of the nettle, by drawing the edges together with a silken thread; in this situation it may commonly be found. The chrysalis is suspended by the tail, and produces the butterfly in about twenty days, or in the beginning of August.—5. Painted Lady, or Thistle, butterfly. The caterpillar, in its form and size, resembles the last, but its colour (according to Lewin), is either dark or pale brown, and sometimes even yellowish. The eggs from which these caterpillars proceed are generally laid by the female insect on thistles, rarely on docks, and sometimes on nettles: the caterpillar conceals itself by uniting the upper edges of the leaf together, and thus escapes immediate detection; in the beginning of July it changes into a chrysalis, generally suspended from the plant that has afforded it nourishment; and in the first week in August the butterfly appears. In some years, this insect is seen in great numbers, while in others it is comparatively of rare occurrence.—6. The Peacock butterfly. The caterpillar of this very elegant butterfly agrees with those of the two last species in size and shape, but the spines are longer: on each change the skin becomes darker, and finally black. It is found on nettles. When in their last skin, the caterpillars forsake their previous concealment within the leaves, and feed exposed; they are then of a fine deep black colour, powdered all over with small white specks. The latter end of June, they suspend themselves by the tail, and change into chrysalides; in three weeks, the butterflies appear. Some of these butterflies live through the winter, while others remain in the pupa state until the spring.—7. The Elm, or Large Tortoiseshell, butterfly. The caterpillar is about an inch and three quarters long, of a light chestnut brown colour, with one or two blackish lines on the sides, and the body covered with short hairy prickles like the last four species. It is only to be found upon elm trees, that grow on the sides of lanes, in sheltered situations: caterpillars of this species are very social, feeding together, and not separating till near the time of transformation. There generally appears to be two breeds of these insects, one is seen so early as March, the other towards the end of summer.—8. The Nettle, or Small Tortoiseshell, butterfly. (fig. 677.) The eggs (a) are deposited on the nettle, and from these the young caterpillars issue about the middle of May: they are then of a light colour, and live together on the top of the nettle, which they enclose within a large loose web. After casting their fourth skin, they change to black, and separate into companies; but when they have acquired their sixth or last skin, they become yellowish on the back, and feed singly. When full grown (b), which generally happens in the

beginning of June, they suspend themselves, and pass into the chrysalis state (c); the



perfect butterfly (d) appearing towards the latter end of the same month. — 9. The Comma butterfly, so called from having a mark resembling a comma on the under side. The caterpillar of this elegant insect is readily known from all the preceding, by being of a bright chestnut colour, with the hinder and largest portion of the back pure white; there are also several short spines or prickles scattered on the body and sides. This caterpillar is generally found secreted beneath the leaves of the hop or nettle; they become full grown the latter end of July, when they suspend themselves on the plant, and passing into pupæ, become butterflies towards the middle of August.

3058. *The only butterflies injurious to cultivated vegetables* are, the large cabbage butterflies, as *Pieris brassicae* Lat. (fig. 678. c) &c. the small ditto (*P. rapæ*, f), and the green-veined white (*P. napi*). The first is the largest; the caterpillar (a) is greenish yellow, irregularly marked with black spots, and, when full grown, is rather more than an inch and a half long: in this state its ravages among cabbage beds are well known. The chrysalis (b) may be found, in summer and autumn, attached to posts, walls, outhouses, and the trunks of trees; this is, perhaps, the best time for destroying it, as the death of one may probably prevent the propagation of a whole brood: the perfect insect (c) might be placed in the list of ornamental butterflies, were it not so pernicious in its larva state. The small garden white, or cabbage butterfly, is frequently a still greater pest than the last: the caterpillar (d) is of a delicate green, with small yellow rings on each side its body; it conceals itself within the folded leaves in the centre of the cabbage and cauliflower, and is therefore less easily discovered: the chrysalis (e) is also green, and is found in similar situations to the last, towards the end of September. Broccoli is a favourite food of this insect. The green-veined white butterfly is likewise very trouble-

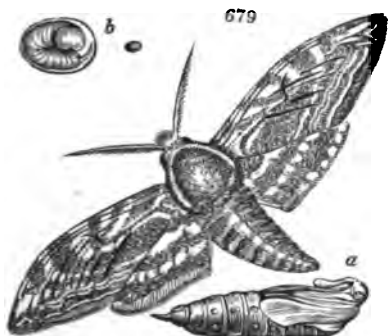


some in gardens: the caterpillar is green, but differs from the last in having three orange stripes; and the butterfly is known by the green nerves on the under side of the inferior wings: this has sometimes been called the turnip butterfly, from its infesting that plant, at certain seasons, in great numbers.

3059. *The Hawk Moths (Sphingidae)* form the second grand division of lepidopterous insects. They are principally distinguished by their antennæ being thickest in the middle, and formed of three sides. They are only to be seen on the wing at the rising and setting of the sun; at which times their flight is so extremely rapid, that the eye cannot distinguish either the motion of their wings, or the colours which ornament them. Some few European species of the lesser tribes fly, however, during the heat of the day. The major part undergo their metamorphosis in the ground, and thus differ essentially from butterflies. Nineteen or twenty species inhabit Britain, and of these about twelve are of a pretty considerable size. The caterpillars of the larger kinds are, in general, very beautiful; and are easily known from those of butterflies, and of other moths, by a sort of horn or curved process, situated on the last segment of the body:

none of these are found to be injurious, either to the gardener or the farmer; on the contrary, they may be classed, as we have before observed, with the ornamental butterflies.

3060. *The following short descriptions of the caterpillars of the five species of hawk moths that may be introduced into plantations, will be sufficient to distinguish them:—1. Eyed Sphinx or Hawk Moth. The caterpillar is of grass green, with oblique pale stripes, and eye-like dots on each side; and it feeds upon the poplar and willow.—2. Poplar Hawk Moth. The caterpillar is green, with oblique white stripes on the sides, and it feeds upon the poplar only.—3. Lime Hawk Moth. The caterpillar is green, with oblique red and yellow stripes on the sides, and it feeds upon the lime.—4. Privet Hawk Moth. (Fig. 679.) The caterpillar is grass green, with purple (or flesh-coloured) and white stripes on the sides; the chrysalis (a) is brown. The perfect insect measures near four*



inches and a half, when its wings are expanded: the larva feeds principally upon the privet, but is said not to refuse either the lilac or the poplar.—5. Humming-bird Sphinx. The caterpillar is pale rose, dotted with white; the horn at the end of the body being blue, tipped with brown. This is a common insect in some parts of England, and in the winged state is most frequently met with in gardens, although we are not aware to what particular plant the caterpillar is most attached.

3061. *The injurious species of hawk moths are few, and belong to a particular tribe (Sesiadæ), the larvæ of which feed upon the interior pith of trees and shrubs. In this manner, the currant clear-wing (Sesia dipuliformis F.) perforates the branches of that tree, and the diminished size of the fruit shows where the enemy has been at work: two or three other kindred species injure trees in the same manner.*

3062. *Moths (Phalænæ L.) constitute the third, and by far the most numerous, division of lepidopterous insects; and it is among these we find the greatest proportion of injurious and destructive species. Nearly all, in their larva or caterpillar state, are external feeders; that is, they feed upon leaves: on changing into the chrysalis state, they either conceal themselves within a silken cocoon, or burrow in the earth; but are never exposed like butterflies. The perfect insects seek their food during the night, generally beginning their flight in the dusk of the evening. The antennæ are thickest at the base, and gradually become more slender, until they terminate in a fine point: but some have their antennæ feathered. Many hundred species of moths inhabit Britain, and thousands are already known as natives of foreign countries.*

3063. *Among the species of moths most injurious to the gardener and agriculturist, we shall notice the following:—The caterpillar of the Angle-shades (Noctua gamma F.), in certain seasons, and in particular countries, is one of the most universal depredators. Although common with us, it is seldom the cause of more than trivial injury in Britain; but in France, during the year 1735, it was so incredibly multiplied, as to infest the whole country. Vast numbers, according to Reaumur, were seen traversing the public roads in all directions, to pass from field to field; they particularly attacked kitchen-gardens, where they devoured every thing. The credulous inhabitants affirmed them to be poisonous; and this idle report gained such general credit, "that herbs were banished for several weeks from the soups of Paris." An alarm somewhat similar, but caused by a different insect, was felt by the inhabitants of the vicinity of London in 1782, when vast multitudes of the brown-tailed moth, in their larva state, stripped the hawthorn hedges for miles of every green leaf: rewards were offered for collecting the caterpillars, and the churchwardens and overseers attended to see them burnt by bushels.*

3064. *Lettuces are greedily devoured by the larvæ of two moths of no very diminutive size. One of these is the beautiful Tiger moth (A'rtia Caja Lat.). The caterpillar is hairy, and is sometimes known by the name of the palmer worm. The other is the Miller, or Pot-herb moth (Noctua oleracea F.). Both these, as caterpillars, may be seen, when about to become pupæ, crawling about in search of a place to undergo their metamorphoses. The caterpillar of Bombyx graminis Fab. is very destructive to pastures. In 1759, and again in 1802, as Mr. Kirby states, "the high sheep farms in Tweeddale were dreadfully infested by a caterpillar, which was probably of this species; spots of a mile square were totally destroyed by them, and the grass devoured to the roots."*

3065. *Fruit trees, and more particularly apple trees, are subject to the attacks of many lepidopterous caterpillars. Independently of the various causes for blight, proceeding*

from the soil and the weather, there are others entirely originating in insects. Gardeners frequently find the tender leaves on the young apple shoots have the appearance of being sown or woven together, or rolled up and withered; now, it is beyond all doubt that neither heat, cold, nor fungi, have the least agency in causing these injuries. They are, in fact, entirely produced by two small caterpillars; and if the leaves are separated, and carefully unrolled, these depredators will be detected. One is of a chestnut brown colour, with a black head; and the other is green, with a few black hairs scattered over its body. Both are the larvæ of different small moths; but, from the lamentable neglect that agricultural entomology has hitherto received, the perfect insects have never been ascertained, and even the effects which they produce have been attributed to other causes. The same caterpillars will be found in those half-destroyed bud-leaves which have been previously injured by cold blight; and thus the evil becomes aggravated. Many gardeners suppose that the eggs of these small caterpillars are deposited in autumn; but it seems much more probable that they are laid very early in the spring, when the first separation of the infant leaf takes place; and were the trees to be well limed with a syringe at that particular time, there is every reason to believe that the eggs would be destroyed, and the injury done by the insect in its larva state prevented.

3066. *Other caterpillars which infest fruit trees* are those of a little moth (*Tinea corticella*), which lives beneath the bark; and the larvæ of *Tortrix Wæberana* (*Hort. Trans.*, vol. ii. p. 25.), by which is often laid the foundation of canker. Linnæus calls the Figure-of-eight moth (*Bombyx cæruleocéphala* F.) the pest of Pomona. Reaumur has particularly noticed another species in France; which, from the observations of Mr. Knight, appears to be found also in England (*Tinea Pomona*?). The caterpillar of this species feeds on the heart of the fruit, and thus causes it to fall in an unripe state. The gooseberry and currant trees in the gardens round London are terribly injured by the black and white caterpillars of the Gooseberry moth; and the chestnuts, particularly in France, are destroyed, while yet young, by the larvæ of a small moth, which eats into the fruit. That pest of Flora, the Rose Tortrix (*T. rosana*), is produced from those little green caterpillars found concealed in the curled or folded leaflets of the rose; and a still more pernicious kind enters the bud, and frequently destroys every opening blossom.

3067. *Other caterpillars, although not found in gardens*, are prejudicial in various ways. The larva of the ghost moth (*Hepialus hümuli* F.) attacks and does much mischief to the roots of the hop plant. The gigantic Goat moth (*Cossus lignipérda* F.), as a caterpillar, lives entirely within the trunk of the willow, and soon brings it to decay: the same tree is also inhabited by one of the clear-winged hawk moths (*Sesia crabroniformis* F.). A small moth (*Pyrælis scälis* F.) eats the culm of the rye within the vagina, and thus destroys many ears. While our woollen garments, furs, feathers, and even books, are sometimes ruined by the depredations of three or four other little moths, unfortunately too well known in our dwellings.

3068. *Hymenoptera*. The wings are four, and transparent. The tarsus (forming the third, or outer, division of the foot) is composed of five joints; and the body is armed with a stinging apparatus. The insects of this order are more intelligent, and more beneficial to man, than any others. The numerous species of bees, in all parts of the world, supply him with honey. The ant, particularly in tropical countries, is the grand promoter of vegetable decomposition; and the innumerable host of ichneumon flies carry on a perpetual warfare with every description of caterpillar that infests vegetation. Wasps are the only injurious hymenopterous insects in gardens; there are several sorts, however, which should be well discriminated. The smaller ones, found in spring and early in summer, are very beneficial, as they search for, and prey upon, small caterpillars. The larger, or autumnal species, are the pest of walled gardens; they should be enticed into phials, half filled with sugared water, or by treacle spread on a plate or tile, &c.

3069. *Hemiptera*. The chief character of this order is that the mouth is in the form of a slender and lengthened proboscis, which when not used, is folded beneath the breast, but not coiled up, as in lepidopterous insects. The wings are four, two of which are always clear, and the others are generally semi-transparent. One division of this order, the bugs (*Cimicidæ*), feed upon other insects, by sucking their juices, and are consequently in no respect injurious to gardens. The other division feed upon vegetable juices, and among these we find the cicadas or frog-hoppers, the aphides, or plant-lice, and the coccæ, or plant-bugs. Few of the larger or more remarkable plant-sucking Hemiptera are found in Europe, but tropical America produces some of the most whimsical and grotesque forms, as *Membrâcis ensâta* (fig. 680. a. a., *M. fuscâta* (b), and *M. spinôsa* (c)).

3070. *The Aphides, or Plant-lice* (called by many the green-fly), truly belong to the Hemiptera; and, next to locusts, they are the most universal devastators of vegetables. Almost every cultivated plant is attacked by them; and their fecundity is so prodigious, that Reaumur has proved that, in five generations, one aphid may be the progenitor of 5,904,900,000 descendants; and it is supposed that in one year there may be ten

generations. This astonishing fecundity exceeds that of any other known animal; but



some appear to multiply in a much less degree. The species are numerous, and are appropriated to different plants. The aphides which appear very early in the spring are produced from eggs deposited upon the branches the preceding autumn, and hatched about the time that the buds begin to unfold their first tender leaves; the first brood is, however, viviparous—in other words, producing its young alive; and this continues during summer; but towards autumn they become oviparous: were not this the case, the cold of winter would cause their total extermination. The most remarkable circumstance attending their propagation is, that the sexual intercourse of one original pair is sufficient for all the generations which proceed from the female for a whole succeeding year. Richardson thinks that all of the first spring brood are females; and, if this supposition be correct, the rapid increase of their numbers during

April and May may be easily accounted for. Some writers say that the larva, chrysalis, and perfect insects (all of which have legs), cannot be distinguished from each other; and others consider that those without wings are the females: there is reason, however, to think the reverse of this to be the case; as it is well known that, during summer, swarms of aphides may be seen on the wing, and are known to settle on places not before infested by them; this is usually attended with the production of a new colony, which must obviously come from the females. The injury they cause is produced by sucking or pumping out the juices of the shoots by means of a long rostrum, which usually lies infested and concealed beneath the breast, and is enclosed in a sheath of five joints. Some, as before observed, have wings; these are four in number, two of which are very small. The different species peculiar to oats, wheat, and barley, seldom multiply so fast as to be very noxious. Those feeding upon the different kinds of pulse, and on flowering plants in general, increase so rapidly, and take such entire possession of whatever they fix upon, that vegetation is checked and often destroyed. In fact, the efforts of man could never keep these insects within any limits, were they not exposed to many devouring enemies, who are incessantly (though in a great measure unobservedly) employed in their destruction. Every gardener must have seen sparrows and other small birds pecking them from rose bushes; but his most friendly coadjutor in this beneficial work is the grub (*fig. 681. b*) of the lady-bird or

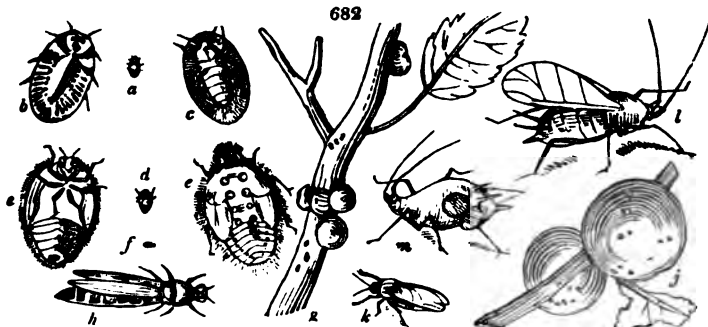
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lady-cow (*Coccinella L.*) (*a*). It is observed that vast numbers of these interesting little beetles are generally seen in years when the plant-louse abounds. Mr. Kirby states, that in 1807, the shore at Brighton and on the south coast was literally covered with them, to the great surprise and even alarm of the inhabitants, who were ignorant that their little visitors were emigrants from the neighbouring hop-grounds, where in their larva state, each had slain his thousands and tens of thousands of the aphid, known to the hop-growers under the name of the *Fly*. The larvæ of many real flies (*Syrphus F.*) (*fig. 681. c*) make astonishing havoc among the aphides. "It was but last week," Mr. Kirby continues, "that I observed the top of every young shoot of the currant-trees in my garden curled up by myriads of these insects. On examining them this day, not an individual remained; but beneath each leaf are three or four full-fed larvæ of aphidivorous flies surrounded with heaps of the skins of the slain; and the young shoots, whose progress had been entirely checked, are again expanding vigorously." (*Int. to Entomology*, vol. i. p. 266.)

3071. *Aphides are also the prey of another most cruel enemy.* This is a small hymenopterous insect, which deposits its egg in their bodies: it is there hatched, and feeds upon the bowels of the living insect; in a short time the aphid swells, becomes hard, and changes to a dark red colour. The artful destroyer within, when he finds his victim dying, eats a hole through its belly, and fastens it by that part to a leaf or twig. When the parasite has thus devoured the inside, and is ready to emerge as a perfect insect, he opens a passage for himself, by cutting out a circular hole on the side, leaving the piece attached to the body like a door on its hinges (*fig. 682. m*). Wall fruit trees, as the peach, apricot, and nectarine, are considerably injured by other species of aphides, which cause the leaves to rise into red tubercles; under these they reside, and, by sucking the sap, they cause the leaves to curl, and thus deform the tree and injure the produce. Mr. Swainson informs us of a fact, not hitherto known; that he never met with the aphides in South America; but that their place in nature is there supplied by numerous species of *Membracis*, *Centrotus*, &c. *Lat.* (*fig. 680.*) which are, in fact, the plant-lice of that continent.

3072. *The different plant-bugs (Coccæ) (fig. 682.)* frequently produce as much mischief, both in the garden, the greenhouse, and the stove, as the plant-lice: they are known by their oval form and short feet, in which they bear some resemblance to the house-bug; some species are clothed with white down, and others look like brown inanimate scales upon the bark: these last are the *Coccus hesperidum* L., and are

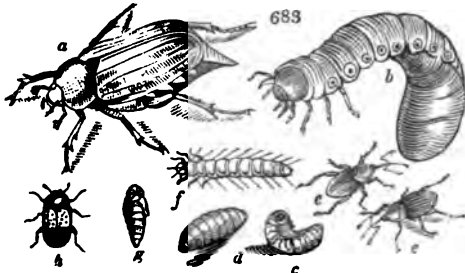


generally found upon the orange, myrtle, and camellia. The vine is exposed to another kind (*C. vitis L.*), which will not live in the open air, but sometimes so abounds upon vines in stoves and greenhouses, that the stems appear covered with spots of white cotton. Plum trees are likewise injured by another of these pests (*C. persicorum Reaumur*), which is very small (a); when magnified, the upper side (b) represents a shield, and the legs are only seen when the insect is turned on its back (c); it is principally found on twigs, and the females resemble small red globules. Mr. Kirby (*Int. to Ent.*, 197.), mentions a coccus peculiar to the currant bush: the eggs were of a beautiful pink, and were enveloped in a large mass of cotton-like web, which could be drawn out to a considerable length. Two other species are peculiar to the apple-tree. The female of one of these (*C. arborum linearis T.*) has the exact shape of a muscle-shell; the other is the most pestilential insect of its race, and is called by many the American blight. It is a minute insect, covered with long cotton-like wool, and takes its station in the chinks and hollows of the bark. It there increases so rapidly, that, if not destroyed, the tree to which it is attached will inevitably perish. The leaves of the oak are inhabited by another small species (*C. ffolii quercus R.*) (*Fig.* 682. d); when magnified, the rudiments of wings are seen both in the upper (e) and under (e) sides. The coccus of the beech (*C. fagi*) is still more minute, and causes small tubercles to arise on the twigs (g). Oak-galls (f) are caused by wounds effected in young growing shoots of the oak by the *Cynips quercus ffolii L.* (A.).

9073. *Other insects of this order, found in gardens, but not very prejudicial to plants, are the various species of thrips, and cuckoo-spit insects (Cercopidae Peab.).* The first are so very minute, that they resemble little black lines: the Thrips phytaspis is the most common, and, when magnified (*h*), is seen to have wings: they live in the blossoms of flowers. The larva of the cuckoo-spit (*Cicada spumaria* L.) lives within a drop of froth of its own making, and is well known.

3074. *Coleoptera*. This extensive and well-defined order comprehends all those insects generally called beetles. They have four wings, but two of them assume the form of hard wing cases, which meet close together in a straight line down the back. There are many tribes of these insects, which, both in their larva and perfect state, are extensively injurious both to the gardener and agriculturist. The principal of those which are indigenous to Britain we shall here enumerate.

3075. The cockchafer (*Melolontha vulgaris* F., fig. 683.) is one of the most destructive insects in this country. It is provincially called brown tree-beetle, blind beetle, chafer, Jack horner, Jeffry cock, May-bug, brown clock, dor, and miller. This insect appears some years in prodigious numbers, committing, both in its grub or larva and in its perfect state, the greatest ravages. The female (a) deposits her eggs in the ground, where in a short time they change into young

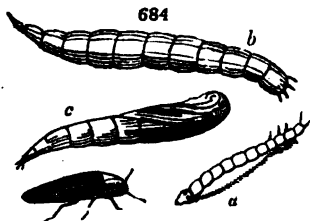


grubs: these, when full fed, are about an inch and a half long (*b*); they are soft and white, with a reddish head and strong jaws. In this state the insect remains four years, during which time it commits dreadful ravages on the roots of grass, plants, and even young trees; gnawing away the fibres so effectually, that the turf they have infested becomes brown, and may be rolled up nearly with as much ease as if it had been cut artificially. When turf thus affected is raised, the grubs are found beneath it, lying on their backs within the mould; and vast numbers may be thus gathered, and given to poultry and swine. When full grown, the larvæ dig in the earth four or five feet deeper, spin a smooth case, and then change into the chrysalis state (*fig. 675. a*). In this inactive form they remain until the following spring; the perfect beetle (*fig. 683. a*) then comes from the ground, and commences an immediate attack upon the leaves of all trees, but more particularly on those of the oak. The following account of the ravages of this insect is so very extraordinary, that, were it not well authenticated by contemporary writers, it would appear incredible. In 1688, the cockchafer appeared on the hedges and trees in the county of Galway, in clusters of thousands, clinging to each other's backs in the manner of bees when they swarm. During the day they remained quiet, but towards sunset the whole were in motion; and the humming noise of their wings sounded like distant drums. They were in such prodigious multitudes, that they darkened the air for the space of nearly three miles; and the noise they made in devouring the leaves was so loud, as to have been compared to the distant sawing of timber. In a short time the leaves of all the trees, for some miles, were destroyed, leaving the whole country, in the middle of summer, as naked and desolate as it would have been in winter. Swine and poultry devoured them in vast numbers; they waited under the trees for the clusters dropping, and soon became fat upon this novel food: even the lower orders of the people, from these insects having eaten up the produce of the earth, adopted a mode of cooking them, and also used them as food. Towards the end of summer, they are said to have suddenly disappeared. (*Phil. Trans.*, 1697, vol. xix. p. 743, &c.) From subsequent facts, there is reason to believe that these insects occasionally migrate into this country from some part of the Continent, probably Normandy or Brittany; as, about 1802, all along the south-west coast of Galway, there were found dead on the shore, for miles together, such infinite multitudes of cockchafers, and in such vast heaps, that, by a moderate estimate, it was computed there could not be less than forty or fifty horse-loads in all. These were doubtless a new colony, intercepted by a storm in their flight to the same districts as had been ravaged by their ancestors; but, meeting with a contrary wind, had been driven into the sea, and destroyed. (*Shaw's Gen. Zool.*)

3076. *Various species of weevils* (*Curetillo L.*), most of them very small, do considerable injury; as all the species live, in their larva and pupa state, upon seeds and vegetables. The *Curetillo nûcum*, or nut weevil (*fig. 683. e e*), is the insect produced by the grub (*d*) residing in the hazel-nut. The female insect singles out a nut, which she pierces with her proboscis; and then, turning round, deposits an egg in the cavity: the nut, not apparently injured, continues to grow, and gradually ripens the kernel upon which the larva (*d*) feeds. The perfect insect (*e*) is of a brown colour, and measures near half an inch in its total length. Two species of very small weevils (*A'pion flavifemoratum* and *A. flavipes K.*) devour the seeds of the purple and white clover. The corn weevil (*Calandra granaria F.*) is well known from its destructiveness to wheat; and there is also another species equally mischievous to that grain. *Curetillo lûpathi L.* devours the wood of the willow; and the small knobs found at the roots of the turnip and cabbage, are formed and inhabited by another small weevil (*Curetillo contractus M.*). But these injuries are trivial, when put in comparison with those produced on the young grafts of apple trees by one of the short-nouted weevils (*Curetillo vastator Marsh.*), which sometimes destroys many hundreds in one night, particularly in the nurseries about London. This most pernicious insect is equally dreaded on the Continent, where it destroys the young vines, often killing them the first year; and is accounted so terrible an enemy to them, that not only the beetles, but their eggs, are diligently searched for, and destroyed:

we are not aware that this pest has yet found its way into our graperies. *Curetillo glandium* does much injury to acorns, which it perforates and devours when in the larva state, like the nut weevils.

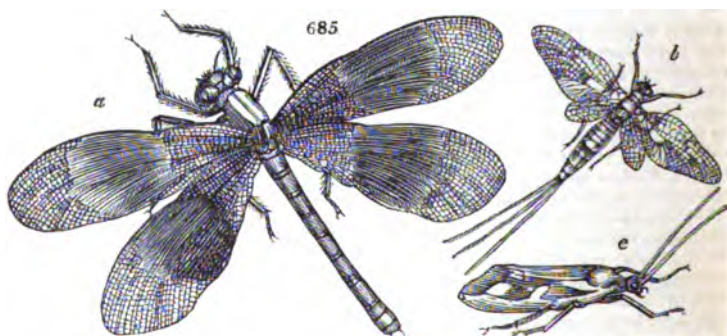
3077. *The wire worm* (*fig. 684 a*) is the grub of a coleopterous insect, the *E'later obscurus* of Marsham (*d*). This fact has been ascertained by Mr. Paul, an ingenious agriculturist of Staraton in Norfolk. The destruction that this grub produces is unfortunately too well known. It lives in the larva (or feeding) state upwards of



five years; during all which time it commits its ravages on the roots of grass and grain, particularly those growing on newly broken-up land. The true wire-worm has been confounded with the larva (b) and pupa (c) of crane flies (*Tipulidæ* Leach); hence the contradictory accounts of this insect to be found in different agricultural works.

3078. *The small jumping beetle, called by farmers the fly, or black jack, and by hop growers the flea, is probably the Háltica némorum, and belongs to this order. It commences its attack upon the turnip and hop plants when they first emerge from the ground. It has been calculated by an eminent agriculturist, that, from this cause alone, the loss sustained in 1786, among the turnips in Devonshire, was not less than 100,000*l*. (Young's Ann. of Agr., vol. vii. p. 102.) Háltica concinna, which very much resembles the last, is more particularly destructive to the hop plant. The last coleopterous insect we shall mention is the Dermestes lardarius, or bacon grub, well known to most housewives, by its devouring bacon, ham, and all descriptions of dried meat. The larva (fig. 683. f) is long and hairy, the pupa soft (g), and the perfect beetle (h) is a third of an inch in length, of a dusky brown colour, with the upper half of the wing cases whitish, marked with black specks.*

3079. *Neuróptera.* Linnaeus, by his wonderful tact at discriminating affinities, perceived that this was a perfectly natural order. But several modern naturalists, without due investigation, have opposed this opinion, and have broken up the Neuróptera into several orders; as these latter, however, will be abolished when the natural arrangement of the Ptilóta is investigated, we shall at once define the group before us. It is composed of masticating insects, having four wings, two of which are always transparent, the other two being in some clear, and in other tribes opaque. In the character of their wings the Neuróptera very much resemble the Hemiptera; but the two orders are immediately distinguished by their mouths, the Neuróptera having strong jaws for devouring their food by mastication, while the Hemiptera have none, and are merely provided with a proboscis for suction. The principal divisions are represented by the dragon flies (*Libellulínæ*, fig. 685. a), cockroaches (*Blattinæ*), grasshoppers and locusts



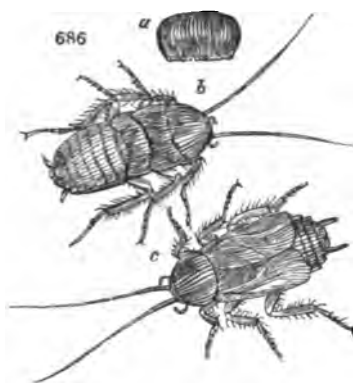
(*Locústidæ*), moth-flies or case worms (as *Phryganea rhombica*, c), and the May flies (*Ephéméra*, b). Few of these, although found occasionally in gardens, are among our more formidable insect enemies, unless, indeed, they happen to appear in considerable numbers. Fig. 685. a represents *Agrion virgo*; b, *Ephéméra vulgata*.

3080. *The cock-roach, called by some the black beetle, belongs to an extensive family. The most pernicious species in England is the Blattá orientális (fig. 686. c). It is now naturalised in every part of Europe, although originally imported from India. Like most of its tribe, it shuns both natural and artificial light. In the London houses, particularly in the rooms on the ground floor, it is often very abundant, and indiscriminately devours bread, meat, flour, and all household stores: as soon as light appears, however, it will scamper off as fast as it can, and vanish in an instant. Red wafers are said to be used as a bait to entice and destroy it. The young are contained in a singular horny case (a), internally divided into a number of transverse partitions or cells; the case is rather flattened, and quite smooth, except on one side, which is toothed. The larva, and also the pupa (b), are both without wings, and are generally larger than the perfect insect (c).*

3081. *The house cricket (Grýllus domésticus L.) is sometimes as abundant in farm-houses, as the cock-roach is in large towns: both insects, in their omnivorous disposition, are nearly the same.*

3082. *The mole cricket (Gryllotalpa vulgáris Lat.) is the most singularly formed insect in this country; its fore feet being dilated and toothed in a manner perfectly resembling those of the mole. It seems to be particularly common in some parts of*

Hampshire and Wiltshire, where it frequents gardens and other cultivated spots.

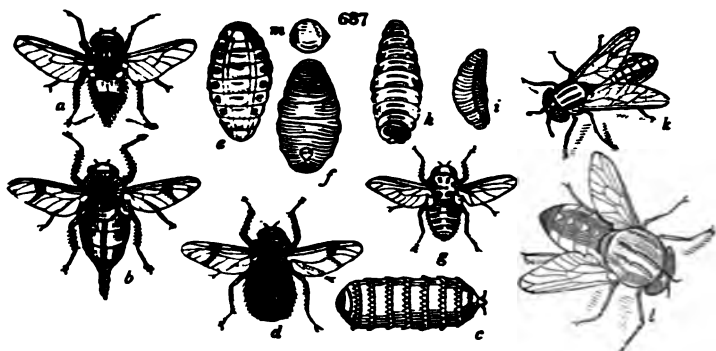


Like the mole, it burrows underground, raising a ridge of earth as it proceeds, and sometimes throwing up little hills; during the night, it ventures on the surface. These insects sometimes do considerable injury to beds of young vegetables.

3083. *The Ephemera*, or May flies, are not numerous, or in great abundance in this country; the largest is the *E. vulgata* (fig. 685. b): the under wings in this family are generally very small; and Harris figures a species (*Exposition of Eng. Ins.*, pl. 6. f. 1.3.) wherein they could not be detected, even with the assistance of a strong magnifier. The duration of the lives of these insects in their various states is most unequal, and deserves particular notice. They remain as larvæ for three years; when ready to become pupæ, they rise to the surface of the water, and instantaneously throwing off their cases, the metamorphosis is at once accomplished. The pupa is furnished with wings, with which it immediately flies to some convenient place; it then throws off a second skin, and in the same moment becomes a perfect ephemera. In this state all the species live but a very short time, some scarcely half an hour, during which time they consummate their nuptials, and the females deposit their eggs. M. Reaumur has given us a most interesting account of a species so abundant in France and Carniola, that the peasants collect them in carts for manure, and frequently twenty-five or thirty of these loads are gathered in one season. After many curious details, M. Reaumur goes on to describe the appearance of these insects on the banks of the river, near his residence, in August, 1798. "The quantity of ephemera which filled the air can neither be expressed nor conceived. When snow falls thickest, and in the largest flakes, the air is never so completely filled with them, as that which surrounded us was with ephemera. Scarcely had I remained a few minutes in one place, when the step on which I stood was covered in every part with their bodies to the depth of two or three, and in some places even to more than four inches. The whole surface of the water, for six feet at least from the bank, was entirely covered with a coat of ephemera; those which the current carried off, were more than replaced by those which fell continually in that place. I was several times obliged to abandon my station, by retreating to the top of the stair, not being able to sustain the shower of ephemera, which, not falling perpendicularly, or with an obliquity equally constant, struck me uninterruptedly, and in a very troublesome manner, on all parts of the face. At the end of about half an hour from its commencement, the great shower began to abate; and, in little more than an hour, scarcely any ephemera could be seen."

3084. *Dipterous insects*, as before observed, connect the Ptilota or four-winged class with that of the A'ptera or wingless insects. The wings are two only; but they are lobed, or slightly divided at their hinder base, so as to represent the additional pair of wings common to most insects. The tarsi are of five joints; the mouth is lengthened into a proboscis; and there is no anal sting. Dipterous insects, in general, have neither size nor beauty to recommend them; yet, from their numbers, they hold a very important station, and are designed to carry on many essential operations in nature. Their larvæ are either aquatic or terrestrial; the former principally living upon smaller insects, and the latter drawing sustenance from decayed animal or vegetable matter, and thus hastening its removal. In this order we find many species highly injurious to vegetation, and others that are offensive and troublesome both to man and beast.

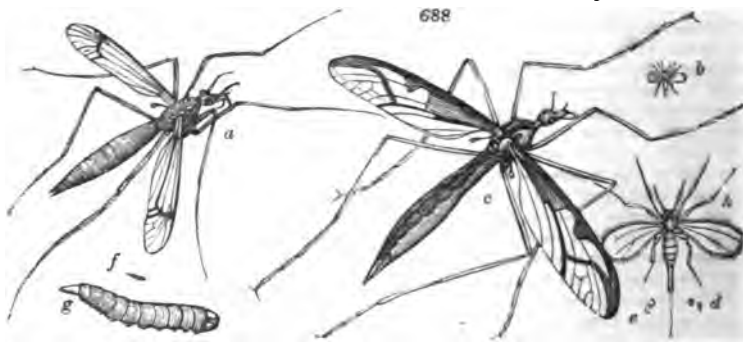
3085. *Dipterous insects, more particularly injurious to animals*, are the whole family of whane flies (*Tabánidae*), gad-flies (*Æstridæ*), and horse-flies (*Hippoboscidae*). The first of these are excessively troublesome to horses and travellers during summer; the valves of their mouths resemble lancets, which they dart into the flesh and immediately draw blood. The *Tabanus bovinus* (fig. 687. l) and the *Hæmatopota pluvialis* (k) are particularly annoying. Of the gad flies, there are several species, each appropriated to a particular animal. Thus, the horse-bee (*Æstrus Equi* Clark, a, b), in its larva state (c), inhabits the anal passage of the horse, and is known among farmers by the name of bots: the chrysalis state is passed in the ground, and the perfect fly (a b) appears in the beginning of August. The gad-fly of the ox (*Æstrus Bovis*, d) appears towards the end of summer; the larvæ (e) are called by country people warbels or wornils; they are found beneath the skin on the backs of cattle, and occasion large tumours; the chrysalis (f), like that of the last species, undergoes its change in the ground. Sheep



are infested by another gad-fly (*E. Ovis*, *g*'), the grub of which (*k*) takes its station in the frontal sinuses, and when full grown it falls through the nostrils; it changes to a chrysalis (*i*), and in two months becomes a fly (*g*). The horse-flies (*Hipp. equina*) (*fig. 689. l*) cause much distress to horses in the vicinity of the New Forest, and handbills may sometimes be taken off the groins and other parts not well covered with hair.

3086. *Dipterous insects, injurious to vegetables in their larva state, are numerous.* To begin with those most pernicious in the garden, we may mention that radishes are devoured by the larva of a small fly (*Musca radicum* *L.*); and that cauliflowers are often attacked by another, which lays its eggs in that part of the stalk covered by the earth, and the maggots when hatched, either occasion the plant to wither and die, or to produce a worthless head. Onions are frequently much injured by the larvæ of a small fly, which Mr. Kirby has named *Scatophaga ceparum*; and Resumur gives the history of a fly (*Eristalis narcissi*) which resides within the roots of the narcissus, and destroys them.

3087. *The different crane-flies (Tipulidæ) comprise several insects, more or less destructive, in their larva state, to the labours of the agriculturist, though not very prejudicial to the gardener.* The largest of these is the *Pedicia rivæa* (*fig. 688. c*), known

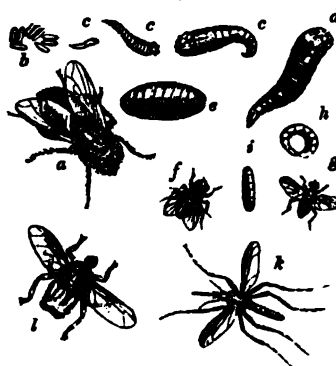


to country people by the whimsical name of gaffer long-legs. Two other species, in their larva state, are confounded with this under the common appellation of the grub. The first belongs to *Tipula oleracea*; it is sometimes very prejudicial to grass in low marshy grounds, and sometimes even to grain. In France, it has been known to destroy the grass in whole districts; and in England, it sometimes cuts off a large proportion of those wheat crops that have been raised upon clover-lays. The other is the larva of *Tipula cornicina*, which, in the year 1813, destroyed hundreds of acres of pasture in Holderness. *Tipula crocata* (*a*) lives in the same manner, but is much less hurtful. But no dipterous insect is more injurious to corn than a small crane-fly of an orange colour, named by Mr. Kirby, *Cecidomyia tritici* (*fig. 688. b*). The female, which is best seen when magnified (*h*), introduces its long retractile ovipositor into the centre of the wheat-flower, and has been known to deposit twelve of her eggs (*d*) in a single ear of the plant. These, being hatched, produce a very small larva (*f*), which, when magnified (*g*), resembles a large maggot: it feeds upon the pollen, prevents the impregnation

of the grain, and thus frequently destroys a twentieth part of the crop. (*Linn. Trans.*) Rye, in the same manner, is attacked by another fly, though of a different genus (*Musca pumilionis*): it inserts its eggs into the heart of the plant, and the larvæ occasions so many to perish, that from eight to fourteen are lost in a square of two feet: this, and *Cecidomyia tritici*, have been mistaken by many writers for that terrible insect, the Hessian fly, but which, fortunately for this country, still remains confined to America.

3088. The other flies that may be noticed in this place are the flesh fly, the cheese fly, and the gnat. The first (fig. 689. a) is well known to deposit its eggs (b) both on raw and cooked meat, when the slightest symptoms of taint begin to appear; the young larvæ are at first very small (c), but progressively increase in size; and when full grown (d), quit the interior of their loathsome habitation, and, burrowing beneath it, change into an oval, smooth chrysalis (e), of a deep chestnut colour. Leuwenhœk has calculated that the eggs of a pair of these insects, in two generations (which would be produced in three months), would give the astonishing number of 700,000 descendants. The cheese fly (*M. putris*) (g) in its maggot state (h) is well known to house-

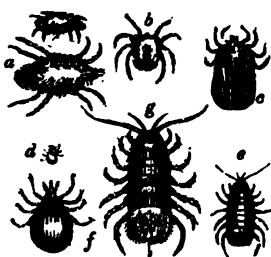
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wives by the name of hopper: the chrysalis (i) is oval, smooth, and brittle, and the perfect insect is a deep black, with very clear wings. The common gnat (*Culex pipiens*) (fig. 689. k), as a larva, resides in water; and hence the winged insect is always most abundant near low and marshy places. It is not generally known that the common musquito of North and South America, and of Europe, has every appearance of being the same species as that found in England. There are, however, many other distinct, though less common, species in the south of Europe; and others in America, ornamented with beautiful metallic colours.

3089. In the Apterous or wingless class of insects, there are a few which demand attention from their hurtful qualities; these we shall notice, without entering into the natural arrangement of the tribes. The red spider or mite (*Acarus telarius*) (fig. 690. a) is the most injurious, as it infests the pine-apple, and other choice fruits, no less than plants. Washing both sides of the leaf with Read's, or any other approved syringe, is considered the most efficient remedy; but the insects dashed to the ground by the stream of water thus directed against them, must be afterwards carefully sought after and killed; otherwise they will again ascend the plant. Another mite (*A. holosericeus* L.) (b) has also been called the red spider: both these are very small, and may be destroyed in the same manner. Carrots and parsneps are often much injured by a small centipede (*S. eléctrica* L.), and the different kinds of ringworms (*Illi* L.); all of which form their habitations within the roots. The wireworm, as before stated, does not belong to this order. The sheep-tick (*Mel. ovinus*) (c) is much larger than the dog-tick (d); though the last, when magnified (f), is obviously

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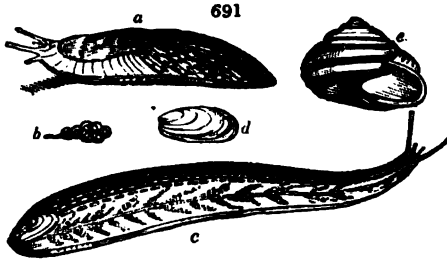
much like it. Both insects fasten themselves upon and suck the blood of their respective animals. The woodlouse (*Oniscus*) lives secluded from the light, and does little or no mischief, feeding principally upon vegetables and roots already in a state of decay. Another species (*O. aquaticus* L.) (fig. 690. e) is aquatic; it is of a small size, but when magnified (g) somewhat resembles the other. Spiders, notwithstanding the prejudices of many people, are useful in catching and devouring insects.

3090. Worms (*Vermes* L.) are distinguished from apterous and winged insects by being altogether destitute of legs at every period of their existence. It will be sufficient, for our present purpose, to divide them into two artificial groups: naked worms, which will include the earth or dew worms, and the different species of slugs; and shelly worms, or those provided with a shelly covering, such as the garden and banded snails.

3091. The earth-worm (*Lumbricus terrestris* L.), unless existing in great numbers, cannot be ranked among injurious animals, notwithstanding the prejudices entertained by farmers and gardeners against them. They perforate the earth in every part; and, by thus preparing it to receive moisture, accelerate the progress of vegetation. Worms

are considered, even to a proverb, as the meanest of beings; but without them the world would be a desert, and neither animal nor vegetable life could be supported.

3092. *Slugs* are the greatest pests to all cultivated plants and roots, upon which they alone feed. Many species are found in Britain; that most common is the *Limax agréstit* (fig. 691. a), or small grey slug: its eggs (b) are small, round, somewhat trans-



parent, and nearly white; they are deposited in small groups under the ground, and are generally hatched very early in spring. Slugs are well known as particularly injurious to the young shoots of wheat, and the early leaves of turnips, and all garden plants. Crows, rooks, and other birds, search for slugs, and devour them at all seasons.

3093. *A particular kind has recently been discovered in this country, called the shell-slug* (*Testacellus Maugei* Fer.) (c). It was found in some of the gardens near Bristol, by Mr. Miller of that city, and is remarkable for feeding upon earth-worms, without attacking vegetables. On this account it may be usefully introduced, where, from particular circumstances, those animals have propagated too much. This genus is known from all other slugs by having a thin oval shell (d) attached to the hinder part of the body. At Bayswater, and some other places in the neighbourhood of London, another species abounds, which has been denominated by Férussac, *Limax Sowérbyi*. It will be found figured and described in the *Magazine of Natural History*, vol. v. p. 694.

3094. *Snails are slugs covered by a shell.* The two species most commonly met with in gardens, are the large garden snail (*Hélix aspersa* Gm.), and the small banded or variegated snail (*Hélix nemoralis* L.) (e). Both these seek the same food as the slug. In wet or moist weather, they may be found crawling upon the ground; but during warm days, they are either concealed on the under surface of the leaves, or shelter themselves close to the roots.

SUBJECT. 2. Operations for subduing noxious Animals.

3095. *The operations under this head, relative to quadrupeds and birds, have already been noticed, § 3038, 3039.*

3096. *The operations for destroying insects, or counteracting their injurious effects, are our next consideration.* These are so numerous, that, were we to enumerate all that have been recommended by writers on agriculture and gardening, it would excite astonishment that all the races of injurious insects had not been exterminated long ago; or, at least, that any should appear in such an undue proportion, as to baffle our immediate efforts to subdue them. Yet the case is far different; and up to this moment we must confess that no one department, either of agriculture or gardening, is so little understood, or has been so little attended to, as that which relates to the present subject. The reasons for this will be evident, when it is remembered, that to check or counteract the operations of these numerous depredators with any success, a knowledge of the peculiar habits and economy of each species is first to be acquired; without this, little good can be done, and the cause not being well understood, the remedy is administered at random. Add to this, the lamentable ignorance of most gardeners respecting the names and economy of the insects almost daily before their eyes, and whose depredations they are constantly suffering from. Thus, a small beetle, which infests the turnips, in some counties has got the name of the flea; in other counties it is called a fly, and by many farmers, the black jack. The aphides are known to some as green flies, and to others as plant-lice. To this cause must also be attributed the failure of remedies or preventatives; many excellent in themselves, but which, by not being well timed, have proved ineffectual, and have thus been brought into disrepute. It may be said, and perhaps with justice, that this subject comes within the province of the naturalist, rather than within that of the agriculturist or gardener, who are to look to him for scientific information, and for effective remedies, arising from a knowledge of the respective economy of insects. Hitherto, however, this information has not been given by naturalists, except in some partial instances, where it has been attended with great and peculiar advantages.

3097. *The young gardener should therefore devote his leisure to acquiring a perfect knowledge of the general forms which belong to insects; of the changes they undergo; and of the primary divisions into which they have been formed by modern naturalists:*

he will thus know what are hurtful in all stages of their growth, and what only at particular times; and he will be able to communicate his ideas, in language intelligible to others.

3098. *If any particular insect is peculiarly injurious*, he must watch its progress, note the manner of its feeding, the time it passes in its larva and pupa state, and the period of its becoming a perfect insect. This knowledge he will ever after be able to apply towards subduing or mitigating the injury; or, if the advice of a scientific naturalist be desired, he will thus have materials upon which a sound judgment may be given.

3099. *Beneficial insects should be encouraged*, as small, though powerful, auxiliaries in subduing those which are injurious. Were it possible to breed or domesticate in any way the lady-cow, our gardens would no longer be overrun with plant-lice (aphides). All the small and early wasps are highly useful in clearing fruit trees of innumerable small caterpillars; and that thousands of insects are annually the food of sparrows and other small birds, has already been mentioned.

3100. *The operations which, in a general way, may be directed to the removal of insects*, may be considered as of three kinds;—preventives, palliatives, and efficient processes.

3101. *The preventive operations* are those of the best modes of culture, as relates to the choice of the seed or plant, soil, situation, treatment, and climate. The four first are under the control of man, and an attention to them will undoubtedly lessen the risk of having injured crops; but, as regards climate and weather, neither foresight nor solicitude can avail any thing.

3102. *The palliative operations* are numerous, and some may be considered as tolerably efficient. Most insects will be injured, and in part destroyed, by artificial bad weather, such as excessive waterings (when the plants will bear it), stormy application of water with a syringe, and violent wind produced by shaking the tree or plant: by these means many insects will be bruised; and others, that are shaken to the ground, can there be destroyed.

3103. *Insects may be further injured by watering the plants upon which they feed with water tinctured either with tobacco, tar, or lime: or by scattering upon the leaves powdered quicklime, soot, ashes, barley awns, &c.*

3104. *The smell of tar* is particularly offensive to most insects; and the effects produced upon them by the fumes of tobacco, sulphur, urine, &c., are well known. Plants, whose leaves are fully expanded, will not be injured by water heated to 130 or 130 degrees; and those without leaves will bear being operated upon with hot water at 200 degrees.

3105. *Operations for the efficient removal or destruction of insects* are either those of enticement, hand-picking, or catching. The first is effected by placing in their way as a trap, more tempting food than that afforded by the plant from which it is desired to remove them, and may be practised on many kinds with much advantage. The late Sir Joseph Banks had the merit of first recommending and making known this plan; which may be executed in various ways.

3106. *For the wire-worm*, and other insects that feed upon the roots of vegetables, let slices of potatoes be stuck through with skewers, and then buried near the seeds or plants: the grubs will collect upon these slices during night; and by examining them in the morning, vast numbers may be captured. This is particularly recommended to proprietors of large kitchen gardens.

3107. *For slugs*, the following method may likewise be practised in extensive grounds, with similar advantage:—Mr. Kirby states, that J. M. Rodwell, Esq., to preserve some of his wheat fields from the ravages of the common grey slug (*Limax agræstis* L.) (fig. 691. a), caused a quantity of turnips, sufficient to dress eight acres, to be got together; and then, the tops being divided, and the apples sliced, the pieces were laid separately, dressing two stretches with them, and omitting two alternately till the whole field was gone over. On the following morning he employed two women to examine, and free from the slugs (which they did in a measure), the tops and slices; which, when cleared, were laid upon those stretches that had been omitted the day before. It was observed invariably, that in the stretches dressed with the turnips, no slugs were to be found upon the wheat, or crawling upon the land, though they abounded upon the turnips; while, on the undressed stretches, they were to be seen in great numbers both on the wheat and on the land. The quantity of slugs thus collected off eight acres was near a bushel." (*Int. to Ent.*, vol. i. p. 182. note.) The same method will prove equally efficacious in small gardens, by substituting cabbage leaves for turnips, laying them near the infested plants, and removing the slugs very early every morning.

3108. *Hand-picking*, in many cases, is the most effectual method to check the progress of caterpillars in small gardens or plantations; great quantities may thus be gathered of those kinds which feed upon esculent vegetables, and the dwarf fruit trees, as currants, gooseberries, &c.

3109. *Catching the perfect insect* is undoubtedly the most certain plan for preventing a renewal of the same injury the following year, for the death of one female will cut off a generation of many hundred larvæ: this plan has been recommended by P. Mosgrave, before mentioned (§ 3039.); but from the difficulty that attends its general adoption, the time that is requisite to become expert in the use of the insect net, and the uncertainty of capturing that particular moth which does the injury (all moths flying only at night), it does not appear likely to be of much practical utility. It is obvious, that if the caterpillars are numerous, twenty may be picked in the same time that two moths might be caught, and thus the advantage of one operation over the other is as two to twenty.

3110. *Dressing with lime* is, perhaps, the most generally beneficial operation that has yet been proposed, provided it be done at the proper season; and as this depends entirely upon the economy of the insect whose depredations it is intended to counteract, no general rules can be laid down, excepting the two following: viz. first, that it should be done when the leaves are wet; and, secondly, that it should be repeated frequently, and at judicious intervals.

3111. *More particular instructions* for destroying insects will be found in the practical part of the work, where we shall notice those species peculiar to certain plants or trees.

3112. *The young gardener*, after having made himself well acquainted with the elements of entomology, will derive much additional information from the perusal of Kirby and Spence's *Introduction to Entomology*, and the study of Samouelle's *Entomologist's Useful Compendium*.

SUBJECT. 3. *Operations relative to Diseases and other Casualties.*

3113. *The subject of the accidents and diseases to which plants are liable* has been treated on in the "Study of the Vegetable Kingdom" (Part II. Book I. Chap. IX.); and it there appeared, that very little could be done by art in curing diseases; but that much might be done to prevent them by regimen and culture, and something to the healing of wounds by amputation and exclusion of air.

3114. *The operations for the cure of accidents* are chiefly cutting off injured parts, supporting, and coating over. Amputation must be performed with suitable instruments, and so as to leave a smooth section calculated to throw off the water. In cutting out large wounds which are deep, the chisel will require to be used; and in cutting off diseased or injured parts from small and delicate plants, a very sharp knife. Supporting the stem or trunk of bruised and wind-shaken trees, or such as are otherwise injured or rendered less secure in their general structure, is an obvious operation, and requires to be done promptly and effectually. It is also requisite in the case of cutting out such deep wounds as may endanger the stems or branches of trees or plants exposed to the free air.

3115. *Coating over wounds to exclude air* is a useful practice; and though it may be dispensed with in the case of small wounds on healthy plants, ought never to be neglected in the case of large wounds on any description of plants, or small ones made on such as are sickly. The usual application is now clay and loam, made so thin as to be laid on with a brush, and two or three coats may be given. On large wounds, paint, or putty and paint, may be used; and in the case of deep hollow wounds, the part may be filled up with putty, or putty and small stones, for the sake of saving the former, and then made smooth and well painted. A composition of tar and tallow is also recommended as being very efficacious. (See *Gard. Mag.*, vol. viii. p. 150.)

3116. *The operations for curing diseases* are few, besides those for the cure of accidents. Washes are applied by the sponge, brush, syringe, or watering pot, for filth, mildew, and blight; and for the two latter diseases, sulphur, or powdered lime, is sometimes added by dredges, or the hand while the plant is wet. Slitting the bark is the operation for hide-bound trees; and peeling off the outer, rough, and already separating bark, by scraping-irons and bark-scalers, is resorted to in the case of old trees, as cutting out is in the case of canker. In scaling off care must be taken not to injure the inner bark; and in cutting out for canker, sharp instruments must be used, and a coating applied. (See 2138. to 2165.)

SECT. IX. *Operations of Gathering, Preserving, and Keeping.*

3117. *Gathering, preserving, and keeping vegetable productions*, form an important part of the horticultural division of gardening. Some productions, after being reared and perfected, are to be gathered for immediate consumption; but a part require to be preserved in a state fit for culinary purposes; or for sowing or dispersing; or sending to a distant market, family, or friend.

3118. *Gathering vegetables or their different parts* is, in part, performed with a knife, as in cutting off some fruits, as the cucumber, or heads of leaves, as the cabbage; and in part by fracture or torsion with the hand, as in pinching off strawberries between the

finger and thumb; gathering peas, with one hand applied to retain the stem firm, and the other to tear asunder the peduncle, &c. In all cases of using the knife, the general principle of cutting is to be attended to, leaving always a sound section on the living plant. Gathering with the hand ought to be done as little as possible, as there are now garden-pincers for all such purposes, which do the work quicker, with far less injury to the plant, and more regard to cleanliness. Sometimes the entire plant is gathered, as in celery and onions; and at other times only the root or tuber, as in potatoes and carrots. In taking up these, care must be taken not to injure their epidermis, as on the preservation of this depends their retention of juices, beauty, and keeping.

3119. *The gathering of hardy fruits* should take place "in the middle part of a dry day; not in the morning, before the dew is evaporated, nor in the evening, when it begins to be deposited. Plums readily part from the twigs when ripe: they should not be much handled, as the bloom is apt to be rubbed off. Apricots may be accounted ready, when the side next the sun feels a little soft upon gentle pressure with the finger. They adhere firmly to the tree, and would over-ripen on it and become mealy. Peaches and nectarines, if moved upwards, and allowed to descend with a single jerk, will separate, if ready; and they may be received into the peach-gatherer (fig. 410.) or any tin funnel lined with velvet, so as to avoid touching with the fingers or bruising. The old rule for judging of the ripeness of figs, was to observe if a drop of water was hanging at the end of the fruit; a more certain one is, to notice when the small end becomes of the same colour as the large end. The most transparent grapes are the most ripe. All the berries on a bunch never ripen equally; and it is therefore proper to cut away unripe or decayed berries before presenting the bunches at table. Autumn and winter pears are gathered, when dry, as they successively ripen. The early varieties of apples begin to be useful for the kitchen in the end of June; particularly the codlins and the jenneting; and in July they are fit for the dessert. From this time till October or November, many kinds ripen in succession. The safest rule is to observe when the fruit begins to fall naturally. Another easy mode of ascertaining, is to raise the fruit level with the foot-stalk; if ripe, it will part readily from the tree: this mode of trial is also applicable to pears. A third criterion is to cut up an apple of the average ripeness of the crop, and examine if its seeds have become brown or blackish; if they remain uncoloured, the fruit is not ready for pulling. Immature fruit never keeps so well as that which nearly approaches maturity; it is more apt to shrivel and lose flavour. Winter apples are left on the trees till there is danger of frost: they are then gathered on a dry day." (*Ed. Encyc., art. Hort.*) In no case should fruit be gathered with the hand, when any of the different descriptions of fruit-gatherers (figs. 403. to 412.) can be used. With one or other of these, and the use of proper ladders (figs. 499. to 503.) every kind of fruit, from the gooseberry to the walnut, may be gathered, without bruising, soiling, or fingering the fruit, and without injuring the tree.

3120. *The gathering of seeds* should take place in very dry weather, when the seed-pods, by beginning to open, give indications of perfect ripeness. Being rubbed out with the hand, beaten with a stick, or passed through a portable threshing-machine, they are then to be separated by sieves and fanners from their husks, &c. and spread out in a shaded airy loft till they are so dry as to be fit for putting up in linen or paper bags, or placing in drawers in the seed-room till wanted.

3121. *Preserving heads or leaves of vegetables* is effected in cellars or sheds, of any temperature, not lower, nor much above, the freezing point. Thus cabbages, endive, chicory, lettuce, &c. taken out of the ground with their main roots, in perfectly dry weather, at the end of the season, and laid in, or partially immersed in sand or dry earth, in a close shed, cellar, or ice-cold room, will keep through the winter, and be fit for use till spring, and often till the return of the season of their produce in the garden. The German gardeners are expert at this practice; and more especially in Russia, where the necessities being greater, have called forth greater skill and attention.

3122. *Flowers and leaves for decoration* may be preserved by drying between leaves of paper, or in ovens; or imbedded in their natural position in fine dry sand, placed in that state in an oven. In this pot of sand they will keep for years; but they must not be taken out till wanted. When at a little distance, it will be difficult to distinguish them from such as are fresh gathered. A rose is cut when the petals and leaves are perfectly dry, a little sand is put in the bottom of the flower-pot, the rose is stuck in the sand, and sand is then slowly sprinkled in till the rose be covered and the pot filled. At Paris and Milan the more popular flowers are frequently preserved in this way.

3123. *Roots are preserved* in different ways, according to the object in view. Tuberous roots, as those of the Georgina, pæonia, tuberose, &c., intended to be planted in the succeeding spring, are preserved through the winter in dry earth, in a temperature rather under than above what is natural to them. So may the bulbous and tuberous roots of commerce, as hyacinths, tulips, onions, potatoes, &c.; but for convenience, these are

kept either loose in cool dry shelves or lofts, or the finer sorts in papers, till the season of planting.

3124. *Potatoes, turnips, and all similar roots*, which it is desired to preserve in a dormant or unvegetating state beyond the season of planting, have only to be sunk in pits to a depth sufficient to prevent that vegetation from taking place. A pit filled with these roots to within five feet of the surface, and the remainder compactly closed with earth, and kept quite dry, will keep one or more years in a sound state, and without vegetating. (*Farmer's Mag.*) For convenience of using, there should be a number of small pits, or rather of large pots, of roots, so buried at a little distance from each other, that no more may be taken up at a time than what can be consumed in a few days. The mould or compost ground will, in general, be found a convenient scene for this operation; and, for a small family, pots contrived with covers, or with their saucers used as covers, may be deeply immersed in a large shaded ridge of earth, to be taken up, one at a time, as wanted. Grain, apples, and potatoes are kept the whole year in deep pits, in sandy soil, formed in the village-greens of some parts of Galicia and Moravia, and in banks and rocks in Spain. Oldacre informs us, in his account of his mushroom-house (*Hort. Tr.*, vol. ii.), that he preserved broccoli in it through the winter; and Henderson, of Brechin, makes use of the ice-house for preserving "roots of all kinds till the return of the natural crop." "By the month of April," he says, "the ice in our ice-house is found to have subsided four or five feet; and in this empty room I deposit the vegetables to be preserved. After stuffing the vacuities with straw, and covering the surface of the ice with the same material, I place on it case-boxes, dry ware casks, baskets, &c.; and fill them with turnips, carrots, beet-roots, celery, and, in particular, potatoes. By the cold of the place vegetation is so much suspended, that all these articles may be thus kept fresh and uninjured, till they give place to another crop in its natural season."

3125. *Green fruits* are generally preserved by pickling or salting, and the operation is performed by some part of the domestic establishment; but in some countries it is made the province of the gardener, who, in Poland, preserves cucumbers and kohlrabi by salting, and then immersing them in casks at the bottom of a deep well, where the water, preserving nearly the same temperature throughout the year, impedes their decay. It must be confessed, however, that vegetables so preserved are only fit to be eaten with animal food, as preserved cabbage (*i. e.* sour-cROUT) or other salted legumes.

3126. *Such ripe fruit* as may be preserved is generally laid up in lofts and bins, or shelves, when in large quantities, and of baking qualities; but the better sorts of apples and pears are now preserved in sets of drawers (*fig. 612.*), sometimes spread out in them, at other times wrapt up in papers; or placed in pots, cylindrical earthen vessels, among sand, moss, paper, chaff, hay, sawdust, &c., or sealed up in air-tight jars or casks, and placed in the fruit-cellar. (2575.) The finest pears, as the *crasannes* and *chaumontelles*, may have their footstalk previously tipped with sealing-wax, as practised in France and the isles of Jersey and Guernsey.

3127. *Hilt's method of keeping pears* may be here mentioned. Having prepared a number of earthenware jars, and a quantity of dry moss (different species of *Hypnum* and *Sphagnum*), he placed a layer of moss and of pears alternately till the jar was filled; a plug was then inserted, and sealed round with melted rosin. These jars were sunk in dry sand to the depth of a foot; preferring a deep cellar for keeping them to any fruit-room.

3128. *Miller*, after sweating and wiping pears, — in which operations, he says, great care must be taken not to bruise the fruit, — packs them in close baskets, having some wheat-straw in the bottom and around the sides to prevent bruising, and a lining of thick soft paper to hinder the musty flavour of the straw from infecting the fruit. Only one kind of fruit is put in each basket, as the process of maturation is more or less rapid in different kinds. A covering of paper and straw is fixed on the top, and the basket is then deposited in a dry room, secure against the access of frost, "and the less air is let into the room, the better the fruit will keep." A label should be attached to each basket, denoting the kind of fruit; for the basket is not to be opened till the fruit be wanted for use.

3129. *James Stewart* preserves his choice apples and pears in glazed earthenware jars, provided with tops or covers. In the bottom of the jars, and between each layer of fruit, he puts some pure pit-sand, which has been thoroughly dried on a fire. The jars are kept in a dry airy situation, as cool as possible, but secure from frost. A label on the jar indicates the kind of fruit; and when this is wanted or ought to be used, it is taken from the jars, and placed for some time on the shelves of the fruit-room. The less ripe fruit is sometimes restored to the jars, but with newly dried sand. In this way he preserves *colmars* and other fine French pears till April; the *terling* till June; and many kinds of apples till July, the skin remaining smooth and plump. Others, who also employ earthenware jars, wrap each fruit in paper, and, in place of sand, use bran. (*Ed. Encyc.*, art. *Hort.*)

3130. *Ingram*, at Torry, in Scotland, finds, that for winter pears two apartments are requisite, — a colder and a warmer; but the former, though cold, must be free from damp. From it the fruit is brought into the warmer room, as wanted; and by means of increased temperature, maturation is promoted, and the fruit rendered delicious and mellow. *Chaumontelles*, for example, are placed in close drawers, so near to a stove, that the temperature may constantly be between 80° and 70° Fahr. For most kinds of fruit, however, a temperature equal to 55° is found sufficient. The degree of heat is accurately determined by keeping small thermometers in several of the fruit drawers at different distances from the stove. The drawers are about six inches deep, three feet long, and two broad; they are made of hard wood, fir being apt to spoil the flavour of the fruit. They are frequently examined, in order to give air, and to observe the state of the fruit, it being wiped when necessary. *Ingram* remarks, that, in Scotland particularly, late pears should have as much of the tree as possible, even although some frost should supervene; such as ripen freely, on the other hand, are plucked rather before they reach maturity.

3131. *Winter apples* are laid in heaps, and covered with mats or straw, or short cut grass well dried.

Here they lie for a fortnight or more, to *sweat*, as it is called, or to discharge some of their juice; after which the skin contracts in a certain degree. They are next wiped dry with a woollen cloth, and placed in the fruit-room. Sometimes, when intended for winter dessert fruit, they are made to undergo a farther sweating; and are again wiped and picked: they are then laid singly on the shelves, and covered with paper. Here they are occasionally turned, and such as show any symptoms of decay are immediately removed.

3132. *In the garden of the Horticultural Society* pears and apples are found to keep longest when packed in dried fern, and placed in a dry shed or cellar, where very little change of temperature takes place.

3133. *The sweating of fruit* is entirely disapproved by some, who affirm, that it thereby acquires a bad flavour, or, at any rate, that the natural flavour of the fruit is deteriorated, and that it gets dry and mealy. They consider it better to carry the fruit directly from the tree, carefully avoiding all sort of bruising, and to lay it thinly on the shelves of the fruit-room; afterwards wiping each fruit, if necessary. The room, they say, should be dry, and the only use that should be made of a stove, is to take off the damp. Such is the prevailing practice at the present time. From what we have observed in the practice of such as are successful in preserving bread corn, and other seeds, as acorns, nuts, &c., we are inclined to think that sweating, by getting rid of a quantity of moisture, must, to a certain extent, be a beneficial practice. Marshall, and most French gardeners, and English gardeners of the last century, are in favour of the practice, and those of the present day are against it.

3134. *Knight's experience in preserving fruits*, with the rationale of his practice, is given in the following valuable extract:—

3135. *Fruits which have grown upon standard trees, in climates sufficiently warm and favorable to bring them to maturity*, "are generally more firm in their texture, and more saccharine, and therefore more capable of being long preserved sound, than such as have been produced by wall-trees; and a dry and warm atmosphere also operates very favourably to the preservation of fruits, under certain circumstances, but under other circumstances very injuriously: for the action of those elective attractions which occasion the decay and decomposition of fruits, is suspended by the operation of different causes in different fruits, and even in the same fruit, in different states of maturity. When a grape is growing upon the vine, and till it has attained perfect maturity, it is obviously a living body, and its preservation is dependent upon the powers of life; but when the same fruit has some time passed its state of perfect maturity, and has begun to shrivel, the powers of life are probably no longer, or at most very feeble, in action; and the fruit appears to be then preserved by the combined operation of its cellular texture, the antiseptic powers of the saccharine matter it contains, and by the exclusion of air by its external skin; for if that be destroyed, it immediately perishes. If longer retained in a dry and warm temperature, the grape becomes gradually converted into a raisin; and its component parts are then only held in combination by the ordinary laws of chemistry."

3136. *A nonpareil apple, or catillac d'Auch, or bergamotte de Bugi pear*, "exhibits all the characters of a living vegetable body long after it has been taken from the tree, and appears to possess all the powers of other similar vegetable bodies, except that of growing, or vitally uniting to itself other matter; and the experiments which I shall proceed to state, prove that the pear is operated upon by external causes nearly in the same manner after it has been detached from the tree, as when it remains vitally united to it."

3137. *Most of the fine French pears*, "particularly the pear d'Auch, are much subject, when cultivated in a cold and unfavourable climate, to crack before they become full-grown upon the trees, and, consequently, to decay before their proper season or state of maturity; and those which present these defects in my garden are therefore always taken immediately from the trees to a vinery, in which a small fire is constantly kept in winter, and they are there placed at a small distance over its flue. Thus circumstanced, a part of my crop of Auch pears ripen, and will perish, if not used, in November, when the remainder continue sound and firm till March or April, or later; and the same warm temperature which preserves the grape in a slightly shrivelled state till January, rapidly accelerates the maturity, and consequent decay, of the pear. By gathering a part of my swan's-egg pears early in the season (selecting such as are most advanced towards maturity), and subjecting them, in the manner above mentioned, to artificial heat, and by retarding the maturity of the later part of the produce of the same trees, I have often had that fruit upon my table nearly in an equal state of perfection from the end of October to the beginning of February; but the most perfect, in every respect, have been those which have been exposed in the vinery to light and artificial heat, as soon as gathered."

3138. *The most successful method of preserving pears and apples*, "which I have hitherto tried, has been placing them in glazed earthen vessels, each containing about a gallon (called, provincially, steens), and surrounding each fruit with paper; but it is probable that the chaff of oats, if free from moisture or any offensive smell; might be used with advantage instead of paper, and with much less expense or trouble. These

vessels, being perfect cylinders, about a foot each in height, stand very conveniently upon each other, and thus present the means of preserving a large quantity of fruit in a very small room; and if the spaces between the top of one vessel and the base of another be filled with a cement composed of two parts of the curd of skimmed milk, and one of lime, by which the air will be excluded, the later kinds of apples and pears will be preserved with little change in their appearance, and without any danger of decay, from October till February and March. A dry and cold situation, in which there is little change of temperature, is the best for the vessels; but I have found the merits of the pears to be greatly increased by their being taken from the vessels about ten days before they were wanted for use, and being kept in a warm room; for warmth, at this as at other periods, accelerates the maturity of the pear. The same agent accelerates its decay also; and a warmer climate cannot contribute to the superior success of the French gardeners; which probably arises only from the circumstance of their fruit being the produce of standard or espalier trees."

3139. *Preserving ripe fruit by retaining it on the tree or on detached shoots.* Some fruits may be preserved through the winter by allowing them to hang on the tree in a moderate climate, somewhat above the freezing point. Vines are sometimes so preserved; and Diel mentions that frequently on the nonpareil pippin, planted in pots, and kept under glass, without any fire-heat, he has had the fruit hanging on the tree till the ripening of the succeeding crop. Arkwright (*Hort. Trans.*, vol. iii. p. 97.), by late forcing, retains plump grapes on his vines till the beginning of May, and even later, till the maturity of his early crops. In this way he gathers grapes every day in the year. By covering some sorts of cherry, plum, gooseberry, and currant trees, either on walls or as bushes, with mats, the fruit of the red and white currant, and of the thicker-skinned gooseberries, may be preserved to Christmas and later. Grapes, in the open air, may be preserved in the same manner; and peaches and nectarines may, in this way, be kept, a fortnight hanging on the trees after they are ripe.

3140. *Preserving ripe fruit in air-tight vessels, in a low temperature,* is perhaps the most effectual and certain mode, at least with the more hardy fruits. Apples and pears, placed in jars or pipkins in which butter had been kept, have been closely sealed up, and placed in a cellar in a temperature never below 32°, and not exceeding 42°, for a year, and found in perfect order for eating. (Druidick, in *Hort. Trans.*, vol. iii.; *Encyc. Brit. Supp.* art. *Food*.)

3141. *Preserving fruit, by gathering it before it is ripe, and then retarding its ripening.* Retarding the wasting or decay of fruit or vegetables gathered for use, is effected by burying them in boxes in the soil, immersing them in deep wells, or, as already stated, placing them in an ice-house, or an ice-cold room. Ripe peaches may thus be kept a week, and other fruits longer; pears, cauliflowers, salads, &c. preserved in a fresh state for some days, and potatoes and other tubers and bulbs for a long period, both fresh and without growing.

3142. *Seeds.* When seeds are to be preserved longer than the usual period, or when they are to be sent to a great distance, various devices have been adopted to preserve their vitality. Sugar, salt, tallow, cotton, sawdust, sand, clay, paper, &c. have been adopted with different degrees of success.

3143. *Livingston*, who, from a long residence in China, is well informed on the horticulture of the Chinese, states, that "from April to October, rain is so frequent in China, and the air is generally so moist, that it is nearly impossible to preserve seeds. If excluded from the air they are quickly covered with mildew, and when exposed, no less certainly destroyed by insects." He proposes to dry Chinese seeds by means of sulphuric acid, in Leslie's manner, which he found dried "small seeds in two days, and the largest seeds in less than a week. Seeds thus dried," he observes, "may be afterwards preserved in a vegetating state for any necessary length of time, by keeping them in an airy situation, in common brown paper, and occasionally exposing them to the air in a fine day, especially after damp weather. This method will succeed with all the larger mucilaginous seeds. Very small seeds, berries, and oily seeds may probably require to be kept in sugar, or among currants or raisins." (*Hort. Trans.*; vol. iii. p. 184., and the article *Cold*, in *Supp. Encyc. Brit.*) Seeds may be preserved and sent to a distance with safety, if, after being thoroughly matured and dried, they are enveloped or baked into a large ball of loam, or enveloped in charcoal, or any other non-conducting material.

3144. *Roots, cuttings, grafts, and perennial plants in general* are preserved, till wanted, in earth or moss, moderately moist, and shaded from the sun. The same principle is followed in packing them to be sent to a distance. The roots or root-ends of the plants or cuttings are enveloped in balls of clay or loam, wrapped round with moist moss, and air is admitted to the tops, or the root ends are stuck in a potato, turnip, or apple. In the former way orange trees are sent from Genoa to any part of Europe and North America in perfect preservation; and cuttings of plants sent any distance which can be

accomplished in eight months, or even longer with some kinds. Scions of the apple, pear, &c., if enveloped in clay, and wrapped up in moss or straw, and then placed in a portable ice-house, so as to prevent a greater heat than 32° from penetrating to them, would, there can be little doubt, keep a year, and might thus be sent from England to Australia or China. Knight found that the buds of fruit trees might be preserved in a vegetating state, and sent to a considerable distance, by reducing the leaf-stalks to a short length, and enclosing the shoot in a double fold of cabbage-leaf, bound close together at each end, and then enclosing the package in a letter. "It was found advantageous to place the under surface of the cabbage-leaf inwards, by which the enclosed branch was supplied with humidity, that being the perspiring surface of the leaf, the other surface being nearly or wholly impervious to moisture." (*Hort. Trans.*, vol. iv. p. 403.)

3145. *Packing and conveying plants in pots.* Plants in pots are packed among moss in boxes, with their tops covered with a net, and sent to any distance where the climate will not injure them, and where water is supplied. Where the climate is severe, they are covered with a glazed tegument, and thus glass cases or temporary hot-houses are employed in ships to carry tender plants from this country to the colder colonies, and to bring plants from the warmer colonies home. Stove-plants are also transported from France, Holland, and Hamburg into Germany and Russia, in waggons with glass covers.

3146. *In packing plants for importation,* much more care is requisite than has in general been bestowed on the subject. "It is thought enough," Lindley observes (*Hort. Trans.*, vol. v. p. 192.), "to tear a plant from its native soil, to plant it in fresh earth, to fasten it in a wooden case, and put it on board a vessel." Nothing can be more erroneous: preparatory to packing, the plants should have their roots well established in pots or boxes, which may, in woody kinds, require from one to three months. Boxes with proper perforations in the bottom are better than pots, because less liable to break, and of less weight. When the period for embarking them arrives, they should be placed in wooden cases, the tops of which must be capable of being opened, and should slope both ways, like the roof of a double green-house. These cases must be furnished with a tarpawling, fixed along their tops, and sufficiently large, when unrolled, to cover them completely, so as to protect the plants from being damaged by the salt water dashing over them in rough weather. It cannot be expected that heavy cases should meet with very gentle treatment on shipboard; and it is certain they will be handled in the roughest manner by watermen, carters, and custom-house officers, after they have arrived in port. The materials, therefore, of which they are made, ought to be of a very strong description, and the joints of the lower part either secured by iron bands, or well dovetailed together. The person in charge of the cases on board should have directions never to exclude them from air and light in fine weather, unless to protect them from the cold, as the vessel makes the land, and after she is in port, or during high winds, or especially when the seamen are washing the decks; but in foul weather to close the lids down, and to unroll the tarpawling over the latter, so as to exclude the sea-spray effectually. If, notwithstanding these precautions, saline particles should become incrustated upon the leaves and stems of the plant, it is necessary that the former should be removed as soon and as carefully as possible, with fresh water and a sponge, otherwise the salt will soon kill them. The quantity of water the plants receive must be determined by what can be spared; so that no other direction for its application can be given, than to keep the mould just moist. The requisite supply of water must also depend much upon the way in which the cases are drained. The best manner in which this can be effected, is by causing holes about half an inch in diameter to be bored through the bottom of the cases and pots. Much mischief being occasionally done to collections by monkeys and parroquets on board the vessels, it is highly necessary that means should be taken to guard against their attacks.

3147. *Collections are not unfrequently injured, after they arrive in this country,* by the pots being shaken so violently as to be deprived of a large portion of their mould. Nothing can well be more destructive of vegetable life than this, which should be prevented by the pots being made square, so as to fit accurately into the bottom of the outer case. There then could be no difficulty in keeping them steady; and, if they were fastened down by cross pieces of wood, they would be secured still more completely. In addition, the surface of the mould ought to be covered deeply with coarse moss, or other similar substance (not grass), which might be secured by packthread passed frequently across the box from its sides, or by slender laths, which would be less likely to become rotten than packthread. By these means, evaporation of the watery particles which are necessary to the existence of the plants, proceeds much less rapidly than when the mould is exposed; and the latter has an additional security against being shaken out of the pots. When it happens that pots are not to be procured, the want of them must be supplied by the collection being planted in earth in the cases themselves, their bottom being

previously strewed to the depth of an inch or two with fragments of earthenware or bits of wood. In such cases, it is particularly necessary that the mould should be securely fastened down.

3148. *Parasitical Orchideæ*, or, as they are commonly called, air plants, may be transported safely to any distance, by being packed loosely in moss, and put into boxes so constructed that the plants may be exposed to a free admission of air, but protected from the sea-water.

3149. *Bulbs* travel most securely if they are packed in paper or canvass bags, they having been previously dried, till all the moisture in their outer coats is evaporated. Dry sand is a good medium for placing them in, if opportunities should not have occurred of giving them the necessary exposure to the sun. But minute bulbs, such as those of *ixias*, *gladioluses*, *oxalises*, and others of a similar kind, only require to be folded in separate little parcels without any previous preparation. *Terrestrial Orchideæ* should be transplanted when in flower, and not when their roots are in a state of rest.

3150. *Any woody or bony seeds, or capsules*, that may have been procured, should be buried among the mould in which plants are potted; or any of those seeds, the juices of which become rancid soon after gathering, such as those of the *Guttiferae*, *Magnoliaceæ*, *Sterculiaceæ*, &c. *Camellia* seeds, which are not readily transported, if sown in mould in China, will have become seedling plants before they reach this country. Acorns and walnuts may be conveyed from hot countries much better in this way than in any other. Palms, too, are better sent in this way than in bags or paper. The plants in all cases, if possible, should have numbers punched upon small pieces of thin sheet-lead, and fastened round the subjects to which they belong with fine iron or copper wire. When such lead is not to be procured, little wooden tallies should be used instead. (*Hort. Trans.*, vol. v. p. 194.)

3151. *Packing and transporting roots of plants, or entire plants in a dormant state*, is a very simple operation. When the distance does not exceed a week's journey, they are packed in straw, and covered with mats: if a longer period is required, the roots are enveloped in earth or moss; but very moist moss is not desirable, as it occasions mouldiness, and rots off the bark of the roots when it begins to dry. Regard in all cases must be had to the kind of plant, season of the year, distance, time, and mode of carriage.

CHAP. IV.

Operations relative to the final Products desired of Gardens, and Garden-scenery.

3152. *The object of gardening* is certain vegetable productions, and certain beauties and effects in respect to design and taste. We now propose to notice the general principles by which the gardener ought to be guided, in directing operations for the attainment of these ends; the mode of conducting the business of a garden in an orderly manner; and the leading points of attention, requisite to insure the beauty and order of garden scenery.

SECT. I. Of the Vegetable Products desired of Gardens.

3153. *The vegetable productions of gardens* are fruits, seeds, roots, stems, and stalks, leaves, flowers, barks, woods, and entire plants.

3154. *Fruits.* All plants require to attain the age of puberty, before they will produce fruits or seeds. In annuals, as in the melon, this happens in a few weeks or months; in trees, as the pear, it requires several years. The first object is to induce the production of blossom-buds; the next, to induce the blossoms to set or fecundate; and the third, to swell and ripen the fruit. New fruits are procured from seeds properly produced and selected; and are continued in trees by grafting or budding; in perennials, by slips or runners; and in annuals, by seeds. The quality of fruits is improved by abundant supplies of nourishment, by increased air, light, and heat, by pruning, thinning, and other means; their bulk by moisture; and their flavour by withholding moisture and increasing light, heat, and air. Fruit is preserved by placing it in a low dry temperature, burying it in the earth, or drying it in the sun.

3155. *Seeds* are the essential part of fruits, or constitute the entire fruit, and are produced on the same general principle. Those produced for culinary purposes in gardening are chiefly from annuals, and are used green, as the pea, bean, Indian cress, &c.; but seeds of almost all garden-vegetables are occasionally produced for the sake of propagating the species. Here attention is requisite to make choice of a proper stock, and to place it so as not to be in danger of impregnation from other allied species, which might hybridise the progeny; to thin out superfluous blossoms; to remove leafy or

barren exuberances, or bulbs, tubers, or other productions which might lessen the nourishment devoted to the production of the seed. Seeds of common forest trees are not generally subjected to such careful management as those of herbaceous vegetables or rarer trees; but, wherever the best progeny are desired, the same practices are applicable. Light, air, and a free exposure, with dry, warm weather, are essential to the proper ripening of seeds. They are preserved in dry, cool temperatures, like fruits; and, if perfectly excluded from air and moisture, will never vegetate; but the vital principle of most seeds is but of short duration.

3156. *Roots*, to be produced in perfection, require a deep, well-pulverised, pliable, porous soil, and moderate moisture. The plants should, in all cases, be prevented from bearing seeds, should have their roots thinned where practicable, and their leaves carefully preserved, and fully exposed to the sun, air, and weather. Roots are preserved by burying in the earth; by being placed in low, dry temperatures, like fruits; or by being kept dry, or dried by art; or by having their buds scooped out, when not intended for vegetation.

3157. *Leaf-stalks* are increased in size in the same way as roots, by a rich, deep, well-pulverised soil, by preventing the plant from producing blossoms, or even flower-stalks, and by thinning out weak or crowded leaves. Leaf-stalks are blanched to lessen their acrimony, as in the celery, asparagus, and chardoon, or used in a green state, as in the rhubarb and angelica. They are preserved to a certain extent in cool, dry, but well-ventilated situations; some sorts, as celery, similarly to roots. The stems of some plants, as the asparagus, are used like leaf-stalks.

3158. *Leaves*. Abundant nourishment supplied by the usual means; abundant moisture, and room for expansion of growth; free exposure to light and air; thinning, and preventing the appearance of flower-stalks, will in general insure large succulent leaves, which are sometimes used separately and green, as in the spinach and white beet; in tufted or compact heads, as in the cabbage and lettuce, or blanched, as in the endive. Leaves of the headed or tufted sorts may be preserved similarly to leaf-stalks; others, as those of most salads, require to be used immediately; while most herbs are dried, before being used, either on small kilns or ovens, or in the sun, at the time the plant begins to blossom.

3159. *Flowers*. These are produced for culinary purposes, medicine, and ornament. The principal of those grown for culinary purposes are the cauliflower and broccoli; and here the first object is to produce a large and vigorous plant, by abundant nourishment and moisture, in a temperate, moist, but not over-warm climate. Free room for the roots and leaves to extend on every side must be given, and the situation should be open and exposed to the full light of the atmosphere; though, if in very hot weather the direct influence of the sun's rays be impeded by a screen at a moderate distance, there will be less risk of over-rapid growth. When the plant is fully grown, the flower appears, and, in the case of the sorts mentioned, is gathered while the fasciculus of blossom is in embryo. Such flowers may be preserved, on the same principle as stalks and headed leaves, for a moderate period. Other flowers, used for culinary purposes, as those of the nasturtium, caper, &c., for pickling, require less attention, the object being flavour rather than magnitude.

3160. *Flowers for medical purposes* should have no culture whatever; for, in proportion as they are increased in bulk they are diminished in virtue. For ornament, flowers are enlarged, increased in number, rendered double, and variegated in a thousand ways, by excess of nourishment, peculiar nourishment, and raising from selected and curiously impregnated seed: these are called florists' flowers. Other flowers are grown for ornament, with a moderate degree of culture, which enlarges their parts generally: such are border-flowers. Others are grown, as much as possible, without producing any change in their parts, as in botanical collections, whether hardy or exotic.

3161. *Barks* produced by British gardening are applied only to one purpose, that of tanning. Little or no culture is ever given expressly to increase or improve the bark; but abundant nourishment and all the requisites of vegetable growth will increase that part of the plant in common with others. Moss, or any other cortical parasites, should be removed. Bark is best separated from the wood, when the sap is ascending with the greatest vigour, late in spring.

3162. *Woods*. The production of timber, and coppice-wood or small timber, is an important and extensive branch of gardening. Timber is propagated in various ways, but the principal sorts generally from seed, either sown where it is finally to arrive at maturity, or in nursery-gardens, and transplanted into prepared or unprepared ground. The growth of all timber may be greatly increased by culture, and especially by deeply turning over, and pulverising the soil previously to planting or sowing, and stirring it, and removing weeds afterwards. The timber is also produced in the most useful, or in any desired form, as in trunks or branches, straight or crooked, or in spray or small shoots, by pruning. But as it is chiefly desired in the form of a straight stem or trunk, pruning

is particularly useful in this respect, especially when joined to judicious thinning, to allow of the beneficial effects of air, and the motion produced by wind. Though pruning and pulverising the soil are undoubtedly of great use in hastening the growth of trees when young, and consolidating their timber as they grow old, yet planting trees in a more rich, warm, and moist soil than is natural to them, is to be avoided. The timber of the Scotch pine and the oak, grown in deep fertile valleys, or in alluvial depositions, is found to be less hard, tough, and durable, than when grown in colder situations and thinner soils. This doctrine applies more especially to the resinous tribe of timber trees, which, as every one knows, thrive best in cold regions, produced by elevation in warm countries, as in the Alps of Italy, or by high latitudes, as in Russia and Sweden. Where timber is grown for fuel, the more rapidly it is made to grow, whether by culture or the choice of species (as the willow, robinia, &c.), the greater will be the produce and profit within a given period. The preservation of timber from fungi, insects, dry rot, and natural decay, is effected by immersion in water or in earth, complete desiccation in the open air, or by saturation with corrosive sublimate of mercury.

3163. *The entire plant* is produced, in gardening, for ornament, in herbs, shrubs, and trees, but especially in exotics; sometimes for culinary purposes, as in the fungi and fuci; for purposes of general economy, as in hedge-plants; for shelter and shade, in hardy trees; and for picturesque effect, in trees and shrubs in parks and pleasure-grounds. In general, the object of culture for this purpose ought to be to give each individual plant sufficient nourishment and space fully to expand itself, and, as it were, to show and express its nature or character: but though this will often apply in hot-houses and artificial gardens, it is in general but partially accomplished, even in picturesque scenery, in the open air, where the object is connection and grouping of different objects, rather than the display of single ones; and it is inconsistent with the formation of hedges, rows, stripes, and masses.

SECT. II. *Of the Superintendence and Management of Gardens.*

3164. *Whenever the culture and management of a garden* requires more than the labour of one man, one of those employed must necessarily be appointed to arrange the labours of the rest, and, in fact, to establish a general system of management. It is only under such a system that the performance of operations can be procured in the proper season, and the objects in view be successfully attained, and at a moderate expenditure.

3165. *On being appointed to a situation as head-gardener*, the first thing to be done, in that capacity, is, to survey the extent of the field of operations, and to ascertain any peculiar products or objects desired by the master, so as to determine the number of permanent hands that will be required. Then the number of implements of every kind must be fixed on and procured, and an estimate formed of the occasional hands, men or women, that may be necessary as extraordinary assistants at particular seasons. If only two or three permanent men are required, then one of them should be appointed foreman, to act as master during absence or sickness, and to have constantly the special charge of the hot-houses, or forcing and exotic departments. If, however, the situation is of such extent as to require a dozen permanent hands, or upwards, then it will generally be found best to appoint a foreman to each department; as one to the artificial climates of the kitchen-garden, another to the open garden, one to the flower-garden and shrubbery, pleasure-ground, &c. (when there are plant-stoves and collections of florists' flowers, these departments should be divided), and one to the woods and plantations, unless there is a regular forester directly under the control of the master. To each of these foremen a limited number of permanent men should be assigned, and, when occasion requires, assistance should be allowed them, either by common labourers or women, or by a temporary transfer of hands from any of the other departments from which they can be spared.

3166. *Economical arrangements.* The next thing is to fix on the hours of labour and of rest, the amount of wages, and regulations as to lodging, &c. The hours of labour ought to be at least one hour per day less than those for field labourers (who require comparatively no mind), in order to allow time for studying the science of the art to be practised. The amount of fines should also be fixed on at the same time: as for absence at the hours of going to labour; for defects in the performance of duty of various sorts, as putting by a tool without cleaning it, being found without a knife or apron, or not knowing the name of a plant, &c. A set of maxims and rules of conduct should be drawn up by the master (for which the succeeding section will afford some hints), and printed, with the amount of fine specified at the end of each rule. The fines levied may either be applied to some general purpose, or returned by equal distribution quarterly.

3167. *The system of keeping accounts* may next be determined on, and this, in gardening, is very simple. The books necessary are, the *time-book*, the *cash-book*, and the *forest or plantation book*.

3168. *The time-book* is a large folio volume, ruled so as to read across both pages, with columns titled, as in the specimen in the page 712. In this the master inserts the

name of every hand; and the foreman of each department inserts the time in days, or proportions of a day, which each person under his care has been at work, and the particular work he or she has been engaged in. At the end of each week the master sums up the time from the preceding Saturday or Monday, to the Friday or Saturday inclusive; the sum due or to be advanced to each man is put in one column, and when the man receives it he writes the word *received* in the column before it, and signs his name as a receipt in the succeeding column. The time-book, therefore, will show what every man has been engaged in during every hour in the year for which he has been paid, and it will also contain receipts for every sum, however trifling, which has been paid by the gardener for garden-labour. In short, it would be difficult to contrive a book more satisfactory for both master and servant than the time-book, as it prevents, as far as can well be done, the latter from deceiving either himself or his employer, and remains an authentic indisputable record of work done, and of vouchers for money paid during the whole period of the head gardener's services. In laying out grounds in a distant part of the country, where upwards of two hundred men were employed under one foreman, we have had their *time, employment, and payments* recorded, and *receipts* taken, in this way, and found it an effectual bar to every thing doubtful or disagreeable.

3169. *The next book is the cash-book* (see next page), which may be a common quarto or octavo book, with horizontal lines running across both pages; Dr. and Cr. columns for cash on the left-hand page; and the right-hand page left blank for signatures. The cash-book may be finally balanced once a year; or oftener, and, if requisite, the sums received from the woods and plantations can be taken out and added together, to show the amount of profit by that department. In small gardens, this is the only book that gardeners in general require to keep; but our business here is to show what belongs to first-rate gardens.

3170. *The forest-book* (see next page), where that department is not an entirely separate concern, may be simply what, in Italian book-keeping, is called a waste-book. The size may be quarto, with a column for cash to each page; and the intention of the book is, to serve as a record for all bargains for the sale of timber, fuel, bark, or the felling of timber, grubbing, planting, &c. When the money is received for any such sale, it is entered in the cash-book. In very extensive concerns it may be necessary to open accounts for particular woods or plantations, as well as for individuals who become purchasers of timber, bark, fuel, charcoal, &c.; in such cases it is hardly necessary to observe, that recourse is to be had to the common ledger of merchants.

3171. *The time, cash, and forest books, and, in common cases, the first two, will answer every purpose as to money matters in private gardens: where gardening is practised as a trade, as in nurseries, &c., of course the routine books common to trades become necessary.*

3172. *The additional books which a gardener may require as official records in his office are, a journal of sowing and reaping, trenching-book, produce-book, and weather-book; or some of these books may be very well supplied by tables of common folio or quarto size. The sowing and reaping-book may be an octavo blank book, with a column for the date on each page. On the left-hand page, the time and place of sowing or planting is recorded, and when the crop is fit to gather, that circumstance is noticed in the opposite page, and in an opposite line, thus:—*

1821.	Sowing or Planting.	1821.	Gathering the Crop.
April 4.	Planted masagan beans in Q. No. 1. A. Sowed spinach between the rows of beans in ditto.	July 23. May 23.	Gathered the first dish of beans. Gathered part of the spinach.

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	Peas.	Beans.	Turneps.	Potatoes.	Onions.
Nov.					
Dec.					
Jan.					
Feb.					
March					
April					
May					
June					
July					
Aug.					
Sept.					
Oct.					
Nov.					
Dec.					

3173. *Or a cropping table may be used for this purpose (fig. 692.) in which there may be two vertical columns for each of the principal crops sown in gardens, and horizontal lines for each month. Then, suppose frame peas, sown in November: begin a line on the left-hand column, headed *peas*, opposite November, and write the variety *frame* in the right-hand column; and when the peas are fit to gather, trace the line diagonally down to the horizontal line representing the month (May, in the figure) in which they ripen. This is a very simple mode, as it presents the sowing and reaping of the whole of*

the principal kitchen-garden crops at one view. A few large sheets, ruled thus, might be bound together; one page would serve for a year, and when a few years were recorded, the whole would present a rich assemblage of facts to suggest ideas as to cropping.

3174. *The trenching-book.* Another very requisite book in extensive gardens is the trenching-book, which is simply a thin octavo volume, in which a page is devoted to each compartment of the kitchen-garden or nursery, or to any ground frequently trenched; and in this column the date of the trenching and the depth is recorded. The object is to insure fresh soil at the surface, by never trenching twice in succession to the same depth.

1827 to 1830.	Compartment, No. 2. A.	1827 to 1830.	Compartment, No. 2. B.
1827. April. 1828. September. 1829. January. 1830. October.	Trenched two spits after asparagus for turnips. — three spits and winter fallow. — one spit (that is dug) for colons, damaged. — two spits, and ridged during winter.	1827. February. 1828. 1829. 1830. August.	Trenched two spits, and dunged for strawberries. Strawberries. Strawberries. Trrenched three spits, and well dunged.

3175. *Or a trenching-table may be easily arranged thus:—*

Com. No. 1.					Com. No. 2.				Com. No. 3.				Com. No. 4.				Slip, No. 5.			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1827.	4	3	2	1	1	3	1	1	4	1	1	2	4	1	2	4	1	3	1	1
1828.	3	2	3	2	4	-	4	2	-	2	4	3	1	2	3	3	4	2	3	1
1829.	2	1	4	3	2	-	2	3	-	3	3	4	2	-	-	2	3	1	4	2
1830.	1	4	1	4	-	-	1	4	1	4	2	-	3	-	-	1	3	-	-	4

3176. *Plan of the kitchen-garden.* For the last two books or tables, as well as for a variety of other purposes, it is necessary that a plan of the kitchen-garden should be made, and the compartments numbered, and their subdivisions lettered; and this plan, as well as another exhibiting every scene under the gardener's care, should be framed and hung up in the office for constant reference.

3177. *The produce-book* may be either a quarto or octavo volume, ruled with blue lines across both pages, with a column for the date on the left-hand page, and the other blank, for signatures. In this book is to be entered daily, on the left-hand page, the disposal of produce gathered or taken from the garden or garden-stores, as the fruit-room, ice-cold room, &c. On the right-hand page the name of the party in the family of the master receiving it is to be signed by the receiver as a receipt. Such books are not uncommon in first-rate gardens; and, like the game-book and cellar-book, are of very considerable use.

1831.	Garden Produce.	Signatures.
June 20	Sent peas, onions, parsley, cabbage, spinach, and some herbs, to the kitchen, by J. Gott Two bunches sweetwater grapes, two cucumbers, a pot of strawberries, and a pine, by J. Twigg A large nectary for Lady Almsbury, by J. Gott	Received by me, Leah Fry, cook. Received by me, Joseph Tomcott, butler.
22	Sent a few fruit of the blood pine to the Horticultural Society in London; and also a seedling mango plant, and some seeds of the new red lettuce. Booked them per mail at Reading, and directed them to G. Bentham, Esq. Horticultural Society, Regent Street, London.	Received by me, Juliet Filtwell, for my Lady A.

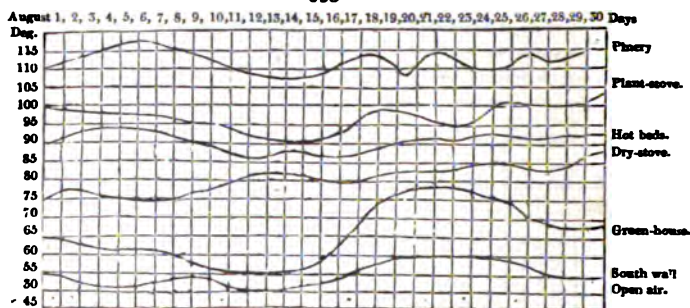
3178. *A weather-book* is very useful, and may be either of the folio or quarto size, with column, as under:—

1831. June	Thermo- meter.		Baro- meter.		Rain and Hail.		Wind.	General character of the day's weather.	Trees in Leaf, or de- foliated. Fungi appear, &c.	Plants in Flower or Fruit.	Birds and Insects ap- pear or dis- appear.	Observ- ations as to Fish and other Ani- mals.	Miscellane- ous. Bodily Faints, pre- vailing Dis- eases, &c.
	M.	N.	E.										
21	50	71	60	28-90	0	0-08	S. S.W.	Fair. Showers.	Marchantia polymorpha in perfec- tion.	Lilium con- didum in full blow.	Sphinx Elipnor appears.	Spawns of the Carp hatched in breeding pond.	Dull and sleepy.
22	54	69	58	28-5			S.W.						
23	51	65	59	28-8	0	0-00	S.	Cloudy.		Nymph ad- vance in flower.			
24	68	70	56	28-7	0	0-01	S.W.	Windy.				Ditto Brewn.	Well and in high spirits.

There is a very good model of this description, called the *Naturalist's Kalender*, by the Honourable Daines Barrington, in quarto, which may be procured and filled up. Indeed, every apprentice ought to be made to keep such a calendar, for the sake of inducing habits of observation. It has been judiciously remarked (*Farm. Mag.*, 1820) that, in all calendars of nature, particular attention should be paid to the inflorescence of aquatics, as these are much more regular in their times of foliation and flowering than land plants. The comparative denseness of the medium in which they live, prevents their being affected by winds or rains, and probably also by electrical and other atmospherical changes.

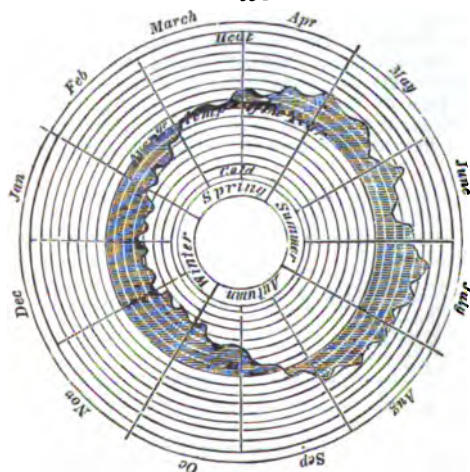
3179. For keeping a register of the temperature of hot-houses and the open air, a book with columns may be adopted, or a table (fig. 693.) may be fixed on, in which the ver-

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tical lines representing days of the month, and the horizontal ones degrees, the variations of each house, and the open air, may be shown by wavy lines made by daily increments depressed or raised, according to the rise or fall of the thermometer in each separate house or place. Twelve tables, or twelve pages of an oblong folio book ruled in this way, would keep a register of all the hot-houses, frames, and the open air of a garden for a year. A very beautiful graphic mode (fig. 694.) of recording the variations of tem-

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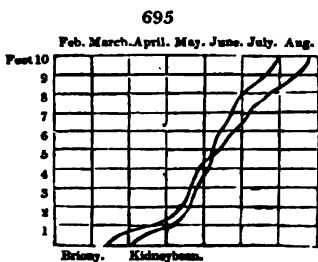


perature of the open air, or of any one hot-house during a year, is given by Howard, in his *Climate of London*, a simplification of which may be adopted by the curious gardener. Here the indicating line waves upon a circular zone, composed of radiating lines, representing time, and concentric circles representing degrees of heat. One line represents the average temperature of the year: all the degrees exceeding the average temperature are projected beyond this line towards the extremity of the zone; and all the degrees under the average are projected from the average line towards the inner circumference of the zone. A series of tables of this sort might prove useful to the gardener, by enabling him, at all times, by a simple glance, to compare the present weather with

that of several past years. Howard's nomenclature of clouds, already given (2018.), deserves also the study of the gardener desirous of scientifically registering the weather. (*Encyc. Brit. Sup.* vol. iii. art. *Cloud*.)

3180. Records of the growth of plants are sometimes kept, to show the comparative warmth and congeniality of seasons to vegetation. When that is to be done, a table (fig. 695.) may be composed of horizontal lines, the distance between which shall represent space in feet or inches, and vertical lines, the distance between which shall represent time by months or days. Then supposing a plant (briony) beginning to push in the

middle of March, make a mark on the lowest line in the middle of the column for that



month, and trace the line as the plant grows, ascending diagonally through the other months, according to the progress of the shoot in feet. If a kidney-bean germinates in the beginning of April, and attains the height of ten feet by the first of September, then the indicatory line will pass through five vertical columns or months, and through ten feet, or spaces, between the horizontal lines (as in the figure). All these books, tables, and records must be kept in the office as a part of its library; by which means, when the head gardener is changed, the new-comer will the sooner become acquainted with the situation and

climate, his duties, and a variety of other useful circumstances.

3181. *Memorandum books.* Besides the above books and tables, it is almost unnecessary to add, that various small blank books for inventories of tools, memorandums of agreements, *out of door entries*, lists of names, &c., will be required both by the head gardener and by his different foremen.

3182. *The reading library of the gardener's office* should at least contain the following works. One of the best *Encyclopædias*; and, to whichever one may be adopted, add the *Suppl. to the Encyc. Brit.*, the best work of its kind hitherto published; the *Agricultural Survey of the County*, and the *Statistical Account of the Parish*. If convenient, the surveys of all the counties in the empire should be procured. The best catalogues of plants, and the best garden periodicals as they appear. For the works requisite to form a more extended library, see the catalogue given in the *Gardener's Magazine*, vol. ii. p. 108. The most generally approved Systems of Botany, Natural History, Gardening, Agriculture, and Rural Architecture.

3183. *The books of a garden library ought to be considered as for the use of journeymen and apprentices, as well as the master*; but the latter ought to be responsible for their being kept clean and perfect. Where the head gardener is of a humane and kind turn of mind, he may assemble his men, and read aloud to, or answer questions put by, them; or he may cause them to read aloud to, and question one another, in such a way as to blend entertainment with instruction. In short, he ought to consider it as a part of his duty to improve their minds, as well as to render them habile in his art, and by all means to ameliorate their condition and manners as much as is in his power. Neill, one of the best modern writers on gardening, and a humane and benevolent man, states of the late Walter Nicol, that "he observed a praiseworthy practice, too much neglected by head gardeners, — that of instructing his young men or assistants, not only in botany, but in writing, arithmetic, geometry, and mensuration. He used to remark, that he had not only improved his scholars, but taught himself, and made his knowledge so familiar, that he could apply it in the daily business of life." The same practice, as already observed (§ 757.), is still carried on in Germany and in Denmark.

SECT. III. *Of the Beauty and Order of Garden Scenery.*

3184. *To unite the agreeable with the useful* is an object common to all the departments of gardening. The kitchen-garden, the orchard, the nursery, and the forest, are all intended as scenes of recreation and visual enjoyment, as well as of useful culture; and enjoyment is the avowed object of the flower-garden, shrubbery, and pleasure-ground. Utility, however, will stand the test of examination longer and more frequently than any scene merely beautiful; and hence the horticultural and planting departments of gardening are, in fact, more the scenes of enjoyment of a family constantly residing at their country-seat, than the ornamental or picturesque departments. It has been a very common assertion, since the modern style of gardening became prevalent, and absorbed the attention of gardeners and their employers, that beauty and neatness may be dispensed with in a kitchen-garden; but this is to assign too exclusive limits to the terms beauty and neatness; and, in truth, may be considered as originating in the vulgar error of confounding beauty with ornament, which latter quality is unquestionably not essential to scenes of utility. Every department of gardening has objects or final results peculiar to itself; and the main beauty of each of these departments will consist in the perfection with which these results are attained; a secondary beauty will consist in the display of skill in the means taken to attain them; and a third in the conformity of these means to the generally received ideas of order, propriety, and decorum, which exist in cultivated and well-regulated minds. It is the business of this section to offer some general observations, with a view to the attainment of the beauties of order, propriety, and decorum.

3185. *Order*, it has been well observed, is "Heaven's first law." It is, indeed, the end of all law. Without it, nothing worth having is to be attained in life, even by the most fertile in resources; and with it much may be accomplished with very slender means. A mind incapable of an orderly and regular disposition of its ideas or intentions will display a man confused and disorderly in his actions; he will begin them without a specific object in view: continue them at random, or from habit, without knowing well why, till some accident or discordant result puts an end to his present progress, unmans him for life, or awakens reflection. But a well-ordered mind reflects, arranges, and systematises ideas before attempting to realise them, weighs well the end in view, considers the fitness of the means for attaining that end, and the best mode of employing those means. To every man who has the regulation and disposal of a number of servants, this mode of orderly arrangement is essentially necessary in order to reap the full effects of their labours; and to no men is it of more importance than to master-gardeners, whose cares are so various, and the success of whose operations, always connected with, and dependent on, living beings and weather, depends so much on their being performed in the fitting moment.

3186. *Propriety* relates to what is fitting and suitable for particular circumstances; it is the natural result of an orderly mind, and may be said to include that part of order which directs the choice and adaptation of means to ends, and of ideas and objects to cases and situations. It belongs to order for a master to allow workmen proper periods for rest and refreshment; propriety dictates the time and duration of these periods; and prudence suggests the wisdom of departing as little as possible from established practices.

3187. *Decorum* is the refinement of propriety. It is in order to procure stable-dung for hot-beds, and to cart it into the framing-ground; it is *proper* to do this at all times when it is wanted, but it is *decorous* to have the work performed early in the morning, that the putrescent vapours and dropping litter may not prove offensive to the master of the garden, should he, or any of his family or friends, visit that scene.

3188. *Neatness*, as opposed to slovenliness, is well understood; it consists in having every thing where it ought to be; and in attending to the decorum of finishing operations, and to minute things in general. These abstract hints may be considered as more particularly directed to master-operators; the following practical directions apply both to *masters and their journeymen or labourers*.

3189. *Perform every operation in the proper season*. The natural, and therefore the best indications for the operations of sowing and reaping, transplanting, &c., are given by the plants themselves, or by the progress of the season as indicated by other plants. But there are artificial calendars or remembrancers, the use of which is to remind the master of the leading crops and operations of culture throughout the year. But, even if such books were made as perfect as their nature admits of, still they are only calculated to aid the memory, not to supply the place of a watchful and vigilant eye, and habits of attention, observation, reflection, and decision. Unless a gardener has these, either naturally, or partly natural and partly cultivated, in a considerable degree, he will be but little better than a common labourer as to general management and culture of garden scenery.

3190. *Perform every operation in the best manner*. This is to be acquired in part by practice, and partly also by reflection. For example, in digging over a piece of ground, it is a common practice with slovens to throw the weeds and stones on the dug ground, or on the adjoining alley or walk, with the intention of gathering them off afterwards. A better way is to have a wheelbarrow, or, if that cannot be had, a large basket, in which to put the weeds and extraneous matters, as they are picked out of the ground. Some persons, in planting or weeding, whether in the open air or in hot-houses, throw down all weeds, stones, and extraneous matters on the paths or alleys, with a view to pick them up, or sweep or rake together afterwards; it is better to carry a basket or other utensil, either common or subdivided (§ 2228.), in which to hold in one part the plants to be planted, in another the extraneous matters, &c.

3191. *Complete every part of an operation as you proceed*. This is an essential point in garden-operations; and though it cannot always be attended to, partly from the nature of the operation, partly from weather, &c., yet the judicious gardener will keep it in view as much as possible. Suppose a compartment, or breadth of rows of potatoes, containing one tenth of an acre, required to have the ground stirred by the Dutch hoe, the weeds raked off, and then the potatoes earthed-up with the forked hoe; the ordinary practice would be, first to hoe over the whole of the ground, then to rake it wholly over, and, lastly, to commence the operation of earthing-up. If the weather were certain of holding good two days, this, on the principle of the division of labour, would certainly be somewhat the most economical mode. But supposing the weather dry, the part left hoed and not raked will, for a time (and one hour ought to be an object in a fine garden), appear unflushed; and if rain should happen to fall in the night, the operation will be

defeated in most soils. Better, therefore, to hoe, rake, and earth-up a small part at a time : so that, leave off where you will, what is done will be complete.

3192. *Finish one job before you begin another.* This advice is trite, but it is of great importance ; and there are few cases where it cannot be attended to.

3193. *In leaving off working at any job, leave your work and tools in an orderly manner.* Are you hoeing between rows, do not throw down your hoe blade upwards, or across the rows, and run off the nearest way to the walk the moment the breakfast or dinner hour strikes. Lay your implement down parallel to the rows, with its face or blade to the ground ; then march regularly between one row to the alley, and along the alley to the path. Never drop your tools and leave off work before the hour has well done striking ; and, above all, never run on an occasion of this kind ; it argues a gross brutalised selfishness, highly offensive to well regulated minds. Never, in short, act in such a manner as to show that the body commands the mind ; but rather so as to convey the idea that the body is in complete subjection to the mind, and that the governing mind is a refined one.

3194. *In leaving off work for the day, make a temporary finish, and carry your tools to the tool-house.* In general, do not leave off in the middle of a row ; straighten your trenches in digging, because, independently of appearances, should a heavy rain of a week's duration intervene, the ground will have to be re-dug, and that will be more commodiously done with a straight than with a crooked, and consequently unequal, trench.

3195. *In passing to and from your work, or, on any occasion, through any part of what is considered under the charge of the gardener,* keep a vigilant look-out for weeds, decayed leaves, or any other deformities, and remove them, or some of them, in passing along. Attend to this particularly on walks, and edgings, and in passing through hot-houses, &c. In like manner take off insects, or leaves infected by them. Much in large as well as in small gardens may be effected by this sort of timely or preventive attention, which induces suitable habits for a young gardener, and occupies very little time.

3196. *In gathering a crop or any part of a crop, remove at the same time the roots, leaves, stems, or whatever else belonging to the plant of which you have cropped the desired part, is of no further use, or may appear slovenly, decaying, or offensive.* In cutting cabbage, lettuce, borecoles, &c., pull up the stem (with exceptions) and roots, and take them at once with the outside leaves, to the compost-heap. Do the same with the haulm of potatoes, leaves of turnips, carrots, celery, &c. Do not suffer the haulm of peas and beans to remain a moment after the last gathering of the crop.

3197. *Let no crop of fruit or herbaceous vegetables, or any part thereof, go to waste on the spot.* Instantly remove it, when decay or any symptom of disease appears, to the compost-yard, or to be consumed by pigs or cattle.

3198. *Cut down the flower-stalks of all flowering plants,* with the proper exceptions, the moment they are fully done flowering, unless seed is an object. Cut off decayed roses and all decaying double flowers, with their foot-stalks, the moment they begin to decay ; and the same of the single plants, where seed is not wanted. From May to October, the flower-garden and shrubbery ought to be looked over by apprentices or women, every day, as soon as the morning dews are evaporated, for this purpose, and for gathering decayed leaves, tying up tall-growing stems before they become straggling, &c.

3199. *Keep every part of what is under your care perfect in its kind.* Attend in spring and autumn to walls and buildings, and get them repaired, pointed, glazed, and painted, where wanted. Attend at all times to machines, implements, and tools, keeping them clean, sharp, and in perfect repair ; for with imperfect tools no man can make perfect work. See particularly that they are placed in their proper situations in the tool-house. House every implement, utensil, or machine not in use, both in winter and summer. Allow no blanks in edgings, rows, single specimens, drills, beds ; and even, where practicable, in broad-cast sown pieces. Keep edgings and hedges cut to the utmost nicety. Keep the shapes of your wall trees filled with wood according to their kind, and let their training be in the first style of perfection. Keep all walks in perfect form, whether raised or flat, free from weeds, dry, and well rolled. Keep all the lawns under your care, by all the means in your power, of a close texture, and dark-green velvet appearance. Keep water clear and free from weeds ; and, if possible, do not let the ponds, lakes, or artificial rivers, rise to the brim in winter, or sink very far below it in summer.

3200. *Finally, attend to personal habits and to cleanliness.* " Never perform any operation without gloves on your hands that you can do with gloves on ; even weeding is far more effectually and expeditiously performed by gloves, the fore fingers and thumbs of which terminate in wedge-like thimbles of steel, kept sharp. Most other operations may be performed with common gloves. Thus, no gardener need have hands like bears' paws. Always use an iron tread fastened to your shoe when you dig ; and generally a broad-brimmed, light, silk or straw hat, to serve at once as a parasol and umbrella. You

will thus save the use of your feet, lessen the wear of your shoes, and avoid the rheumatism in the neck. Let your dress be clean, neat, simple, and harmonious, in form and colour: in your movements maintain an erect posture, easy and free gait and motion; let your manner be respectful and decorous to your superiors; and conduct fair and agreeable to your equals. Elevate, meliorate, and otherwise improve, any raw, crude, harsh, or inharmonious features in your physiognomy, by occupying your mind with agreeable and useful ideas, and by continually instructing yourself by reading. This also will give your face expression, even if it has none naturally. Remember that you are paid and maintained by and for the use and pleasure of your employer, who may no more wish to see a dirty, ragged, uncouth-looking, grinning, or conceited biped in his garden, than a starved, haggard, untutored horse in his stable." (*Trugott Schwesetapper.*)

3201. *He who undertakes the profession of a gardener*, says the Rev. W. Marshall, takes upon himself a work of some importance, and which requires no small degree of knowledge, ingenuity, and exertion, to perform well. There are few businesses which may not be learned in much less time than that of a gardener can possibly be. It often happens, however, that a man who has been very little in a garden, and that only as a labourer, who can do little more than dig, or put out cabbage plants, will call himself a gardener; but he only is worthy of the name who, having had much practice in the various parts of horticulture, possesses a genius and adroitness, fitting him for making experiments, and for getting through difficulties that the existing circumstances of untoward seasons, &c. may bring him into. He should possess a spirit of enquiry into the nature of plants and vegetation, and how far art (in his way) may be made successfully useful, or at least probably so. The mode of growth, the pruning, the soil, the heat, and the moisture that suits particular plants, are not to be understood without a native taste, and close application of the mind. Whoever will give himself the pains to trace a good gardener through the several stages of his employ, in all the seasons of the year, will find it to be one continued circle of reflection, labour, and toil. Gardening depends more upon the labour of the brain than of the body: there is no such thing as always proceeding with certainty, and insuring success. Plants will die, and that sometimes suddenly, under the very best management. There are few things to be done in a garden which do not require a dexterity in operation, and a nicety in hitting the proper season for doing it. A gardener should be a sort of prophet in foreseeing what will happen under certain circumstances, and wisely cautious to provide, by the most probable means, against what may happen. A man cannot be a good gardener, unless he be thoughtful, steady, and industrious; possessing a superior degree of sobriety and moral excellence, as well as genius and knowledge adapted to his business. He should be modest in his manners and opinions. It too often happens, with those who have much practical skill, that they slight what is written upon the subject of their profession; which shows a degree of prejudice quite unworthy of a man of real merit.

3202. *The character of a gardener is here set high*; but it is the goal of respectability at which he ought to aim who presumes to call himself a professed one. A gardener has reason, indeed, to love his employment, as he meets with health and tranquillity in the exercise of it; but, considering what he is, and what he does, in his proper capacity, he may justly claim a superior degree of estimation and reward. A true gentleman is of a liberal spirit, and I would plead for his gardener as a proper person to be generous towards, if his manners be good. (*Introd. to Gard.*, p. 447.)

PART III.

GARDENING AS PRACTISED IN BRITAIN.

3203. *The art of gardening, in the earlier ages of society*, would be practised without those local subdivisions, or technical distinctions, which its progressive improvement has since rendered necessary; and being then carried on in one enclosure, called a Garden, the term Gardening was then sufficiently explicit for every purpose. But at present the local subdivisions and technical distinctions of this art are various; we have the kitchen, fruit, flower, forcing, and exotic gardens, the pleasure-ground, shrubbery, park, and timber-plantation, all within the province of Gardening; and the terms culinary gardening, fruit-gardening, flower-gardening, planting, &c. as technical distinctions for them. The vague manner in which so many terms have been used by gardeners and authors has led to some confusion of ideas on the subject, which it is much to be wished could be avoided in future. Taking the word gardening as a generic term, we have arranged its ramifi-

cations or divisions in what we conceive to be permanent or specific distinctions. The principle of classification which we have adopted, is that of the use or object in view; and, applying it, we think all the varieties of gardening may be included under the four following species:—

3204. *Horticulture*, the object of which is to cultivate products used in domestic economy. It includes culinary and fruit gardening or orcharding; and forcing or exotic gardening, as far as respects useful products.

3205. *Floriculture*, or ornamental gardening, the object of which is to cultivate plants ornamental in domestic economy. It includes flower, botanic, and shrubbery gardening; and forcing and exotic gardening, as far as respects plants of ornament.

3206. *Arborticulture*, or planting, the object of which is to cultivate trees and shrubs, useful in general economy. It is practised in forests, woods, groves, copses, stripes, and rows.

3207. *Landscape-gardening*, the object of which is to produce landscapes; or, so to arrange and harmonise the external scenes of a country-residence, as to render them ornamental, both as domestic scenery, and as a part of the general scenery of the country. This branch is by some called picturesque, rural, ornamental, or territorial improvement; rural ornament, ornamental gardening, pictorial improvement, new ground-work, ornamental planting, &c. It includes the ancient, formal, geometric, or French gardening, and the modern, natural, picturesque, or English gardening.

3208. *There are other terms applied to gardens and gardening*; as nursery, market, physic, &c. gardens, and nursery-gardening, market-gardening, &c.; but these concern gardening as a *trade*, rather than as an *art*, and their discussion is referred to the succeeding Part of this work, in which gardening is considered statistically.

BOOK I.

HORTICULTURE.

3209. *In treating of horticulture*, some, as Nicol and Abercrombie, have neglected its local unity; and, adopting its technical subdivisions, have treated of the culinary fruit and forcing departments, as if they were separate gardens. But as these departments are all generally carried on within the same ring-fence, and as it is impossible to form and arrange a kitchen-garden, without at the same time forming and arranging the walls and borders destined to receive the most valuable part of the fruit-garden, and equally so to lay out the area enclosed, without determining the situation and extent of the forcing department, we deem it preferable to treat of Horticulture as actually carried on, and in the following order: viz. The formation of the kitchen-garden. The distribution of the fruit trees. The forming and planting of a subsidiary orchard. The general culture of the kitchen-garden. The general culture of the orchard. The construction of buildings used in the forcing-department. The general culture of the forcing-department. Catalogue of plants and trees used in horticulture. A monthly table of horticultural productions.

CHAP. I.

The Formation of a Kitchen-garden.

3210. *The arrangement and laying out of a kitchen-garden* embraces a variety of considerations, some relative to local circumstances, as situation, exposure, soil, &c.; and others depending on the skill of the artist, as form, laying out the area, water, &c.: both require the utmost deliberation; for next to a badly designed, ill placed house, a misplaced, ill arranged, and unproductive kitchen-garden is the greatest evil of a country-residence.

SECT. I. *Situation.*

3211. *The situation of the kitchen-garden, considered artificially, or relatively to the other parts of a residence*, should be as near the mansion and the stable-offices, as is consistent with beauty, convenience, and other arrangements. Nicol observes, "In a great place, the kitchen-garden should be so situated as to be convenient to, and, at the same time, be concealed from, the house. It is often connected with the shrubbery or pleasure-garden, and also placed near to the house. There can be no impropriety in this, pro-

vided it be kept in good order, and that the walls be screened by shrubbery from the immediate view of the public rooms; indeed, it has been found, that there is both comfort and economy in having the various gardens of a place connected, and placed at no great distance from the house. In stepping from the shrubbery to the flower-garden, thence to the orchard, and lastly to the culinary garden, there is a gradation both natural and pleasant. With such an arrangement, in cases where the aspect of the ground is answerable, and the surface, perhaps, is considerably varied, few faults will be found."

3212. *Sometimes we find the kitchen-garden placed immediately in front of the house,* which Nicol "considers the most awkward situation of any, especially if placed near, and so that it cannot be properly screened by some sort of plantation. Generally speaking, it should be placed in the rear or flank of the house, by which means the lawn may not be broken and rendered unshapely where it is required to be most complete. The necessary traffic with this garden, if placed in front, is always offensive. Descending to the consideration of more humble gardens, circumstances are often so arbitrary with respect to their situations, as that they cannot be placed either so as to please, or give satisfaction by their products. There are cases where the kitchen-garden is necessarily thrust into a corner, and perhaps is shaded by buildings, or by tall trees, from the sun and air; where they are placed on steep slopes in a northern aspect, the subsoil is a clayey or cankered gravel, and the site cold and bleak. Such situations as these are to be avoided, and may be considered among the worst possible. Next are open, unsheltered plains. But even there, if the soil be tolerably good, and the subsoil be not particularly bad, shelter may be formed, so as that in a few years the garden may produce a return for the expense laid out in its improvements." (*Kalendar*, p. 8.)

3213. *To place the fruit and kitchen gardens at perhaps half a mile's distance or more from the house* was formerly the prevailing taste. In many cases, Neill observes, "this has been found inconvenient, and it can seldom happen that the garden-walls may not be effectually concealed by means of shrubs and low-growing trees, so as not to be seen, at least from the windows of the public rooms, and the garden yet be situated much nearer to the house. It is scarcely necessary," he adds, "to observe that an access for carts and wheelbarrows, without touching the principal approach, is indispensable." (*Ed. Encyc. art. Hort.*)

3214. *With respect to the natural situation of a garden,* Nicol and Forsyth agree in preferring a gentle declivity towards the south, a little inclining to the east, to receive the benefit of the morning sun. "If it be situated in a bottom, the wind will have the less effect upon it; but then damps and fogs will be very prejudicial to the fruit and other crops; and if situated too high, although it will in a great measure be free from damps and fogs, it will be exposed to the fury of the winds, to the great hurt of the trees, by breaking their branches, and blowing down their blossoms and fruit." (*Tr. on Fruit Trees*, p. 286.)

3215. *The situation should not be so elevated as to be exposed to boisterous and cutting winds;* nor should a very low situation be chosen, if circumstances afford any choice. It should be situated conveniently for access from the house. (*Abercrombie's Practical Gardener*, p. 1, 2.)

3216. *Avoid low situations and bottoms of valleys,* say Switzer, Darwin, Bradley, and Lawrence, "because there is often a sourness in the earth that cannot be eradicated, and, in this uncertain climate of ours, heavy fogs and mists that hang so long on the fruit and leaves in low situations, that not only vegetation is retarded, but also the ripening of the fruit." (*Pract. Fruit Gard.*, 2d edit. p. 19.) "The greater warmth of low situations," Dr. Darwin observes, "and their being generally better sheltered from the cold north-east winds, and the boisterous south-west winds, are agreeable circumstances; as the north-east winds in this climate are the freezing winds; and the south-west winds, being more violent, are liable to do much injury to standard fruit trees in summer by dashing their branches against each other, and thereby bruising or beating off the fruit; but in low situations the fogs in vernal evenings, by moistening the young shoots of trees, and their early flowers, render them much more liable to the injuries of the frosty nights that succeed them, which they escape in higher situations." (*Phytologia*, sect. xv. 3. 6.) Professor Bradley "gives a decisive fact in regard to this subject. A friend of his had two gardens, one not many feet below the other, but so different, that the low garden often appeared flooded with the evening mists, when none appeared in the upper one; and in a letter to Bradley he mentions, that his lower garden is much injured by the vernal frost, though his upper one has escaped. A similar fact is mentioned by Lawrence, who observes, that he has often seen the leaves and tender shoots of tall ash trees after thick mists to be frozen, and as it were singed, in all the lower parts and middle of the tree; while the upper part, which was above the mist, has been uninjured." (*Darwin's Phytologia*, sect. xv. 3. 6.)

3217. *Main entrance to the garden.* Whatever may be the situation of a kitchen-

garden, whether in reference to the mansion or the variations of the surface, it is an important object to have the main entrance on the south side, and, next to that, on the east or west. The object of this is to produce a favourable first impression on the spectator, by his viewing the highest and best wall (that on the north side) in front; and, which is of still greater consequence, all the hot-houses, pits, and frames in that direction. Nothing can be more unsightly than the view of the high north wall of a garden, with its back sheds and chimney-pots, from behind; or even getting the first *coup d'œil* of the hot-houses from a point nearly in a parallel line with their front. The effect of many excellent gardens is lost or marred for want of attention to this point, or from peculiarity of situation.

3218. *Bird's-eye view of the garden.* When the grounds of a residence are much varied, the general view of the kitchen-garden will unavoidably be looked down on, or up to, from some of the walks or drives, or from open glades in the lawn or park. Some arrangement will therefore be requisite so to place the garden, or so to dispose of plantations, that only favourable views can be obtained of its area. To get a bird's-eye view of it from the north, or from a point in a line with the north wall, will have as bad an effect as the view of its north elevation, in which all its "baser parts" are rendered conspicuous.

SECT. II. *Exposure and Aspect.*

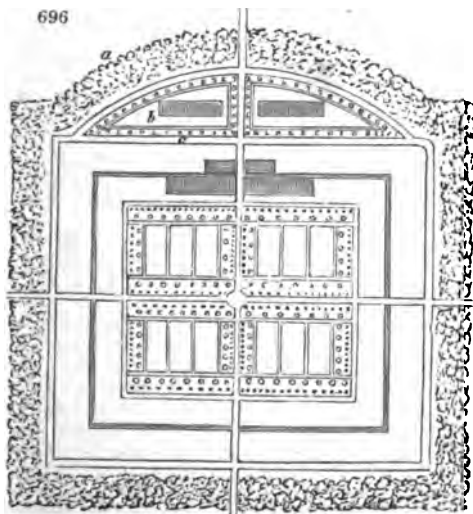
3219. *Exposure* is the next consideration, and in cold and variable climates is of so much consequence for the maturation of fruits, that the situation of the garden must be guided by it, more than by locality to the mansion.

3220. *The exposure should be towards the south*, according to Nicol, and the aspect at some point between south-east and south-west, the ground sloping to these points in an easy manner. If quite flat, it seldom can be laid sufficiently dry; and if very steep, it is worked under many disadvantages. It may have a fall, however, of a foot in twenty, without being very inconvenient; but a fall of a foot in thirty is most desirable, by which the ground is sufficiently elevated, yet not too much so. (*Kalendar*, p. 6.)

3221. *An exposure declining towards the south*, is that approved of by Switzer, "but not more than six inches in ten feet." Two or three inches he considers better. (*Pract. Fruit Gard.*, 2d edit. p. 17.)

3222. *An open aspect to the east*, Abercrombie observes, "is itself a point of capital importance in laying out a garden, or orchard, on account of the early sun. When the sun can reach the garden at its rising, and continue a regular influence, increasing as the day advances, it has a gradual and most beneficial effect in dissolving the hoar frost, which the past night may have scattered over young buds, leaves, and blossoms or setting fruit. On the contrary, when the sun is excluded from the garden till about ten in the morning, and then suddenly darts upon it, with all the force derived from considerable elevation, the exposure is bad, particularly for fruit-bearing plants, in the spring months; the powerful rays of heat at once melt the icy particles, and, immediately acting on the moisture thus created, scald the tender blossom, which drops as if nipped by a malignant blight: hence it happens, that many a healthy tree, with a promising show of blossoms, fails to produce fruit; the blossoms and thawed frost sometimes falling together in the course of a morning. The covering of the hoar-frost, or congealed dew, is otherwise of itself a remarkable preservative of the vegetable creation from frosty winds." (*Pract. Gard.*, p. 1.)

3223. *An exposure in which is a free admittance for the sun and air*, is required by Forsyth, who rejects a place surrounded by woods as very improper, because a foul stagnant air is very unfavourable to vegetation; and it is also observed that blights are much more frequent in such situations than in those that are more open and exposed. Such an exposure will generally be to the south, but much depends on



the surrounding scenery. For this reason the northern boundary of a garden, where the hot-beds are generally placed, will admit most sun and air, in proportion to the open space, when of a rounded rather than an angular form; especially if the plantation (fig. 696. *a*) which surrounds the garden gradually decline in height as it approaches the hot-bed ground (*b*) on the north, and the surrounding walk (*c*) on the other sides.

3224. *If there be any slope in the area of a garden*, Marshall considers "it should be southward, a point to the east or west not much signifying; but not to the north, if it can be avoided, because crops come in late, and plants do not stand the winter so well in such a situation. A garden with a northern aspect has, however, its advantages, being cooler for some summer productions, as strawberries, spring-sown cauliflowers, &c.; therefore, to have a little ground under cultivation, so situated, is desirable, especially for late succession-crops." (*Introd. to Gard.*, 5th edit. p. 8.)

SECT. III. *Extent.*

3225. *The extent of the kitchen-garden* must be regulated by that of the place, of the family, and of their style of living. In general, it may be observed, that few country-seats have less than one acre, or more than twelve acres, in regular cultivation as kitchen-garden, exclusive of the orchard and flower-garden. From one and a half to five acres may be considered as the common quantities enclosed by walls; and the latter size, under proper management, with abundance of manure, is capable of supplying a respectable establishment. Where a farm is cultivated by the proprietor, it is found a desirable practice to have part of the more common kitchen-crops, as cabbages, turnips, peas, potatoes, carrots, &c. grown in the fields; the flavour of vegetables so grown being greatly superior to that of those raised in a garden by force of manure. Where a farm is not kept in hand, by annually changing the surface of the garden by trenching, this effect of enriched grounds is considerably lessened.

3226. *To assist in determining the extent of a garden*, Marshall observes, that an acre with wall trees, hotbeds, pots, &c. will furnish employment for one man, who, at some busy times, will need assistance. The size of the garden should, however, be proportioned to the house, and to the number of inhabitants it does or may contain. This is naturally dictated; but yet it is better to have too much ground allotted than too little, and there is nothing monstrous in a large garden annexed to a small house. Some families use few, others many, vegetables; and it makes a great difference whether the owner is curious to have a long season of the same production, or is content to have a supply only at the more common times. But to give some rules for the quantity of ground to be laid out, a family of four persons (exclusive of servants) should have a rood of good-working, open ground, and so in proportion. If possible, let the garden be rather extensive, according to the family; for then a good portion of it may be allotted for that agreeable fruit the strawberry in all its varieties; and the very disagreeable circumstance of being at any time short of vegetables will be avoided. It should be considered also that artichokes, asparagus, and a long succession of peas and beans, require a good deal of ground. Hotbeds will also take up much room, if any thing considerable be done in the way of raising cucumbers, melons, &c. (*Introd. to Gard.*, p. 25.)

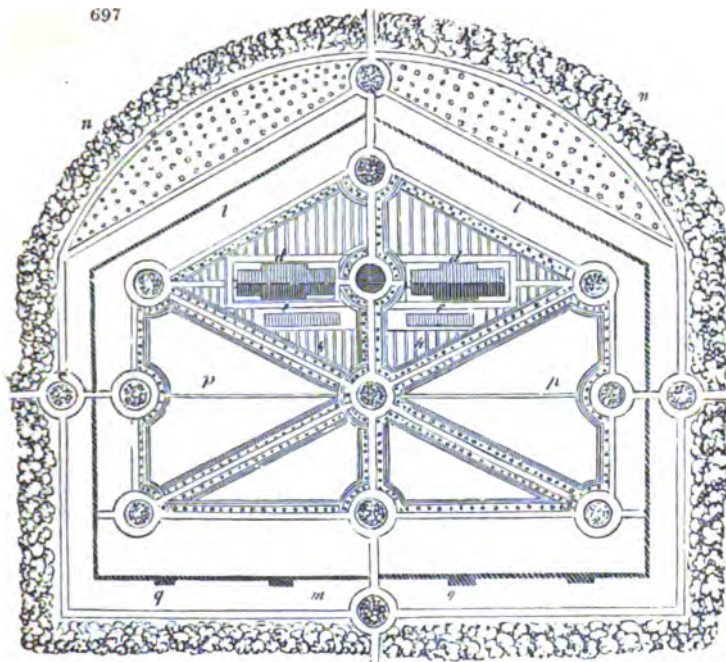
SECT. IV. *Shelter and Shade.*

3227. *To combine adequate shelter*, with a free exposure to the rising and setting sun, is essentially necessary, and may be reckoned one of the most difficult points in the formation of a garden.

3228. *The kitchen-garden should be sheltered by plantations*; but should by no means be shaded or be crowded by them. If walled round, it should be open and free on all sides, or at least to the south-east and west, that the walls may be clothed with fruit trees on both sides. (*Nicol, Kal.*, p. 6.)

3229. *The garden should be sheltered from the east, north, and west winds*, by hills, rising grounds, high buildings, or plantations of trees, at such a distance on the east and west sides, as not to prevent the sun from shining upon it. (*M'Phail, Gard. Rem.*, 2d edit. p. 12.)

3230. *To shelter an elevated garden on a steep declivity* (fig. 697.), it may require to be surrounded on all sides by high woods (*n*), and even to have groups of evergreens, as pines and hollies (*e*), and hedges of trellis or lattice-work (*p p*), within the garden. The hot-houses (*d*) and hotbeds (*f*) may be placed, and more delicate culinary crops (*k*) cultivated, in an artificial basin or hollow, which will have the advantage of being sheltered both naturally and artificially, and, being on a steep exposed to the south, will have a powerful influence in accumulating heat in winter from the sun's rays. The south borders of such gardens (*l, m*), and the walls heated by furnaces (*g*), will frequently be found to produce earlier crops than gardens placed on level surfaces and in low sheltered situations.



3231. *Shelter may in part be derived from the natural shape and situation of the ground.* Gentle declivities, Neil observes, at the bases of the south or south-west sides of hills; or the sloping banks of winding rivers, with a similar exposure, are very desirable. If plantations exist in the neighbourhood of the house, or of the site intended for the house, the planner of a garden naturally looks to them for his principal shelter; taking care, however, to keep at a reasonable distance from them, so as to guard against the evil of being shaded. If the plantations be young, and contain beech, elm, oak, and other tall-growing trees, allowance is of course made for the future progress of the trees in height. It is a rule that there should be no tall trees on the south side of a garden, to a very considerable distance; for, during winter and early spring, they fling their lengthened shadows into the garden, at a time when every sunbeam is valuable. On the east, also, they must be sufficiently removed to admit the early morning rays. On the west, and particularly on the north, trees may approach nearer, perhaps within less than a hundred feet, and be more crowded, as from these directions the most violent and the coldest winds assail us. If forest trees do not previously exist on the territory, screen-plantations must be reared as rapidly as possible. The sycamore (*Acer Pseudo-Platanus*) is of the quickest growth, making about six feet in a season; next to it may be ranked the larch, which gains about four feet; and then follow the spruce and balsam of Gilead fir, which grow between three and four feet in the year. (*Edin. Encyc. art. Hort.*)

3232. *A garden should be well sheltered from the north and east, to prevent the blighting winds from affecting the trees; and also from the westerly winds, which are very hurtful to the gardens in the spring or summer months.* If a garden be not naturally sheltered with gently rising hills, which are the best shelter of any, plantations of forest trees, made at proper distances, so as not to shade it, will be found the best substitute. (*Forrest, Tr. on Fruit Trees, p. 286.*)

3233. *Shade as well as shelter is attended to by Abercrombie, who observes, "that competent fences are serviceable in sheltering tender seedlings, and in forming warm borders for early crops and winter-standing plants; while in another direction some part of the line of fence will afford a shady border in summer, which is required by the peculiar constitutions of many small annual plants. Where a kitchen-garden encloses two, three, or four acres, it will admit cross walls at proper distances, by which the advantages just mentioned may be multiplied."* (*Prac. Gard., 2d edit. p. 3.*)

SECT. V. Soil.

3234. *The soil of a garden is obviously of the greatest consequence in its culture. It is, however, a subordinate consideration to situation and exposure, for the soil may be changed or improved by art; but no human efforts can remove the site, or change the exposure of a plot of ground.* This subject was much more attended to about a century ago, in the days of London and Wise, Switzer and Hitt, than it seems to be at present; gardeners, in general, depending too much on manures, and other adventitious

aids, for securing large, though sometimes ill-flavoured, culinary crops. Jethro Tull has some coarse, but to a certain extent just, remarks on this subject. As an auxiliary argument in support of his delusive doctrine of rejecting manure in culture, he affects to "wonder that gentlemen who are so delicate in other matters should make no scruple to eat vegetables and fruits grown among the vilest filth and ordure." (*Treatise on the Horse-hoeing Husbandry*, 3d edit. p. 30.)

3235. *The best soil for a garden*, M'Phail observes, "is a sandy loam, not less than two feet deep, and good earth, neither of a binding nature in summer, nor retentive of rain in winter; but of such a texture, that it can be worked, without difficulty, in any season of the year. It should be remembered, that there are few sorts of fruit trees, or esculent vegetables, which require less depth of earth to grow in than two feet to bring them to perfection; and if the earth of the kitchen-garden be three or more feet deep, so much the better; for when the plants are in a state of maturity, if the roots, even of peas, spinach, kidneybeans, lettuce, &c. be minutely traced, they will be found to penetrate into the earth, in search of food, to the depth of two feet, provided the soil be of a nature that allows them. If it can be done, a garden should be made on land the bottom of which is not of a springy wet nature. If this rule can be observed, draining will be unnecessary; for when land is well prepared for the growth of fruit trees and esculent vegetables, by trenching, manuring, and digging, it is by these means brought into such a porous temperment, that the rains pass through it without being detained longer than necessary. If the land of a garden be of too strong a nature, it should be well mixed with sand, or scrapings of roads, where stones have been ground to pieces by carriages." (*Gard. Rem.*, p. 12.)

3236. *The soil of a new garden should be two or three feet deep*, according to Forsyth, "but if deeper the better, of a mellow pliable nature, and of a moderately dry quality; and if the ground should have an uneven surface, by no means attempt to level it, for by that unevenness, and any little difference there may be in the quality, you will have a greater variety of soil adapted to different crops. The best soil for a garden is a rich mellow loam; and the worst, a stiff heavy clay. A light sand is also a very unfit soil for a garden. Sea-coal ashes, or the cleanings of streets and ditches, will be found very proper to mix with a strong soil; and if the ground should be cold, a large quantity of coal-ashes, sea-sand, or rotten vegetables should be laid upon it, in order to meliorate and loosen the soil, and render it easy to work. Lime-rubbish, or light sandy earth from fields and commons, will also be found of great service to stiff clayey ground. If the soil be light and warm, rotten neat's dung is the best dressing that you can give it. If horse-dung be ever used, it must be completely rotted, otherwise it will burn up the crop the first hot weather." (*Tr. on Fr. Trees*, p. 290.)

3237. *Different soils are required in the same garden*. This is Nicol's opinion, who has had more experience in the formation of gardens than any of the authors from whom we are quoting: his remarks "on soils, and how to improve them," merit every attention, and will be duly valued by those who have seen any of the excellent kitchen-gardens he has formed in Fifehire, Perthshire, and other northern counties. It is a happy circumstance, he says, "that in many instances we meet with different soils in the same acre." In the same garden they should never be wanting; and where nature (or natural causes) has been deficient, recourse must be had to art; inasmuch as the variety of fruits and vegetables to be cultivated requires different soils to produce them in perfection. It would be absurd, however, to imagine, that for every particular vegetable there is to be a particular soil prepared.

3238. *The varieties of soil in any garden may, with propriety, be confined to the following*:—Strong clayey loam, light sandy loam (which are the two grand objects), a composition of one fourth strong with three fourths light loam, half strong and half light, and one fourth light and three fourths strong. These, by a proper treatment, and with the proper application of manures, may be rendered productive of any of the known and commonly cultivated vegetables in the highest degree of perfection.

3239. *In order to improve a soil*, we must be guided much by its nature, so as, if possible, to render it serviceable for general purposes. And hence our duty is to endeavour to hit on that happy medium which suits the generality of esculents, in the formation or improvement of the soil in the kitchen-garden. Such a soil should be sufficiently tenacious to adhere to the roots of plants, though not so much so as to be binding, which would certainly retard their progress and extension in quest of food. Hence a loam of a middle texture, rather inclining to sand, may be considered as the most suitable soil for the purpose here in view, and that on a double account; viz., the greater part of the valuable kinds of kitchen vegetables delight in such soil, and it is worked at less expense than a stiff one; and in severe droughts it is neither apt to crack or be parched, nor in hard frosts to throw out tender plants or seeds.

3240. *If soils be too strong*, the tender roots of plants push weakly in them, sicken, canker, and perish; and if a soil be too light, and poor withal, plants deposited in it will push their roots far in quest of that stability and nutriment which is essentially necessary to their support. So that, if our aim be the production of wholesome and well-matured vegetables, we must attend sedulously to the formation of a proper soil, and not trust entirely to the force of dungs, as by too free an application they have a bad effect on the quality of esculents.

3241. *Where the bottom is wet, and the subsoil of a cankering nature*, it may be improved by judicious draining: where the soil is stubborn, by the addition of small gravel, sea-sand wherein is a considerable quantity of small pebbles and shells, coal-ashes, lime, gravel, pounded brickbats, brick-kiln ashes, &c.; but, above all, by being carefully laid up in ridges in the winter months, and indeed at all times when not in crop, in such a manner as to give the greatest extent of surface for the weather to act upon: where the soil is a poor sand, or gravel, it may be improved by the addition of clay, or strong clayey loam, scourings of ditches which run through a clayey subsoil, pond-mud in a like situation, or scrapings of roads which lie in a clayey district, &c.

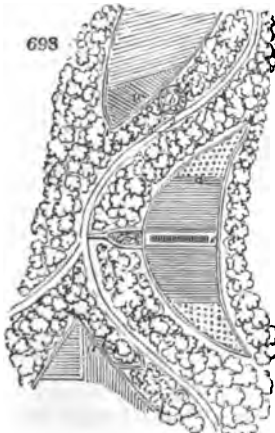
3242. *Soils that abound with metallic substances*, and which generally make them appear of an iron colour, are termed fox-bent or till. These substances are often found

to be intimately mixed, or rather consolidated with the soil, in considerable masses, which are adhesive and very ponderous. Such soils are the most unfavourable to vegetation of any, and are quite ineligible for the purpose here in view, without being much improved. For this purpose, lime will be found most serviceable, if judiciously applied, and the soil be frequently turned over by digging or trenching, so that the soil and the lime may be intimately mixed together, and that the atmosphere may have full effect upon them; for without this, the lime will not operate so effectually, nor will the clayey particles of the soil be divided or meliorated so well. It may seem unnecessary to observe, that, according to the quantity of iron matter contained in the soil, lime will be required to reduce it. In order to ascertain this quantity, a magnet will be found useful; and, one of the masses being calcined, and then reduced to a powder, the magnet will separate the iron particles from the soil, showing the proportion of iron and of earth. Thus we may fertilise the soil, taking for the extremes, in ordinary cases, and supposing the lime of a middling quality, 150 and 400 Winchester bushels an acre; applying the lime in a quick or powdered state, and properly working the soil, being careful, in the first place, to drain it of superabundant moisture.

3243. *Ridging up of soil*, as above hinted at, has the happiest effect, especially for stiff soils, and should never be omitted when the ground is not under crop. In dead sandy loams, also, and in cankered gravels, it is of incalculable advantage, and greatly meliorates them: it is a fact proved by experience, that exposing soil to the sun's rays in part, by throwing it into a heap, whereby it is also partly shaded, and trenching it once a month, or in two months, will sooner restore it to fertility than any other process, exclusively of adding fresh matter. Thus, if any ingredient noxious to vegetation abound in the soil, it may be expelled, or be exhaled by the action of the atmosphere, more particularly if the soil undergo a summer and also a winter fallow. In the latter case, however, care should be taken to have the surface encrusted by frost, as often as possible, by turning it, and giving it a new surface each succeeding thaw. (*Gard. Kalend.*, p. 19.)

3244. *The soil intended for a garden may be known by its productions.* "In selecting ground for a garden," Neill observes, "the plants growing naturally on the surface should be noted, as from these a pretty correct opinion may be formed of the qualities of the soil. The subsoil should also be examined. If this be radically bad, such as an iron till mixed with gravel, no draining, trenching, or manuring will ever prove an effectual remedy; if, on the contrary, the subsoil be tolerably good, the surface may be greatly meliorated by these means. In every garden two varieties of soil are wanted, a strong and a light one, or, in other words, a clayey loam and a sandy loam; different plants requiring these respective kinds. For the general soil, a loam of middling quality, but partaking rather of the sandy than the clayey, is accounted the best." (*Ed. Encyc.*, art. *Hort.*)

3245. *General practice.* It appears to be generally agreed on by practical men, that there ought to be between two and a half and four feet of good soil over the whole surface of the kitchen-garden. This depth will rarely be found to exist naturally; or, if it does in some places, it will be deficient in others. The proper heights for the borders and compartments being fixed on, and the whole thoroughly drained, the next thing is to trench the soil to the proper depth from the level or levels of the intended surface, whether these run under or over the present surface, removing all unfavourable subsoil, either to such hollows within the ring-fence of the garden as require to be filled up to a greater depth than that fixed on for the good soil; or, what is preferable, placing it without the garden. This done, the next thing is to introduce as much good soil as will raise the surface to the thickness required. The strongness or lightness of this additional soil must depend on the nature of that already there, and on the object in view. In complete gardens, it may be desirable to have three qualities of soil, viz., a strong loam or light loam, and a loam of medium quality; the latter occupying the borders and about half of the compartments. The soils introduced, therefore, must be such as, with what is naturally there, will effect these objects. If, for example, the local soil is every where light or sandy, then one part, say that destined for strong loam, should receive as much of clayey loam as will bring it to the temperament desired; that for a medium loam a lesser portion, with as much light earth as will bring it to the required depth: and if the natural soil is deemed too light, to that also must be added a portion of



what is more cohesive, &c. It may be observed, however, that the general object, in selecting, forming, or improving the soil for a kitchen-garden, is to obtain, as Nicol expresses it, "a loam of a middle texture rather inclining to sand," such soil being easy to work, little affected by either droughts, rains, or frosts; and the greater part of the valuable kinds of kitchen vegetables delighting in it. All the authors we have quoted above may be said to agree in desiring such a soil for the whole of the kitchen-garden. In peculiar situations, as where villas are built on rocky steepes and other romantic situations, it may become a matter of great difficulty and expense to bring soil from a distance; and it may also be found equally difficult to find a bed for it, by the removal of rock, &c. In such cases, all that can be done is to select the most favourable spots (*fig. 698. a, c*); cultivate them to the utmost, connect them by walks and shrubbery; and place the economical buildings, attached to the garden (*b*), and hot-houses, &c. (*e*), in the most commodious situations, and where they will not interfere with general effects. There are many very productive gardens of this description in the north of Scotland, and in the territory of Genoa.

SECT. VI. *Water.*

3246. *A copious supply of water* is essential to a good kitchen-garden, and, from whatever source it is furnished, should be distributed either in reservoirs or open cisterns, or in pipes, properly protected, over the garden, and in hot-houses. If the supply is from a pond or river, a system of lead or cast-iron pipes may be adopted, and the delivery effected by cocks at proper distances; but if from wells or springs, the delivery should be into open stone or cast-iron cisterns; or, in default of these, into tubs or butts sunk in the earth. In Tuscany, where the inhabitants excel in the manufacture of pottery, immense jars of earthenware are frequently adopted; in the Royal Garden at Paris, sunk barrels; and cisterns of masonry, lined with cement, are general in the best gardens on the Continent. In these gardens, a system of watering is adopted, which, though rendered more necessary there by the climate than it can possibly be in this country, yet in various respects deserves imitation.

3247. *Many kitchen-crops are lost, or produced of very inferior quality, for want of watering.* Lettuces and cabbages are often hard and stringy; turnips and radishes do not swell, onions decay, cauliflowers die off, and, in general, in dry seasons, all the Cruciferae become stunted, or covered with insects, even in rich deep soils. Copious waterings in the evenings, during the dry seasons, would produce that fulness and succulency which we find in the vegetables produced in the Low Countries, in the Marsh Gardens at Paris; and in this country at the beginning and latter end of the season.

3248. *The watering the foliage of fruit and other trees, to destroy or prevent the increase of insects, and of strawberries and fruit-shrubs to swell the fruit, is also of importance; and though the climate of Scotland is less obnoxious to great droughts than that of the southern counties, yet we find that excellent horticultural architect, John Hay, adopting a system of watering in various gardens lately formed by him in the neighbourhood of Edinburgh.*

3249. *The contrivance for watering or washing the foliage of the wall trees in Dalmeny garden, laid out by this artist, deserves particular notice.* Water is supplied to the garden from a reservoir, situated on an eminence, a considerable height above the garden walls. Around the whole garden, four inches below the surface of the ground, a groove, between two and three inches deep, has been formed in the walls, to receive a three-quarter inch pipe for conducting the water. About fifty feet distant from each other are apertures through the wall, two feet and a half high, and ten inches wide, in which a cock is placed, so that, on turning the handle to either side of the wall, the water issues from that side. The nozzles of the cocks have screws on each side, to which is attached at pleasure a leathern pipe, with a brass cock and director; roses, pierced with holes of different sizes, being fitted to the latter. By this contrivance, all the trees, both inside and outside the wall, can be most effectually watered and washed in a very short space of time, and with very little trouble. One man may go over the whole in two hours. At the same time the borders, and even a considerable part of the compartments, can be watered with the greatest ease when required. The conveniency and utility of this contrivance must at once be perceived by every practical horticulturist. The same plan of introducing water is adopted in a garden which J. Hay planned and executed for Viscount Duncan, at Lundie House, near Dundee; and, after the experience of several years, it has been greatly approved of. The water at Lundie is conveyed to the garden from a considerable height, and is thrown from the point of the director with great force, and to a good distance. (*Edin. Encyc.*, art. *Hort.*) A similar contrivance has been applied by the same artist to the walls at Castle Semple, near Paisley. (See *Gard. Mag.*, vol. viii.)

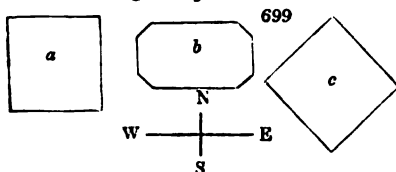
3250. *Water in a garden is absolutely necessary, according to Justice; well water is far from being proper, but that which is impregnated by the sun's rays is highly con-*

ducive to vegetation. He recommends forming a large pond or basin in the centre of the garden, which shall at the same time contain fish. (*Brit. Gard. Direct.*, p. 2.)

3251. *A source of water is considered essential to a garden* by most writers. "Water," Switzer observes, "is the life and soul of a garden; it is one of the most essential conveniences of a country-seat, and especially useful to kitchen-crops; for, indeed, what can be made of any ground without it?" London and Wise, Evelyn, Hitt, and Lawrence are warm in recommending it. M'Phail observes, that a garden, to bring the produce of the soil to the greatest perfection, "should be well supplied with water, to water the plants in dry seasons." (*Gard. Rem.*, 2d edit. p. 13.) If water can be introduced, observes Marshall, "and kept clean with verdant banks around it, it would be very useful where a garden is large; but let it be as near the centre as possible, being the most convenient situation. It should be fed from a spring, and (if it could) be made to drip in the reservoir, because its trickling noise is agreeable music in a garden to most ears." (*Introd. to Gard.*, p. 42.) "If there be no natural stream that can be conducted through a garden," observes Nicol, "water should be conveyed from the nearest river, lake, or pond; soft water being most desirable for the use of the garden." (*Kalendar*, p. 7.)

SECT. VII. Form.

3252. In regard to *form*, almost all the authors above quoted agree in recommending



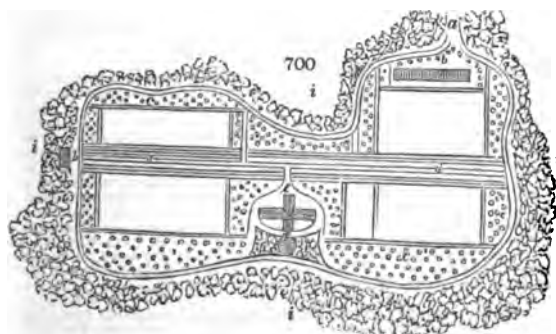
a square (fig. 699. a) or oblong, as the most convenient for a garden; but Abercrombie proposes a long octagon, in common language, an oblong with the angles cut off (b); by which, he says, a greater portion of the wall in the slips behind will be on an equality with the garden as to aspect.

3253. *A geometrical square* is recommended by Hitt, "set out in such a manner, that each wall may have as much benefit of the sun as possible," that is, with reference to the compass, set out as a rhomboid (c).

3254. *A square or oblong form*, M'Phail considers as the most convenient. A square with a semicircular projection on the north side, or a parallelogram with a northern projection in the form of a semicircle, were favourite forms with the late W. Nicol. These opinions, it is to be considered, refer more properly to the space enclosed by walls than to the whole gardens, which ought to be considered as comprehending the entire space included in the ring-fence; which fence, choice or accidental circumstances may produce in any shape, from the circle (fig. 702.) to the most irregular figure. (figs. 698. 700.)

3255. *The oval, polygonal, and trapezium forms* have been adopted for the walls of a garden, in order to procure a more equal distribution of sun and shade; but the inconveniences attending the culture and management of the compartments of such gardens are considerable; nor does it appear an equal distribution of sun is so suitable, as that of having some walls as advantageously exposed as possible for the more delicate fruits, and others less so for hardier sorts, and for retarding fruits.

3256. *Even irregular figures are admissible*: such figures (fig. 700.), being surrounded



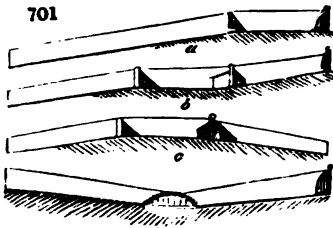
by wood (i), and interspersed with fruit trees, will form very agreeable shapes in walking through them; and, while the compartments are thrown into right-lined figures to facilitate culture, the angles can be occupied with fruit trees or shrubs, permanent crops, as strawberries, asparagus, &c. with the hot-houses (c), or other buildings (e), or with

ponds (f), and other adjuncts. Some of the walks may be wavy (a), as a direction indicated by the outline of wood, and one main walk (d d) may be formed broad and straight, to display the whole.

SECT. VIII. Walls.

3257. Walls are built round a garden chiefly for the production of fruits. A kitchen-garden, Nicol observes, considered merely as such, may be as completely fenced and sheltered by hedges as by walls, as indeed they were in former times; and examples of that mode of fencing are still to be met with. But, in order to obtain the finer fruits, it becomes necessary to build walls, or to erect pales as substitutes. The influence which walls have in increasing the temperature of the air immediately in contact with them is estimated at 7° of south latitude. The mean temperature of a south wall, or within a few inches of one, is equal to the mean temperature in the open plain of 7° farther south. Hence it is, that grapes which ripen in the open air at Bordeaux, require a south wall in the neighbourhood of London, which is 7° farther north. (*Perth Miscellany*, vol. i. p. 43.)

3258. The placing, proportioning, and constructing the walls of a kitchen-garden require the artist to display a degree of taste, as well as a knowledge of fitness and propriety. "If these," Nicol continues, "be properly set down, so as to answer the cast of the ground (fig. 701.), and be raised to proper heights, according to their extent, the rest is easy, and follows as a matter of course.



In this particular branch of gardening, utility and simplicity ought to go hand in hand, otherwise true taste will be wanting. It is not in curves, circles, and ogees we shall find satisfaction. The walls, if the ground admit of it, should all run in direct lines, corresponding to the slopes on which they are placed (*a, b, c, d*); they may be built level, or they may be inclined, so as to suit the general cast of the ground; but the nearer they are to a level the better they will please. The mind is dissatisfied and distracted in beholding any building apparently

unstable. We can look upon a mast placed oblique, or on a tree growing aslant, with firmness and satisfaction, because we know the one is supported by ropes, and the other by roots; but on a wall running much off the level, we look with a degree of distrust or of fear. If the north wall can be placed quite level, and also the south wall on a lower level, and so as that the east and west walls shall fall, from north to south, a foot in thirty or in twenty-five; and if the ground be lengthened from east to west, in the proportion of three to two, the extent being two or three acres, on such a spot may be formed a garden that will not fail to please. Next, on a spot of the above, or of similar dimensions, sloping to the south, and not level from east to west, but declining a few feet, perhaps one in fifty, to the east; in this case the opposite walls should run directly parallel to each other, both with respect to latitude and to inclination, otherwise the eye will be displeased by the distorted appearance of the coping when at the full height. Next, all as here described, and the ground sloping to the south and to the west. And next, a dead level spot, in which case particularly the walls should be of different heights. But ground falling to the north, or much distorted, should be avoided, as being very unfit for erecting walls or other buildings upon; and on which a complete modern garden cannot be formed without considerable difficulty, and a great additional expense." (*Kalend.*, p. 142.)

3259. Walls with a south aspect, as Switzer observes, have been all along reckoned the best for fruits, though later observation and experience have not confirmed it; for when the days are something long, and the heat of the sun in its greatest strength, it is late before the sun shines upon them, and it leaves them early in the afternoon. Besides, when it is mid-day, the sun is so much elevated above the horizon, that it shines but faintly and very slopingly upon them, which makes the heat to be much the less, inasmuch as a smaller quantity of rays fall upon such a wall, it being visible that both before and after noon the sun shines hotter than when it is in its highest meridian. Whence, it is natural to infer, that walls with a little inclination, either to the east or west, are the best aspects; and, of the two, the east and south-east are to be preferred to the west or south-west, though they are as much exposed to the sun as east walls are. As though the sun shines stronger in the afternoon than in the morning, because it continues to act on air already warmed, yet the rays of the morning sun are more healthy and cheerful than those of the afternoon sun, which, experience shows, are generally languid and unhealthy. In my opinion, a south wall, inclining about twenty degrees to the east, is preferable to any other, inasmuch as the sun shines as early on it as on a full east wall, and never departs from it till about two o'clock in the afternoon; besides, it is something removed from those destructive winds that come from the west and north. (*Pr. Fr. Gard.*, p. 312.)

3260. Equality of aspect. Hitt proposes to have no south wall, but by the position of the four sides of his garden (fig. 689. c) endeavours to obtain a comparatively equal distribution of solar heat. The plan he recommends contains two acres, the ground descending from the south-west side. In respect to aspect, he says, the sun's rays continue no longer upon the north-west wall than three in the afternoon, which is best for grapes, peaches, nectarines, and all other kinds of fruit that require the most regular heat to bring them to perfection; for, as apricots, peaches, and nectarines blossom early in the spring, at which time our climate is frequently attended with frosty nights, destructive of both blossoms and fruit, the sun's rays, darting in lines at right angles upon the wall at nine o'clock, dissolve the congealed moisture much

sooner than if they darted upon it at right angles at noon, which they must do if the wall stood due south. 'Tis true, a south wall will receive more sun by three hours, that is, from about three in the afternoon till near six (in the vernal equinox), but that is no great advantage; for before that time of the day the air will be sufficiently warmed. Besides, if the wall be built full south, it will not be so proper for fruit trees as a south-east aspect; for in the middle of the day the sun will cause the trees to exhale their juices faster than their roots can absorb them, which will render the fruit smaller, and the pulp harder and worse flavoured, than those which receive the beat more regularly. The south-east wall receives the sun about nine o'clock, and affords a proper situation for some of the best kinds of winter pears; some kinds of grapes, peaches, and nectarines will ripen well against it; and this has one equal advantage with the south-west wall, viz. that of the sun's rays striking obliquely upon it at noon. The north-west aspects of walls receive but little sun, for it shines not upon them till three in the afternoon; but they will serve for fruits which ripen in summer, as cherries, plums, and some kinds of pears. (*Tr. on Fruit Trees*, p. 53.)

3261. *The best aspect for a fruit-wall in Scotland*, Nicol observes, "is about one point to the eastward of south, such walls enjoying the benefit of the morning sun, and being turned a little from the violent west and south-west winds. South-east is, for the same reasons, accounted by many a better aspect than south-west." Dr. Walker, on the other hand, with reference to the same country, states, that the six hottest hours of the day are from eleven to five o'clock, and that it is not a wall of a south-east, but of a south-west aspect, which enjoys this heat. (*Essays on Nat. Hist.*, p. 258.)

3262. *The height of walls for training fruit trees* generally approved is from ten to twelve feet; but it is more commonly determined by the size and form of the garden, and the inclination of its surface. The following judicious observations of Nicol are the best which have appeared on this subject. The irregular surfaces on which gardens are often obliged to be formed in Scotland, require the greatest attention and nicety from the designer; and hence the fulness of his remarks.

3263. *With respect to the height of fruit walls, considered merely as such*, Nicol prefers twelve feet; that height being very convenient for the operations of pruning, watering, gathering the fruit, &c., and admitting of a sufficient expansion of the branches of most trees. But the height of garden walls should be regulated by the extent, or by the apparent extent, of the ground enclosed by them. The apparent extent is mentioned as well as by the real extent, because it often depends on the form and cast of the ground, in how much the eye shall be pleased. If it be a square, it will seem less than it really is; and if a lengthened parallelogram, larger; and according to its flatness or its elevation, the eye will be deceived.

3264. *A small spot surrounded by high walls has a bad effect and a gloomy appearance.* The walls being of different heights give relief. In a garden of an acre, being a parallelogram of the best proportion, and gently elevated, the north wall may be raised to the height of fourteen feet; the east and west walls to twelve; and the south wall to ten feet above the ground level. If the ground slope considerably, the breakings in the respective heights of the walls may be less; they may be only a foot; and the relief will be the same, or nearly the same, to the eye, in ranging along their surfaces. In a garden of greater extent, the walls may be raised to a greater height; but by no means in proportion, if it extend to several acres. The extreme height of the north wall of any garden should never exceed eighteen feet; and containing, suppose four acres, the east and west walls should be fifteen, and the south wall only twelve feet high, in order that it may give the necessary relief to the eye. In a garden four hundred feet long and three hundred feet broad, which forms a handsome parallelogram, and contains something above two English acres, if the ground lie on an easy slope, a very eligible height for the north wall is sixteen feet; for the east and west walls fourteen; and for the south wall twelve. But if the ground be quite level, or nearly so, the north wall being the same height, the east and west walls should only be thirteen feet and a half, and the south wall eleven feet in height; or the east and west walls may only be thirteen, and the south wall ten feet high, if it be a dead level. (*Kalendar*, p. 145.)

3265. *Fruit walls five or six feet high*, Hitt observes, will do very well for peaches, cherries, vines, and figs, but he would not advise the planting of plums, apricots, or pears, on such walls; they requiring more room, and to stand longer before they bear.

3266. *Fruit walls ten feet high* are preferred by Forsyth, but he says they may extend to fourteen feet.

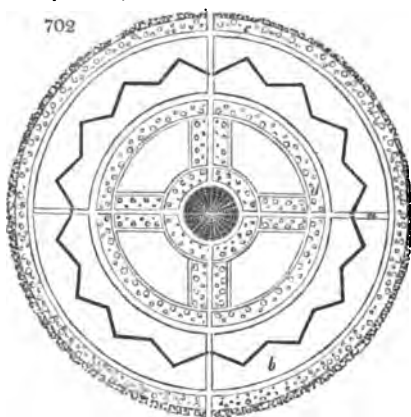
3267. *Many low walls, or stout ranges of palings*, Abercrombie observes, "will produce a greater total effect in accelerating fruit, than the same expenditure in high walls."

3268. *The situation of the garden doors in the walls* demands attention. We have already shown the importance of entering the garden from the south, south-east, or south-west sides; and this circumstance must not be lost sight of for main entrances. Doors in the north wall, or north ring-fence, should be considered as exclusively for the operators of the garden. Doors, in short, should be so contrived, as never to invite visitors to the north slip, or so as to get behind the hot-houses. The width of doors depends on the extent of the garden, and whether the melon-ground and compost-ground are within the walls, or in the external area. In general, the doors in the ring-fence, and the walk round the outside of the garden, should be such as to admit a one-horse cart for bringing in manure and soils.

3269. *The sloping or bevelled walls*, recommended by the author of *Fruit Walls Improved* by inclining them to the horizon, are disapproved of by Switzer, because, "though the author's very curious calculation is, perhaps, no whit inconsistent with truth; yet experience has taught (and that in a sloping wall at Belvoir Castle, I think, of the author's own directing), that though the sun may act with more vigour in its solstitial capacity on a sloping than on a perpendicular wall, yet it is as deficient in its performances in the morning; and by the author's own arguments, as well as the observations of almost every body that has made any observation at all, that dews are expelled at least an hour in the morning sooner from a perpendicular wall than a sloping one; so that what is gained at one time is lost at another." (*Pract. Fr. Gard.*, p. 314, 315.)

3270. *Other modifications of kitchen-garden walls.* Hitt observes, "I have seen some walls stuck with tiles projecting, called horizontal shelters, some built with large pillars, and others with curves: all these are attended with evils of one kind or other; for the horizontal shelters are great receptacles of noxious insects, particularly of the small green and variegated caterpillars. These insects devour the leaves; and eat deeply into the fruit when grown to a good size; so that it perishes and drops off the trees. The shelters are likewise very prejudicial to both fruit and branches, by depriving them of the descending dews, from which they imbibe great nourishment. Large pillars or piers have almost the same ill effects;

besides, they shade the rays of the sun from the trees, part of the day, more or less, in proportion to their size. Though walls built with curves have, in calm seasons, the benefit of more heat than others, yet, in windy weather, the winds from some point or other rebounding from side to side, break and destroy the

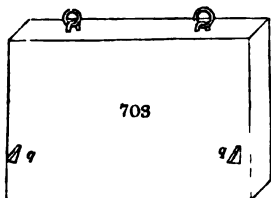


tender branches and blossoms of trees, whereby they are much more injured than the heat reflected from one wall to the other can be of advantage to them. I have found by experience, that walls built straight and upon arches, as mentioned before, are preferable to all others, having a coping which projects about two inches to shoot off the rain, in order to preserve the wall." (*Tr. on Fruit Trees*, p. 40.)

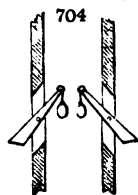
3271. With respect to the construction of walls for kitchen-gardens, the common upright, straight wall is now generally preferred to the sloping, angular, or curved walls, tried in several places about a century ago, and criticised by Justice, Miller, Switzer, and other authors of that day. There may occur cases, however, in which these uncommon forms, and others which we have noticed (2114. to 2433.) may be adopted with propriety. A very good application of the angular wall, when formed of boards, may be made in the case of a circular garden. (*fig. 702*.) At each angle (*a, b*) a light cast iron post with grooves is to be inserted in the ground; and in these grooves, the ends of the boards, say in six or eight feet lengths, are to be inserted, and left without any fastening. If they shrink during summer, being loose, they will only

drop a little, but never show any crevice; and, in order to let the trees be fully exposed to the weather in winter, or to paint, repair, or renew the boards, all or any part of the latter may easily be taken out, leaving the cast-iron props in the grounds, and the trees as entirely detached as if they were standards or border bushes (*d*). In this way, a large surface of cheap and neat walling might be obtained in very little space, and on the whole an agreeable effect produced. A walk, shrubbery, and hedge (*c*) may surround the whole.

3272. *Hollow walls.* Walls, when built of brick, may be constructed hollow, so as to save from one fifth to one half of the materials, and may be as efficient for fruit, as if solid. The various modes of constructing hollow brick walls have been already given. Hollow



walls of stone may be formed by using hollow light deal boxes (*fig. 703*.) three inches in thickness, three feet long, and two feet deep. The boxes are to be used as gauges for preserving the vacuities of the proper width and length; spaces being left solid between the vacuities in order to tie the two sides of the wall together. Each box has two rings in its upper side, by means of which it may be easily drawn up to about two thirds of its height; at which height, two catches (*fig. 704*.) will fly out by means of weights at their tails, as shown at *q q*, in *fig. 703*; and these will hold the gauge boxes in their proper situation till they may require again to be raised. (*Encyc. of Cott. Arch.*, § 1354.)



3273. *Fruit walls, according to Hitt, should be founded on piers,* placing them at such distances as to admit one tree, of the sort proper for the aspect, between, and forming them of dimensions suitable to the size of the walls, and the nature of the foundations. The advantages he states to be, a saving of material, and extended space for the root. If, however, the wall is to be planted with fruit trees on both sides, the latter advantage is imaginary; and, indeed, the construction might often prove injurious, by admitting the hardy roots of trees fit for a northern exposure to intermix with the more delicate ones of such as are planted on a south aspect. Robertson (*Hort. Trans.*, vol. iv. p. 95.) recommends such walls for peach trees, but obviously on the supposition that no use is made either of the north side of the wall or north border.

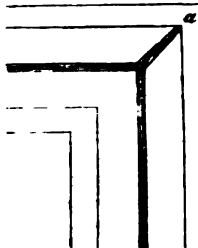
3274. *The foundation of a garden wall, according to M'Phail, should be dug out no deeper than the thickness of good earth on the surface, in order that as little wall may be lost as possible.*

3275. *Fruit walls may be strengthened by piers, according to Forsyth, placed from forty to sixty feet apart, and projecting half a brick beyond the wall.* Such piers are now made round, or rounded off, as the technical term is, which is more convenient for training trees.

3276. *Projecting stone buttresses* are, in some places, set at intervals in the walls, Neill informs us, in order to strengthen them, and break the force of the winds when sweeping along. From the external angles of the walls of Dalmeny Park gardens, where they meet at right angles, a wall (*fig. 705. a*), is extended diagonally about

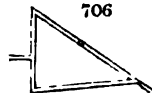
seventeen feet. This extension is found very useful in breaking the force of the wind when ranging along the walls. At the same time it does away, in a considerable degree, the formal box shape of the garden when viewed from the higher grounds in the neighbourhood. (*Ed. Encyc. art. Hort.*)

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feet in height. (*Pom. Française*, p. 78.) T. G. Cullum built, in Suffolk, a nine-inch wall with rounded piers, and copings of slate supported by oaken brackets, projecting a foot from the wall, and found the result answer his expectations. (*Hort. Trans.*, vol. iv. p. 269.); but as fixed copings must be injurious in summer, by excluding light, rain, and air, and harbouring vermin, we should prefer the temporary coping of boards recommended by Miller, Forsyth, and Nicol. The temporary coping used at the garden of the Horticultural Society, at Chiswick, deserves to be noticed, as well as the manner in which it is fixed. The boards are nine inches wide, supported on metallic brackets (fig. 706.) permanently fixed in the wall, and so as to admit the boards to fit exactly below the stone coping of the wall. The boards are rabbeted, so as to fit accurately into each other at the ends, and have holes corresponding to those in the upper part of the bracket, through which a short bolt is passed and fixed with a cotter, or spare nail, below. Three men will put up such a coping on 1000 feet of wall in two hours. On the upper side of the boards, near the edge, small hooks are screwed, for fastening netting, &c., and also cord lines to serve as rafters for supporting the same: the latter slanting so as to admit of room sufficient to walk between them and the wall.

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3278. *With respect to the materials for kitchen-garden walls*, brick is almost universally preferred. Forsyth says, "Where brick cannot be got, it is better to dispense with walls altogether, or to adopt wooden ones." Brick, Nicol states, is best for the superstructure, and stone for the foundation and basement. Bricks give more warmth, and answer better for training trees upon than stone. South, east, and west aspects should therefore be faced with brick, if the wall be not entirely built of it. If the wall be built entirely of stone; or be backed with stone, though faced with bricks, and trees are to be trained against such backing, the stones should be run in regular courses of from four to seven or eight inches thick, and be each fifteen or twenty inches in length, in order that there may be a frequency of joints, and that the trees may be properly trained against the wall.

3279. *Dark-coloured whinstone* (greenstone, or basalt) is the next best material to brick, when properly squared and hammer-dressed, as it absorbs heat; and next to that, a kind of bluish grey stone (sandstone flag), or, in parts of the country consisting of primitive rocks, clay slate that rises in natural flags, the thickness, or nearly the thickness, of bricks, and which require but little dressing, or trouble in building. The nearer the stone approaches to black, the more valuable it is for the purpose; the preference being given to the darkest whinstone, merely because it absorbs and retains heat more than light-coloured stones, and, by reason of its close texture or grain, repels moisture better, or retains less of it, than other stones. But good durable freestone (sandstone), being properly squared, hammer-dressed, and run in courses as above, makes a very good wall for training the more common kind of fruits to; such as apples, cherries, pears, and plums, and may answer very well for east, west, and north aspects. But the better aspects, as south, south-east, or south-west, on which are to be trained apriots, figs, nectarines, peaches, and the finer sorts of pears and plums, should, if at all convenient, be faced with brick, or be built with dark whinstone.

3280. *The basement of the wall should universally be built of durable stone*, if it can be obtained, in preference to brick; whether the superstructure be of brick, or of stone in courses. In many cases it is cheaper than brick; in any case more solid and durable. Supposing a ground-level line to be determined on, the foundation or basement should be sunk at least a yard below it. If for a stone superstructure, it should be thirty inches thick; for a brick and a half brick thick wall, twenty inches; and if for a wall faced with brick, and backed with freestone, two feet, or twenty-six inches thick, according to the size of the stones; that is to say, the basement should generally be six inches thicker than the superstructure, there being a shelf or scarcement of three inches thick on either side of the wall. If the basement be built with bricks, in order to save materials, the scarcement need not be made more than two inches; that is, the half breadth of a brick on either side; so allowing four bricks to the basement, and three to the superstructure. (*Kalend.*, p. 144.) The foundation and basement of walls, Neill observes, are often made of common building sandstone, while the superstructure is brick; and sometimes the back part of the wall is of sandstone, and the front only of brick. Sandstone, which rises in flags, is the best substitute for bricks. Both kinds of materials admit of the branches of the trees being nailed in regularly, and without difficulty. Where brick is scarce and dear, Justice builds the foundation of stone, and lays one course of bricks on that side of the wall which has the best aspect, carrying up the other with stone. In countries where Roman cement of good quality is abundant and cheap, the face of the wall which has the best aspect, or both faces where the aspects are equal, may be coated over with that material.

3281. *Slate walls.* A patent was taken out, some years ago, for constructing garden walls of iron framing, filled in with slate panels, or with panels of flagstone, of earthenware, or even of glass, or any other material. (See *Gard. Mag.*, vol. vi. p. 310.) Slate walls constructed on a different principle, and either built hollow, to be heated with hot water, or steam; or solid, for the sake of retaining the heat, will be found described by Mr. Mallet, in the *Gard. Mag.*, vol. ix. p. 193.

3282. *Trellises against stone walls.* "Where the walls are of common rubble building," Neil observes, "a trellis of spars is sometimes placed against them, and to this trellis the branches are tied with osier twigs or rope-yarn. This is regarded as a very good plan; but the expense is considerable, as, to prevent the lodging of insects, the trellis must be smooth and painted. The trees thus enjoy the shelter and regular heat of the wall, without being injured by its dampness in rainy weather; and as the wall is not injured by the driving and drawing of nails, there are fewer lurking places for the woodlouse and the snail. The rails of the trellis are made closer or wider, according to the nature of the tree to be trained against it. In a few instances, in Scotland, walls have been built of different kinds of whinstone, chiefly greenstone and basalt." (*Edin. Encyc. art. Hort.*) In England trellises are frequently formed by stretching copper wire, one sixteenth of an inch in diameter, in horizontal lines eight inches apart; the wire being fastened to the wall by cast-iron nails, with eyes (fig. 526.), through which it is passed.

3283. *The courses of bricks in kitchen-garden walls,* some artists require to be laid horizontally, or on a level; but Hitt, Nicol, and most modern designers, prefer them laid in lines parallel to the surface of the border, which, besides presenting a more agreeable effect to the eye, answers better for lateral or horizontal training, in which, when adopted on such walls, the shoots are laid in parallel to the courses of brick and the surface of the ground. Were they laid in horizontally, there would necessarily be an unsightly blank at the top and bottom of each tree. This is a matter deserving attention, both on account of economy and the effect produced.

3284. *Many different kinds of wooden walls* have been described (2424.), and one or other of them may be adopted in small gardens, or in particular situations. Nicol affirms (*Kal.*, p. 148.) that fruits may be produced on wooden walls, in as high perfection as on those of brick. He acknowledges them, however, to be less durable. Switzer describes a wooden fruit-wall, made from the boards or sides of "old shipping, which may be had at sea-port towns, and is, indeed, some of the best for fruit of any, not excepting brick walls; for, being pitched and tarred, on account of its preservation before it goes to sea, time and the salt water, and the different climates through which the vessel sails, so harden and incrustate the planks, that the heat of the sun strikes upon it to a degree not to be borne withal, as all that make voyages at sea can testify. These kind of wooden walls are generally made at half the expense of brick, and will last many years; and you may nail tolerably well into them."

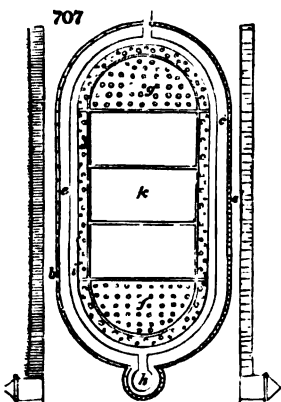
3285. *Mud walls.* A sort of walls to save bricks are made of mud; "but I do not," says Switzer, "thereby mean such as were in old times made of those coarse materials, though I have, I confess, often seen good fruit on them, but such as they make at this time in Dorset and Wiltshire (dry climates), chalk and mud mixed together, with a proportionable quantity of old hay or straw mixed with it. These walls, when the foundations are laid of brick, or stone, or chalk, two or three feet high, which they often do, make very good walls for fruit trees. (*Pract. Fr. Gard.*, p. 300.) The great durability of cob-walls, which are of this description, when constructed with a stone foundation and secure coping, is attested in the *Encyc. of Cott. Arch.*, § 838. to § 842.

3286. *Open railings, or lattice-work of timber or cast iron,* are sometimes used as substitutes for walls. The garden of the Duke of Chandos (Pope's Timon), at Edgeware, was surrounded by a wrought-iron rail twelve feet high. We have, in the case of a garden of a north aspect, employed an open railing (fig. 707. b) instead of the south wall, and a boarded wall (a) as the fence on the north side. The advantage of this plan is, that the south border (c) of the north wall is sheltered at all times, and the north border and walk of the south rail (e, i) are exposed to the sun during winter and spring, when the trees trained against the rail are defoliated; while in summer, the same border is shaded by the foliage of the trees, and thereby as well adapted for salading and late crops, as the north border of any opaque wall. This garden had round ends; the semicircular compartments (f, g) formed by which were devoted to fruit-shrubs; and the other compartments (k), being rectangular, to the culture of the ordinary annual crops: at one end was a building (h) serving as a tool-house and watching-lodge.

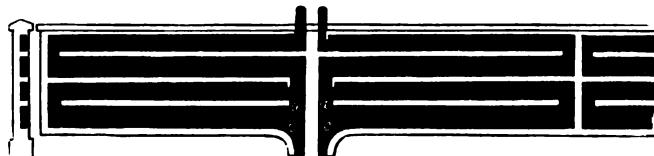
3287. *Hot or flued walls* have been in use in kitchen-gardens for more than a century; but till lately they were confined to walls with southern aspects. At present, however, it is not uncommon, where all the four walls of a quadrangular kitchen-garden are of brick, to flue the whole of them. The expense of a flued wall is exactly the same as that of a solid one, what is lost in labour being gained in materials; and it is found of great advantage, in cold and late autumns, to apply fires for even two or three weeks, as well to ripen the wood, as the remaining fruit. An improvement

in the construction of flued walls has been made by Mr. Sheilla, of Erskine House, which may be thus described. In the wall (fig. 707.) there is an open space *c*, over the fireplace, where the smoke and heated air enter the flues; and here, at *a*, a damper is placed for regulating the admission of the heat throughout the whole wall. By drawing this damper a few inches, a certain portion, at the pleasure of the operator, of the hottest air, direct from the furnace, is allowed to ascend direct to the third flue, which thus renders the upper portion of the wall as hot as the lower part, without the necessity of any variation whatever in the construction of the brickwork. (*Gard. Mag.*, vol. viii. p. 670.) Flued walls may be heated by steam or hot water, as well as by smoke or hot air; but there is this great advantage of adopting steam or hot water, that regular flues are unnecessary, all that is required being to construct the wall hollow from bottom to top, introducing at the height of eighteen inches or two feet from the level of the ground a single tube for the circulation of the heated fluid.

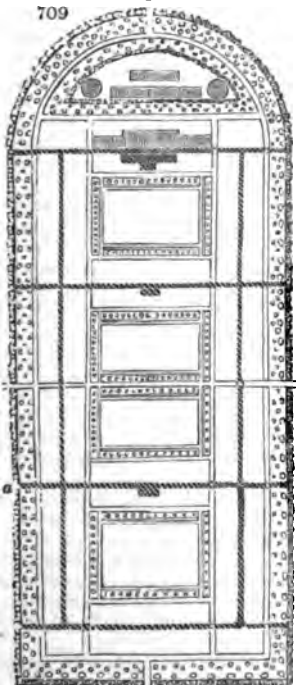
3288. *Cross walls* (fig. 709. *a*, *b*) are introduced where the boundary wall is not sufficiently extensive to produce the desired quantity of fruit, and also to produce shelter to the garden. They are very generally flued walls



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in all modern gardens north of London, and are not unfrequently wholly or in part covered with glass. The direction of these walls is almost universally east and west, and their height is determined by the surrounding walls to which they are joined. These cross walls, Nicol observes, are not placed nearer to each other than 100 feet; if they be 200 feet separate, it is perhaps better.



3289. *Hedges are sometimes introduced instead of cross walls*; but it is obvious they possess only two of their advantages, that of affording shelter and shade. Where they are adopted for these purposes, evergreens, as the holly, box, laurel, spruce, &c. are to be preferred to deciduous trees; as, from their surface being, at all seasons of the year, more compact than that of deciduous hedges, they are less liable to harbour birds and vermin. No hedge has a finer effect than one of shining green holly, decorated with its coral berries. (See *Hort. Trans.*, vol. ii. p. 354.) An admirable garden hedge might be formed with the greatest rapidity, and with certainty of being uninjured by insects, by covering a cast-iron trellis with giant ivy.

3290. *Colour of walls.* Garden walls are generally left of the native colour of the material of which they are constructed; but they have been also coloured white or black, and the latter colour frequently preferred, as absorbing and radiating more heat than any other, and thereby accelerating the maturity, and improving the quality of fruits. (*H. Dawes*, in *Hort. Trans.*, vol. iii. p. 390.) From various trials, it appears that fruit-walls of every description, in the open air, may be blackened with advantage; but under glass, white is preferable, as reflecting light, which is there obtained with more difficulty than heat.

SECT. IX. *Ring-fence and Slip.*

3291. *The ring or outer fence of a garden is generally placed at some distance from the fruit or main walls. The object is to admit the use of these on both sides, as well as to obtain a portion of ground in addition to what is enclosed. This fence may either be an evergreen hedge, paling, low wall, or sunk fence, and with or without a wire fence to exclude hares and rabbits. It may be placed at any distance from the walls, according as accidental circumstances, or the purposes to which it is intended to devote the intervening space, may determine. This space is technically called the slip, and, according to M'Phail and most authors, should not be narrower than thirty feet, nor so wide as to throw the plantation for shelter too far off to produce its effect.*

3292. *The breadth of the slip, according to Nicol, should be at least twenty feet, in order to afford a sufficient border for the trees, and a walk; but it may be as much more in breadth as may be necessary to give ground without the space enclosed by walls for the supply of the family, and it may be enlarged on all sides, or on any particular side, for that purpose. (Kal., p. 6.) The garden, Forsyth states, should be surrounded with a border, or slip, from forty to sixty feet wide or more, if the ground can be spared; and this again enclosed with an oak paling, from six to eight feet high, with a *cheval de frise* at top, to prevent the people's getting over: it will also strengthen the paling. By making slips on the outside of the garden wall, you will have plenty of ground for gooseberries, currants, strawberries, &c. You may allot that part of the slips which lies nearest to the stables (if well sheltered and exposed to the sun) for melon and cucumber beds; and you can plant both sides of the garden-wall, which will give a great addition to the quantity of wall-fruit. (Tr. on Fr. Trees, p. 294.)*

SECT. X. *Placing the Culinary Hot-houses and Melon-ground.*

3293. *The situation of the hot-houses of a kitchen-garden is as various as the size and form of gardens. In very extensive establishments, as at Kew, and the Royal Gardens, Kensington, a garden or walled enclosure is entirely devoted for this department, including also the frame or melon ground. In ordinary cases, however, the culinary hot-houses are either placed against the north wall of the garden, or against one or more of the cross walls. Sometimes they are placed in the slip, which is made wider on purpose, either on the east and west sides of the garden, or to the north, when it is situated on a considerable declivity. Their effect, however, is almost always best when situated within the walls of the garden, either attached to, or on the north or cross walls. In this way they are sources of greater interest to the proprietor, and come more naturally into the general course of promenade than by any other arrangement: for it must not be forgotten, that the pleasure or satisfaction derived from even culinary hot-houses does not wholly consist in being put in possession of certain fruits of excellent quality (for, if so, recourse need only be had to public markets), but in marking the progress of the trees or plants on which these fruits are grown, in all their different stages; and, as Nicol observes, in being able to say, "These are the products of my own garden."*

3294. *Placing the hot-houses in a range with a directly south aspect, or one inclining to the east, is recommended by Nicol; and it may be here observed, that what is a desirable aspect for the best walls of a garden, will also be the best aspect for the hot-houses. By placing them in a range, "there will be an evident saving in the division or end lights, besides the saving of labour and time to those who attend to them. Being properly arranged according to their different lengths, breadths, and heights, very much beauty and variety may be given to the whole appearance." (Kal., p. 272.)*

3295. *The hot-houses occupy a considerable part of the south wall, Neill observes, "in many gardens. In the area behind them are sheds for tanners' bark, rich mould, and other requisites: while there is a cart-access to the doors of the furnaces, and these with the rubbish necessarily attending the operations of forcing, are completely hidden from view. In some places all the forcing-houses form a continuous range; but generally the pine stove and succession pit, being of different dimensions, are placed separately." (Edin. Encyc. art. Hort.)*

3296. *Culinary hot-houses should not be mixed with houses for plants of ornament. In some old ill-arranged places, the green-house and plant-stove, or botanic hot-houses, are united with those destined for culinary products, and this is very suitable, or is rather a matter of necessity, in places on a moderate scale; but where variety and effect are taken properly into consideration, the ornamental or curious productions of gardening will be kept separate from those whose beauty consists entirely or chiefly in their utility. In this way, two distinct and strongly marked characters are produced, instead of scenery of a mixed, and, as it were, neutralised character.*

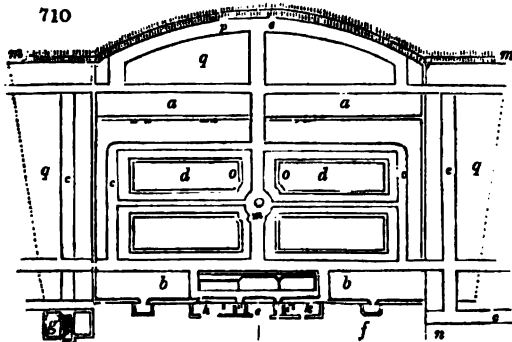
3297. *The situation of the melon-ground is generally in the slip; and, where the range of hot-houses are placed on the north wall, with the ground sloping, so as to shorten the*

shadow thrown by this wall in winter, when the sun is low, the melon-ground is with great propriety placed in what may be called a bay of the slip behind the north wall (fig. 709. c). This may almost always be the case when the compost-ground and melon-ground are placed adjoining each other, as the part most liable to be shaded may be devoted to the former. "The reasons," Forsyth observes, "for allotting part of the outside slip next the stable, to hotbeds for raising melons and cucumbers, are, first, because there will be no litter to carry within the walls to dirty the walks; secondly, the beds will not be seen from the garden; and, lastly, there will be a convenience in carrying the dung, by which a great deal of time will be saved in carting and wheeling. It will be necessary, especially in exposed situations, to enclose the melon-ground with either a wall or paling from six to eight feet high. It was formerly a practice to enclose melon-grounds with reed-fences; but, although these are tolerably warm, and are easily removed from one place to another (being made in separate panels), they are very apt to harbour vermin." (*Tr. on Fruit Trees*, p. 295.) In Dalmeny garden, Neill informs us, the melon-ground is situated on the east side of the garden, the garden-wall being extended on the north of it to the same height as the other walls, and flued like the rest of the walls which have a south aspect. The pine-stoves and pits are placed in this melon-ground. (See *Gard. Mag.*, vol. i. p. 199.)

3298. The mould and compost ground, as above suggested, should generally be combined with the melon-ground, and will be most convenient, if placed between the pits and hotbeds, and the garden wall on which the range of hot-houses is placed; and thus, when the melon-ground is placed in the bay behind the north wall, the compost-ground occupies a space that would otherwise be too much shaded for hotbeds or pits.

SECT. XI. Laying out the Area.

3299. The area, or space enclosed by the garden walls (fig. 710. a, b), is usually formed



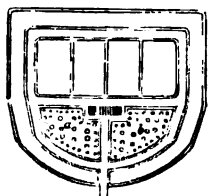
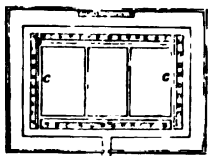
into compartments, very commonly called quarters (dd), and borders, or narrow slips (a), running parallel to the walls (b) and walks (c). The magnitude and number, both of compartments and borders, as well as of the walks, depend on the size of the garden, and partly also on the taste of the designer. Rectangular figures are almost universally preferred for both. The breadth of wall-borders ought generally

to be the same as the height of the accompanying wall; the borders may be broader, but do not produce a good effect when narrower. In a garden of an acre within the walls, the walks are never less than six feet broad, the surrounding or wall border from ten to thirteen feet, and the marginal borders from seven to eight feet wide. In the latter, an espalier rail is frequently fixed about five feet from the edging of the wall; in other cases, the trees are planted along the middle of the border, and trained as dwarfs; an alley or path, commonly two feet wide (o), separates the borders from the compartments. In the slip may be formed irregular compartments or borders (q), the gardener's house (g), and the compost and melon-ground (f). The fence on the south side may be an open railing (p), and on the north a wall or close holly-hedge, the whole surrounded by a plantation nearer or more distant, according to circumstances. The hot-houses being placed against the north wall (b), behind them are placed the sheds, and on a moderate scale these may contain a working-room (h), fruit and seed-room (e), tool-houses (k), and the furnaces (i). To the open space behind (f), for composts and hotbeds, there should always be a carriage entrance (n), for bringing in earth, fuel, dung, &c. In the centre of the garden may be a fountain or basin of water (m), and in the gardener's house an upper bed-room to overlook the whole. In smaller gardens (fig. 711.) the same general plan is adopted, as far as their extent admits. Where ornament is to be combined with use, the standard fruit-trees and shrubs may be planted in borders accompanying the walks (c c); but where economy of ground is the object, the trees and shrubs may be collected together in compartments (a, b), and borders altogether omitted.

3300. In laying out the compartments of a garden, Forsyth observes, "you must

be guided, in a great measure, by the form and size of the garden; but do

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not lay them out too small, as in that case a great part of the ground will be taken up with walks and borders. The best figure is a square, or oblong, when the garden is of that form; but if not, they may be laid out in any other figure that is thought to be most convenient." Some of the compartments, in some of our best gardens, Neill observes, are laid out in beds four feet wide, with narrow alleys. So many alleys, no doubt, occupy a deal of room; but advantages of convenience and neatness, in enabling the workmen to clean and gather the crop, without trampling the ground, seem to compensate the sacrifice of space. For currant, gooseberry, and raspberry bushes, the compartments are, of course, reserved undivided; and narrow beds are unnecessary in the case of large perennial plants, such as artichokes or rhubarb.

3301. *Laying out the borders.* Abercrombie recommends the borders next the walls to be made of prepared soil, "from eight to twelve feet wide, and the same description of soil extended under the walks, in order to allow a liberal width for the roots to spread without impediment. Next to the borders, leave a space for a

walk entirely round the garden, from four to six feet wide. Some persons also choose to have a border on the inward side of the walk, for the cultivation of espaliers, and esculents of dwarf growth; others divide the central parts at once into main compartments or divisions. The walks or alleys must be regulated by convenience of access. Where the ground is extensive, the centre should be traversed by a walk, with parallel borders, from which cross walks may branch, if necessary." (*Pr. Gard.*, p. 4.) The borders under the walls, Forsyth observes, should, in the inside, be from ten to twenty feet wide, according to the size of the garden, to give full liberty to the roots of the trees to spread. There should be a footpath, about two feet and a half from the wall, for the greater convenience of nailing the trees, gathering the fruit, &c. This walk should be from two to two feet and a half wide (to admit a barrow or barrow-engine for watering the trees), and covered with sand; or, which is better, coal-ashes, about two or three inches thick, but without any gravel or rubbish below. (*Tr. on Fruit Trees*, p. 294.) The borders for wall trees, according to Nicol, should not be less than twelve feet in breadth; but fifteen or eighteen feet is not too much. That is to say, the soil should be prepared for these breadths, if it be not naturally good, and perfectly answerable for the different kinds of trees to be planted. For our own parts, we are inclined to think, with a writer in the *Gardener's Magazine*, vol. ix. p. 321., that "before long, instead of having a border of ten or twelve feet wide close to the wall to be constantly dug and cropped, and a gravel walk, four or five feet wide beyond it, we shall see a wide gravel walk close to the wall, over a previously prepared border." This plan would be better than the present one of deep digging the borders; but, in our opinion, it would not equal, either in usefulness or in appearance, that of mulching the borders, and of forming the walk of flag-stones, supported by piers, as recommended by us in the *Gardener's Magazine* on various occasions.

3302. *Preparation of fruit-tree borders.* It is not enough, Nicol observes, that the upper soil of a border only be improved. The subsoil must also be attended to, and be laid comfortably dry; otherwise success in the rearing of fruits will be precarious and doubtful. Draining is the basis of every improvement in horticulture, being the basis of improvement in the soil. In this particular case, of preparing fruit-tree borders, it is indispensable. It is also necessary that the roots of the trees be kept out of the subsoil, if it be of a cankering quality, as till, clay, or corroding sand. This matter has appeared evident to many, and various means have been taken to prevent them from getting down to a bad substratum, at much trouble and expense. The following method, Nicol observes, is the least expensive and most effectual of any, and has been successfully practised for several years.

3303. *Forming an impervious bottom to borders.* If the subsoil be wet and cankering, let the border be cleared out its whole length, to the depth and breadth before mentioned. Lay the bottom in a sloping manner from the wall to the walk, giving it a fall of six or eight inches. Run a drain along by the conjunction of the border and walk, a few inches lower than the bottom thus formed, which shall be capable of completely draining off both under and surface water. It may be a rubble-drain, or a box drain, according to necessity. Now, lay over the bottom, thus formed and smooth, two inches of good earth, if clayey so much the better, which pulverise and pass the roller over; then an inch of clean pit or river gravel, which also pass the roller over; another

inch of earth, as above, which also roll; and, lastly, an inch of gravel, also, as above. This should be done with the materials rather in a dry state; but when completed the whole should be moistened moderately with a watering-pot, and rolled until the surface acquires a hard shining consistency. Keep rolling and watering alternately, till the whole becomes firm and glazed, and till the earth and gravel be intimately mixed and incorporated. Thus may a bed be formed for the roots of fruit trees, much superior to one of stone or brick; at an expense greatly less; and of a nature more kindly, which no root will penetrate.

3304. *Prepared soil for borders* should be thrown in, having been previously laid up in a ridge, along the outer edge of the border, before the floor thus made get damaged by wet, or other accidents; and care must be taken that at no future period it be disturbed in digging or trenching the border.

3305. *A fit composition for apples, apricots, cherries, and figs* is, three fourths of rich lightish earth, and one fourth of strong loam; properly composed, and moderately enriched with cow-dung, or a mixture of cow and hog dung, or of cow and stable dung; avoiding the latter, however, when the two former can be obtained, as the coolest dungs answer best for fruit trees. The average depth of the borders for these kinds of trees should be thirty inches.

3306. *A very fit soil for peaches, pears, and plums*, is three fourths loam, and one fourth sandy earth, being well mixed, and moderately enriched, as above. The depth for peaches and nectarines may be thirty inches, as above; but for pears and plums, it should not be less than three feet on the average, that is, two feet nine inches at the wall, and three feet three inches at the wall, or thereby. (*Kal.*, p. 153. See also Harrison's *Treatise on Fruit Trees*, in which the subject of the preparation of borders is treated of in detail.)

3307. *Where the expense of forming proper soils for fruit-tree borders is not incurred*, it is necessary to adapt the kind of trees to the soil. On soils, Neill observes, "naturally very light, gravelly, and sandy, peaches and nectarine trees do little good; it is better to plant apricots, figs, or vines, which agree with such soils, and, when trained against a wall having a good aspect, will, in the southern parts of the island, afford excellent crops of fruit. On such soils, even espalier and dwarf standard apple trees are short-lived, subject to blight, and produce only stunted fruit. Next to renewing the soil, the best remedy is to engraft and re-engage frequently, on the best wood of the trees, giving the preference to grafts of those kinds which experience has shown to be the most productive and healthy in that particular place. In shallow soils, some have been in the practice of making troughs or hollows, and filling them with rich earth, for the reception of the trees; but this is not to be approved of; the roots of the trees will probably be confined to the trough, and it is possible that water may be retained in it." (*Edin. Encyc.* art. *Hort.*)

3308. *The number and breadth of walks*, Marshall observes, "must, in a great measure, be determined by the quantity of allotted ground, exceeding in these particulars where there is room. But few and wide walks are preferable to many contracted ones. If the garden is small, one good walk all round is sufficient; and if long and narrow, the cross walks should not be many: six or eight feet walks are not too wide for a moderate-sized garden." The middle walk, according to Forsyth, "should be about seven feet, which is wide enough to admit a cart; and the others about three or four feet broad, with a border on each side, five or six feet wide, at least, between the walk and the fruit trees." "If the garden be very extensive," Neill observes, "the centre is traversed by a broad walk. If it be of the largest dimensions, and possess a cross wall or cross walls, the arrangement of the walks requires to be altered accordingly; a main walk proceeding directly to the door, in the centre of the cross walls."

3309. *A walk should always proceed from the main entrance to the main object of the garden.* The entrance, as already observed (3217.), should either be in the centre of the south-east or west walls. Where there are hot-houses, it should, if possible, be in the south wall, and from it a broad walk with suitable borders should proceed direct to the centre of the garden, and across it to the centre of the range of hot-houses. Main walks in square or parallelogram gardens, entering from whatever point, should, in general, proceed to the centre; but in long octagons or irregular gardens, diagonal walks, though they occasion a little more trouble in culture, have a noble effect. It is almost needless to observe, that no main walk ought ever to terminate abruptly, or look to a mere blank, a defect, or an unsightly object. These, and various other points of the greatest consequence as to future effect, must be left to the taste of the designer.

3310. *Gravel is almost universally considered the best material for walks*; but there are various substitutes. "Sand," Marshall observes, "may be adopted for walks, and there is a binding sort of it that does very well; but lay not any of it too thick, as it is the less firm for it. Drift-sand is a good substitute for gravel. Coal-ashes, strewed thinly in the alleys, are better than nothing, as they at least serve to keep the feet dry and clean. If the garden be a strong soil, these ashes (when worn down) should be thrown out of

the walks, with a little of the earth, and will prove a good manure for the compartments." (*Introd. to Gard.* p. 35.) A binding sand, Forsyth says, "makes good walks, and they are easily kept; for when moss or weeds begin to grow, they may be cleaned with a horse-hoe, or scuffed over with a Dutch hoe, in dry weather, and raked a day or two after, by which they will be made always to look neat and clean. I, however, give the preference to sea-coal ashes, which, in my opinion, make the best walks for a kitchen-garden, and they are easier kept than any others, being firm and dry, and cleaner to walk on than sand, especially after frost." Sand may be made to bind by mixing it with pulverised clay. Loose water gravel, gravel from the sea-shore, which is commonly mixed with decayed shells, and, in short, every description of loose stony material, may be consolidated into one compact mass, by being mixed with such a proportion of burnt clay, in powder, as will fill up all the interstices. The clay may be burnt in heaps with fagot wood, by any gardener or common labourer; or on a very large scale in movable kilns, such as are described in our *Encyclopædia of Agriculture*. Where a walk is already laid with loose gravel, something may be done towards rendering it firm, by strewing the surface with powdered clay before heavy rains; or, by strewing it with Roman cement and powdered clay, or sand, and washing it in by copious waterings from the rose of a watering pot.

3311. *Grass walks may do where gravel is scarce*; but the latter is so clearly preferable, that, except for a little variety in large gardens, where there are many walks, grass walks will hardly be made choice of, as they are troublesome to keep in order; and if much used are apt to get bare, and out of level, especially when narrow: they are also frequently damp to the feet. Chamomile has been used also to form green or carpet walks, planting it in sets about nine or ten inches asunder; which naturally spreading, the runners are fixed by walking on them, or rolling.

3312. *Edgings to walks are essential to the beauty and completeness of a kitchen-garden*, though, in some cases, verdant edgings are dispensed with. According to Marshall, the borders should have their outer edges, in contact with the walks, made up firm and even. Where the design or intimate communication with the house requires *edgings*, box is superior to every thing else. In extensive kitchen-gardens, edgings of vegetables, particularly of box, are dispensed with as inconvenient, and apt to harbour slugs. At the same time the margins of the beds and main walks should be kept even and well defined; for this purpose, nothing is more neat and lasting, or better fitted to save trouble, than narrow edgings of brick a single course wide. In the interior compartments, parsley may be sown for an edging; or slips of thyme, winter savory, hyssop, and other aromatic herbs, may be planted; and as long as such herbs flourish, or remain ungathered, they form a verdant edging, in character with the kitchen-garden. (*Introd. to Gard.* p. 5.) Border-edgings, Neill observes, are not in use, except for the walks next the walls, and the cross walks in very large gardens; for these, dwarf-box is almost universally employed.

3313. *In laying out the slip or exterior area of the kitchen-garden*, those parts not occupied as the melon or compost-ground are disposed of in two borders: the one for fruit, surrounding the wall, and of suitable breadth and composition as to soil; the other next the boundary, of such breadth as the width of the slip allows. The walk between these borders should, in gardens of one or more acres, be made of sufficient width to admit a one-horse cart to make the circuit of the garden, so as to bring in manures, soils, fuel, &c. to any of the wall-doors, for the purpose of being wheeled into the inner garden. The outer border is commonly occupied by low fruit shrubs, or common kitchen crops; but in small places, and where the garden is of a mixed character, it is arranged as a shrubbery; and, where Forsyth's advice is taken, the shrubs are mixed with the more hardy fruit trees.

3314. *A reserve and nursery department* should always be formed in the slip, at least in gardens where any thing like beauty or perfection is aimed at. The use of this compartment is to preserve or raise plants, some in pots, others in the open ground, to supply vacancies within the walls. Whatever crop is sown or planted in the garden, a small portion of it should, at the same time, be sown or planted in the nursing department, some in pots, and others in the open ground; by which means, when any blanks occur in the former, they can be filled up from the latter. One part of this department should be devoted to propagating fruit trees and fruit shrubs for the same purpose, and also for giving away to poorer neighbours, and for stocking cottage and farm gardens.

3315. *The best seasons for forming a garden* are the spring and summer; but, at all events, at whatever time the operations are begun, they should be arranged so as to be finished early in autumn, to admit of planting the fruit trees and laying the edges of the walks at that season, or very early in the spring. The reader who wishes to enter more into detail of the various subjects treated of in this chapter may consult the *Gardener's Magazine*, vol. i. p. 199; v. p. 28; vi. p. 669; vii. p. 679; viii. pp. 425. 549. 659. 671; and vol. ix. pp. 15. 46. 193.

CHAP. II.

Of the Distribution of Fruit Trees in a Kitchen-garden.

3316. *To select and arrange a proper collection of fruit trees, and plant them in their appropriate situations, is the next step in forming a kitchen-garden.* This subject naturally comprehends, 1. *Wall-trees*; 2. *Espaliers and dwarf standards* for the borders; 3. *Standards* for the compartments; 4. *Fruit shrubs*. As a point of practice common to each of these divisions of fruit trees, we may mention that of registering their names either in series (2216) on a plan of the garden, or by reference to numbers attached to the trees, cut in tallies placed by them, stamped in lead and hung on them, nailed to the wall or espalier-rail, or written on labels of different kinds, &c. With respect to the varieties of fruits recommended in the sections of this chapter, those who consider them as too limited will find ample choice in our Horticultural Catalogue, Chap. II.

Sacr. I. *Of the Selection and Arrangement of Wall Fruit Trees.*

3317. *Fruit trees adapted for walls* may be considered in regard to the sort of fruit, sort of plant, distance, and planting.

3318. *With respect to the sorts of fruit and their distribution on the different aspects of the walls, the first general principle is, that the more delicate species of trees, as the grape, fig, and peach, are planted against the warmest walls; the next is, that the more delicate varieties of the more hardy fruits, as the cherry and pear, are placed against warm walls; and the last, that such varieties of the hardy fruits as it is desired to ripen very early, find a place there.* The best border and wall, says Abercrombie, should be allotted to the vine, the peach, nectarine, fig, and apricot: let the vine take the first place for aspect, as, in Britain, it is difficult to bring it to ripen out of doors north of London. Where the peach, nectarine, fig, and apricot cannot have a south aspect, the south-east and south-west are the next best. Some early sorts of the apricot will ripen on an east or west wall. The west is the middling exposure, and by no means on a par with the east. The cherry, in general, may have an exposure looking to any point of the compass, except full north, yet choice early kinds deserve a south border, nor do they attain the climax of perfection without. The morello cherry, the pear, the plum, the apple, and the mulberry will do on any wall; but all late fruit is universally improved in proportion to the goodness of the aspect, from the west and east through all the intermediate points to the south, and some of the high-flavoured French pears require a fine wall to grow in perfection. The end of a building is a good site for a free-growing pear tree; which, if a garden wall be not uncommonly high, will require a deal of lateral room. Fig trees also require a long and high wall.

3319. *The sorts or varieties of fruit that may be procured at the nurseries are so numerous as to puzzle an inexperienced person in making the selection.* After all, much is generally, and with propriety, left to the nurseryman, who recommends the sorts most in repute at the time. "I have long made it my business," says Nicol, "to persuade my employers, in the planting of new gardens and orchards, to limit the varieties of fruit, in the firm conviction that I was acting for their interest; for certainly the rage for multiplying them, and of having a numerous collection, has too much prevailed of late. It were better to be contented with a few good kinds that produce well in most seasons, than to plant many sorts for the sake of variety, of which a crop is obtained, perhaps, once in three or in seven years. It is no doubt of very great importance to select and adapt the kinds to the climate, soil, and aspect; and in some situations a greater variety may be planted with propriety than in others. This matter must be determined by existing circumstances, by the fancy of the proprietor, and by the discretion of the gardener." The following list kindly selected for us by Mr. Thompson, of the Horticultural Society's garden, than whom no man in Britain is better acquainted with hardy fruits of every kind, exhibits an ample collection of good bearing trees, and well-flavoured fruits. Those marked with an asterisk (*) Mr. Thompson considers the most valuable kinds, and such as should be preferred in the planting of small gardens, where the walls are of little extent.

Apples.
*Golden Pippin, S., S.E., or S.W.
*Ribston Pippin, E. or W.
*Nonpareil, S., S.E., or S.W.
Cuth, E. or W.
Court of Wick, Ditto.
Reine des Canadas, Ditto, or S.E., or S.W.
Newtown Pippin, S.E., or S.W.
*Cornish Gillyflower, Ditto.
*Court-pendu Plat, Ditto, or E. or W.
*Golden Harvey, Ditto.
*Bourne Nonpareil, S. or W.
*Byke House Ramet, Ditto.
*Braham Bellefleur, Ditto, or N.E., or

Bedfordshire Foundling, Ditto.
Pears.
*Jargonelle, S.E. or W.
*Marie Louise, E., W.
*Gosse's Beaupré, Ditto.
Duchesse d'Angoulême, Ditto.
*Beurré Diel, Ditto.
*Gloist Marston, S., E., or W.
*Vitis d'Ilver, Ditto.
Beurré d'Arenberg, Ditto.
Chausmental, Ditto.
Colmar, Ditto.
*Beurré Beurré, Ditto.
Beurré Rance, Ditto.

Cherries.
*May Duke, S., E., W.
*Royal Duke, Ditto.
*Knight's Early Black, Ditto.
*Elton, Ditto.
*Florence, E. or W.
*Early Purple Guigne, S., E., W.
Black Tatarian, Ditto.
Late Duke, E., W., N.
*Morello, Ditto.
Plums.
*Green Gage, S., E., W.
*Co's Golden Drop, Ditto.
*Washington, Ditto.
*Purple Gage, Ditto.

Blue Impératrice, E. or W.
Kirk's, Ditto.
Drap d'or, S., E., W.

Apricots.
*Large Early, S., E., W.
*Mansueti, Ditto.
*Royal, Ditto.
*Turkey, Ditto.
Breda, E. or W.

Peaches.
Early Anna, S.
*Grave Mignonne, Ditto.

Royal George, Ditto.
*Noblesse, Ditto.
*Mette, Ditto.
*Bellegarde, Ditto.
*Barrington, Ditto.
*Lete Admirable, Ditto.

Nectarines.
*Etrappe, S.
*Violet Hâvre, Ditto.
White, Ditto.
Pimontan Orange, Ditto.
Duc de Tello, Ditto.

Figs.
*Blue or Black India, S.E., S., or S.W.
*White, or Brown Lachie, Ditto.
Black Gamos, Ditto.
White Gamos, Ditto.
*Brown Turkey, Ditto.
Bramwell, Ditto.

Other Sorts.
The Mulberry is sometimes introduced as a wall tree, and planted on a western exposure.

3320. *The sorts of plants made use of for planting against walls* are dwarfs and riders (standards planted against a wall), and these may be of the age of one year from the graft, or they may be several years trained. Dwarfs are understood to be the permanent trees, and riders merely temporary plants introduced to fill up the upper part of the wall. With both sorts it is the practice to make choice of trees that have been two or more years trained; or if they have been moved in the nursery every second year, they may be of five or six years' training, in which case they come into immediate bearing. Some gardeners, however, prefer young plants.

3321. *With respect to the age of the plants*, Nicol observes, "maiden, or one year trained trees, are to be preferred, especially of apples and pears. Even of the stout fruits, such will succeed best; though two or three years' trained are often planted. I here allude to the dwarfs. Riders of greater age than dwarfs may be planted, in any case, with propriety; they being considered temporary, and it being desirable to obtain fruit of them as soon as possible." A safe mode is, to plant partly maiden, and partly trained plants; by which means, those which come early into fruit, should they prove bad sorts, may be replaced by others, or re-grafted with good sorts: meanwhile, those sorts which are approved of will afford an early return for the labour and expense incurred.

3322. *The distance at which wall trees should be planted from each other depends jointly on the sort of tree, and the height of the wall.* For a wall nine or ten feet high, Marshall plants apricots, peaches, and nectarines, twenty feet apart. Nicol, for a wall of twelve feet in height, indicates the following distances: — Apples, eighteen or twenty feet; apricots, twenty to twenty-four; figs, fifteen or eighteen; cherries, twelve or fifteen; nectarines and peaches, twelve or fifteen; pears, twenty-four to thirty; and plums, eighteen or twenty feet. For low walls, of five or six feet: — apples, thirty; cherries, pears, thirty to thirty-five; and plums, twenty to twenty-four feet. The distances at which wall trees ought to be planted, according to Abercrombie, depend on the general growth of the species, connected with these other things: — whether the individual plant has been dwarfed by the mode of propagation, or is a free grower; whether the species will bear to be kept in bounds by the knife; and, lastly, on the height of the wall: thus, a higher wall is a compensation for a reduced distance, and a lower will make it necessary to increase the intervals. Supposing the wall to be twelve feet high, the following are good average distances for planting the kinds named: — Vines, from ten to fifteen feet asunder, or in vacant spaces between other walls where the distance is less, because the vine bears pruning well, and can always be reduced to the prescribed limits. Peach trees and nectarines, from fifteen to twenty feet. Fig trees, eighteen to twenty feet, or more, as the bearers are not to be shortened. Apricot trees, fifteen feet for the dwarf early sorts, eighteen to twenty-four for the free-growers, as the plant does not bear the knife well. Cherry trees, from fifteen to twenty feet. Pear trees, twenty feet, if on dwarf stocks; thirty feet, if on free stocks. Plum trees, from fifteen to twenty-four feet. Apple trees, if on dwarf stocks, fifteen feet; if on free stocks, twenty-five or thirty. Mulberry trees, fifteen or twenty feet. Along the line of the walls only nine feet high, increase the intervals to one fourth as much again; and of walls six feet high, to one half.

3323. *The distance of the stem of the tree from the wall at the ground's surface should, according to most authors, be nine inches; cherries, apples, and pears may be somewhat more; and peaches, nectarines, and vines somewhat less.*

3324. *The intermediate spaces between dwarf wall trees* are commonly filled up with riders, or some other temporary fruit-bearing plant. While the principal wall trees are making progress, Abercrombie observes, "riders may be introduced between them; these should be confined to sorts which are the quickest in coming into bearing, for else, as soon as the trees become productive, it will be time to remove them. Against low walls, currants, gooseberries, and raspberries may be placed instead of riders. Plant a wall tree nine inches from the wall, to give the root some room behind; detach or shorten the roots pointing towards the wall, so that the parts left on that side may not be cramped." (*Pr. Gard.*, p. 189.) On walls ten feet in height or upwards, Nicol plants riders between the dwarf or principal trees, "in order the sooner to furnish the wall; but for low walls it is not worth the while, as gooseberries, currants, or raspberries answer better, and produce fruit more immediately."

3325. *With respect to the mode of planting*, the roots of each plant should be trimmed, previous to being planted, by pruning off the points of those bruised in the taking up, and moderately thinning them out, if thought too thick, or too much crowded. This is seldom necessary for maiden trees, but it is often so with respect to plants that have stood several years in the nursery, or that have been trained against walls or pales, and have made strong roots. The roots should be, in some measure, rendered proportionate to the tops; and as the shoots and branches are to be headed down, or to be well shortened and thinned out, it follows that the roots should also be moderately thinned and pruned. In doing this, however, be careful to retain those most promising, and best furnished with fibres. The surface level being determined on, prepare the pit so that the plant may be placed just as deep in the ground as it was before, and not deeper; spreading out the roots and fibres, and carefully bedding them in the compost prepared for that purpose. Fill in the common earth, gently tread it round the stem, keeping it a few inches clear of the foundation, and secure the plant from the bad effects of high winds, by tacking it to the wall. Proceed thus, tree by tree, till all be planted. They require no further care till March, when it will be proper to head them down. (Nicol.) Most writers agree in recommending November as the best time to plant on absorbent soils, March for heavy or wet land, and February for medium soils.

SECT. II. *Of the Selection and Arrangement of Espaliers and Dwarf Standards.*

3326. *Espaliers or dwarf standards* are planted in the borders of the principal walks in all complete kitchen-gardens. Besides the value of their fruit, they form a sort of counterpart to the trees on the walls, and add much to the general effect of the garden, by increasing the appearance of design; and much to its beauty in detail by the variety of their blossoms in spring, and their fruit in autumn. Some gardeners, however, disapprove of them, or do not consider them of much consequence. "If espaliers are planted," says Marshall, "let them be only fruit of the best sorts, and in spacious gardens, where they may have a good length and height allowed them to grow freely." M^r Phail disapproves of espaliers, as hurtful to crops of vegetables in the kitchen-garden. Forsyth is silent on the subject. Abercrombie says, "Espaliers may be planted in some of the borders, in a row along the inner edge." Nicol observes, "Espaliers, if well managed, are both ornamental and useful in the garden, affording a deal of fruit, yet taking up little room." "Of late years," Neill observes, "some have proposed to banish espalier trees altogether, alleging that they injure the kitchen-garden compartments, by depriving them of sun and air. But in point of fact, they exist in the greater number of kitchen-gardens, and are not likely soon to be laid aside. If they are sometimes injurious, by depriving the plants of air, they are at other times very useful, acting as a hedge in protecting the young crops from the violence of strong winds. Espalier trees generally produce excellent fruit, the sun and air having access to both sides of the tree; they commonly afford abundant crops, and the fruit is not apt to be shaken by high winds. Further, they tend to hide the crops of culinary vegetables from the eye, and to render the walk of the kitchen-garden as pleasant as an avenue in the shrubbery." Our opinion is, that they are chiefly valuable for their general effect; for, the borders being usually dug, their smaller roots are prevented from establishing themselves close under the surface, and the trees in consequence seldom bear well. Were the borders, however, never stirred more than two or three inches deep, and never cropped, there can be no doubt that espaliers would be as productive in fruit as they are agreeable in point of effect. Espalier trees, like wall trees, may be considered in regard to the kind of espalier rail, sort of fruit, sort of plant, distance, and planting.

3327. *The proper situation for an espalier rail*, according to Nicol, is in the border, by the principal walks, and three or four feet distant from the walk. They may be placed on each side of the cross walks, if the garden be not very small; but in that case, they would both confine and overshadow the kitchen crops too much. The railing ought to be plain and neat, four or five feet high, and the upright spars to which the trees are trained, nine inches apart. The posts should be set on blocks of stone, and should be run in with pitch, or, which is a better way, set in blocks of stone, in an iron hose batted into the stone. These blocks, in either case, should be sunk under the surface of the ground.

3328. *Espaliers*, Abercrombie states, "may be inserted three feet from the edge of the border; but if the ground under the walks has not been prepared, five feet will be better. The stem or head of a wall tree or espalier must be planted with a little inclination to the fence or trellis; and nailed or tied, to prevent the wind from shaking it. Espaliers have the branches trained to an upright superficial trellis, standing detached, and thus bear on both sides. Occupying little room, they drip and shade less than standards, but are more troublesome to manage. While young, they may be rendered in some degree ornamental; but as the plants get old, the most skillful pruning can hardly keep the espaliers fruitful, or prevent them from looking formal, unless the order of bearing will allow the old wood to be freely cut out. Not having the benefit of

reflected heat from a wall, there is a distinct motive for training them with a short stem, and with the branches laid horizontally, rather than in a fan-like expansion, and with the highest branches at four feet, or not exceeding six, from the ground; for thus they receive a stronger reflection of sun from the earth. At planting, it is easy to set them to the best aspect."

3329. *The proper kinds of fruit for espaliers and dwarf standards, according to Mr. Thompson, are included in the following list, in which those marked with an asterisk (*) are deemed the most valuable. For small gardens the apples ought to be grafted on paradise, and the pears on quince stocks.*

Apples.	Pears.	Plums.
*Royal coding, Kentish ditto, *Charles ditto, *Royal greenish, *Hutton's pippin, *Duke, Golden reinette, *Royal russet, *King of the pippins, *Golden reinette, *Dutch magnonne, *Court of Wick, *Frost's golden pippin, Hughes's ditto, *Court-pendin pie, *Worcester pippin, Banchamwell, *Baltimore de Canada, *Alfriston, *Brimstone bellflower, *Baldwins' seedling, *Syke House russet.	*Jargonelle, *Summer bergamot, *Warden, Cœur du caméleon, *Beurré de Capmount, *Marie Louise, *Beurré Diel, *Autumn Colmar, *Beurré Rave, *Faint Nells, Besset, Napoleon, *Gloire d'été, *Easter Beurré, *Beurré rance, *Flemish beauty, Duchesse d'Angoulême.	*Green gage, Orleans, *Piedmoulin, *White magnonne bonnet, Blue perdrigon, Purple gage, Washington, Blue impérial, Cœur's golden drop, Kitch's.
	Cherries.	Other Sorts.
	*May duke, Bolman's duke, *Morello, *Kentsh, Royal duke, Eton, Knight's early black, Late duke.	The mulberry, quince, smaller, and service are sometimes introduced as espalier trees, or dwarf standards, especially where there is no orchard.

3330. *Dwarf standards are by some preferred to espalier trees.* Hitt and Switzer approve of them, and Forsyth and Marshall prefer them. Abercrombie approves of dwarfs in common with espaliers, but seems, with M'Phail, to prefer them planted by themselves in the compartments. This we conceive to arise from the peculiar notions that many gardeners have, that the kitchen-garden ought to be a mere place of culture, without any of that neatness, or of those beauties, which would render it a scene fit to be included in the course of walks for recreation. Where different ideas are entertained, and that order, regularity, and neatness are attempted which are to be found in an eminent degree in the kitchen-gardens of Scotland, espaliers and dwarfs will be valued as forming the chief furniture of the borders. Abercrombie observes, "Dwarf standards are raised with low stems, of one, two, or three feet in height, and with round heads proportionately diminished. These are the earliest bearers compared with other standards, and produce large fruit in great abundance for the size of the tree. In small gardens the same benefits and conveniences which recommend the half standards are attached to these in a superior degree."

3331. *The sort of plants, as far as respects age, are chosen on the same principle as in choosing wall trees; but such as are grafted on dwarfing stocks are generally preferred:* apples on paradise, creeping apple, or doucin stocks; pears on quince stocks; and cherries on the perfumed cherry or small wild cherry stocks.

3332. *The distances at which to plant espalier trees, according to Nicol, are, "for apples, on crab-stocks, thirty; cherries, twenty; pears, on free (rapid-growing) stocks, thirty to thirty-five; and plums, twenty to twenty-four feet. Pears on quince stocks are planted from twenty to twenty-five feet asunder. Dwarf standard apple trees, on paradise stocks, may be planted very closely, as they occupy but little room; they do not require more than ten or fifteen feet.*

SECT. III. Of tall Standard Fruit Trees in a Kitchen-garden.

3333. *Though tall standard Fruit Trees are more generally confined to orchards, yet they were formerly common in the kitchen-garden, and are still occasionally introduced in the slip. They cannot, however, be recommended, on account of their drip and shade, which render it impossible to grow culinary vegetables under them to any degree of perfection, either in size or flavour; and also of the too orchard-like character which they in time give the garden: but even if these objections were got over, there is another which in our opinion is insuperable; which is, that, owing to the continual stirring of the ground to a considerable depth, they never can bear abundant crops.*

3334. *Practical opinions.* According to Marshall, "The fewer standard trees in a garden the better, as they take up much room, and by their shade prevent the proper growth of the vegetables that are near them." M'Phail considers them as hurtful to crops of vegetables. Abercrombie says, "full standards are only or chiefly adapted for orchards and other grounds not occupied with esculents as principal crops. In the interior compartments, some full and half standards may be introduced; being thinly scattered towards the angles of the compartments, not to overspread the ground, nor placed nearer together than forty feet; indeed, many designers of horticultural plantations would restrict the full standards to the orchard and pleasure-ground, as plants cultivated underneath them are apt to suffer from drips." (*Pr. Gard.*, p. 6.) Forsyth recommends their being mixed with other trees in the shrubberies which surround gardens. Nicol concurs in this opinion; and in general prefers standards in the outer border of the slip, or in the orchard. For the sorts of fruit trees proper for standards, see Chap. III. on Orchards.

SECT. IV. *Fruit Shrubs.*

3335. *By fruit shrubs* are to be understood the gooseberry, currant, raspberry, cranberry, &c. They are almost universally planted in the walk borders, at regular distances of from six to ten feet. Plantations of them are also formed in the compartments, and in the outer border of the slip. "Some of those useful shrubs, gooseberries and currants," Marshall observes, "should grow in every aspect of the garden, in order to have a succession of their fruits as long as may be. Raspberries may be set in plantations, in rows. Though these shrubs are best by themselves, yet here and there, by the walks, a detached bunch may be kept; or here and there one against a warm wall. Currants, gooseberries, and raspberries," he adds, "do well espaliered as to a production of early and fine fruit." Abercrombie observes, "Gooseberry and currant bushes may be planted in single rows, in cross rows, or in plantations by themselves: plant some near the outward edge of the main compartments; others along the borders where there are no espaliers; others, again, in cross rows, to divide large compartments. Raspberries may occupy other borders and compartments." (*Pract. Gard.*, vol. v. p. 189.) Forsyth recommends planting gooseberries "in a compartment by themselves, or round the edges of the compartments, about three feet from the path. Never plant them under the shade of other trees, as it will injure the flavour of the fruit." "Currants and gooseberries," Nicol observes, "are often planted in lines by the sides of the walks or alleys of the garden; but in that way, especially if not well managed, they are generally more cumbersome than useful. It is a better method to plant them in compartments by themselves, and to make new plantations every sixth or seventh year, as young plants are found to produce more handsome fruit, and also to bear more plentifully, than old ones. The same thing may be said of raspberries, which produce the finest fruit when young; that is, about the third or fourth year after planting, if properly managed. It is proper to plant some of all the above fruits on a north border, or other shaded situation, in order to prolong their season. Some may very properly be planted against vacant places on any of the walls, pales, or espaliers. The Antwerp raspberry, in particular, and some of the kinds of gooseberries, are highly improved in size and flavour, if trained to a south wall." The cranberry was first introduced as a garden fruit by Sir Joseph Banks, and is grown to most advantage in bog earth, kept moist. The margins of ponds, or other reservoirs, in the slip, are good situations for this plant: but when the dewberry, bilberry, and other fruit-bearing bog-earth plants are introduced, we would recommend a border or other compartment in a shady situation, furnished with bog earth; and to which water could be readily applied, either by the watering-pot, engine, or by means of underground channels. Our own opinion on the subject of planting fruit shrubs is, that, where abundant produce and high-flavoured fruit are the objects, not only gooseberries and currants, but even raspberries, cranberries, and bilberries, ought to be planted in compartments by themselves, in open airy situations, and at such distances, plant from plant, that they may not touch each other when fully grown. For immediate produce, the compartments may be planted of double the distance at which the shrubs are finally to stand; or, if the expense of the extra-plants should be an object, the space between may be cropped with vegetables; never, however, planting any thing within the reach of the roots of the bushes.

3336. *With respect to the sorts of fruit shrubs*, the following list is given by Mr. Thompson, those to be preferred being marked with an asterisk (*) :—

Gooseberries, Red.
Small sorts.—*Red Champagne, Raspberry, *Rough red, Red Turkey, small dark rough red, *Scotch best jam, Miss Bold's.
Large sorts.—*Boardman's British crown, Malling's crown Bob, *Keepe's seedling, Harbottle's Lancashire lad, Red rose, *Lalch's titmouse, *Farver's racing lion, *Red Warrington.
Gooseberries, White.
Small sorts.—*White crystal, *White

*Champagne, *Early white, White damson, *White honey.*
Large sorts.—*Woodward's white-smith, Crompton's Rhoda queen (very like the preceding), *Wellington's glory, *Taylor's bright Venus, *Cleworth's white lion, *Saunders's Cheshire lass, Bringer's maid of the mill, Cook's white eagle.
Gooseberries, Yellow.
Small sorts.—*Shipbar, *Yellow Champagne, *Early sulphur, *Ramballion, *Hepburn yellow Aster.

Large sorts.—*Dixon's golden yellow, Prophet's regulator, Prophet's suckwood.
Gooseberries, Green.
Small sorts.—*Early green hilly, *Hepburn green protie, *Glenn's green, or York seedling, *Pittaston green sage, Green walnut.
Large sorts.—*Levant's Eliza, Hopley's Lord Crew, Partisan's laurel, *Collier's jolly angler, Briggs's independent, Masson's heart of oak, *Edwards's jolly tar, Large smooth green.

3337. *The sorts of plants* are commonly such as have been grown two or three years from the cuttings, or, in the case of raspberries, suckers of the preceding year. Older gooseberry and currant trees, where they can be procured, should be preferred, to a certain extent, as they bear immediately, and, when they grow old, can readily be renewed. Raspberries, from their nature, can never have stems of more than a year in age.

3338. *In respect to distance*, according to Nicol, "from four to six feet square, according to the quality of the soil, may be deemed sufficient: that is, in good land, six feet; in middling land, five; and in poor land, four feet."

3339. *The mode and season of planting* is regulated on general principles. (3885. to 2912.) The reader may consult, on the subject of this chapter, *Gard. Mag.*, vol. iii. pp. 192. 309.; vol. vi. pp. 52. 54, 55. 430. 434.; vol. vii. pp. 3. 316. 325. 327. 329.; vol. viii. pp. 165. 580. 582. 587.; and vol. ix. pp. 70. 73. 321.

CHAP. III.

Of the Formation and Planting of an Orchard, subsidiary to the Kitchen-garden.

3340. *An orchard, or separate plantation of the hardier fruit trees*, is a common appendage to the kitchen-garden, where that department is small, or does not contain an adequate number of fruit trees to supply the contemplated demand of the family. Sometimes the orchard adjoins the garden, and forms a part of the slip; at other times it forms a detached, and perhaps distant, enclosure; and not unfrequently, in countries where the soil is propitious to fruit trees, they are distributed over the lawn, or a field kept in pasture. Sometimes the same object is effected by mixing fruit trees in the plantations near the garden and house.

3341. *As to the situation, exposure, soil, and shelter of orchards*, most of the observations submitted as to these properties in kitchen-gardens will equally apply to them; but there is this difference, that, as orchards are not generally surrounded by walls, and, when full grown, ought never to be under the spade, the surface may be much more irregular; and, in regard to form, it is a matter of no great consequence. Size will of course be regulated by the quantity of produce desired, and nothing can be more simple than the arrangement of the trees; which is almost always that of the *quincunx*, the distances between the plants being greater or less according to the sorts made choice of.

3342. *As to the site of an orchard*, Abercrombie observes, "land sloping to the east or south is better than a level; a sheltered hollow, not liable to floods, is better than an upland with the same aspect, and yet a gentle rising, backed by sufficient shelter, or the base of a hill, is eligible. A good loam, in which the constituents of a good soil predominate over those of a hot one, suits most fruit trees: the subsoil should be dry, and the depth of mould thirty inches, or three feet. Before planting, drain if necessary; trench to the depth of two feet; manure according to the defects of the soil; and give a winter and summer fallow; or cultivate the site for a year or two as a kitchen-garden, so that it may be deeply dug, and receive a good annual dressing."

3343. *In a situation much exposed*, plant shrubs, or wilding fruits, as screens, or as nurseries. Forest trees may be planted as an outer screen, but on a distant line, whence their roots will not draw the soil to be occupied with fruit trees. Where ornamental grounds present a good aspect, as well as a prepared shelter, fruit trees are distributed in them to great advantage.

3344. *As to the size of an orchard*, Forsyth observes, "it may be from one to twenty acres, or more, according to the quantity of fruit wanted, or the quantity of ground that you may have fit for the purpose."

3345. *Any soil* will do for an orchard which produces good crops of corn, grass, or garden vegetables; a loamy soil is to be preferred, though any of a good quality, neither too light and dry, nor wet, heavy, and stubborn, but of a moderately soft and pliant nature, will be found to answer the end. Shingly and gravelly soils disagree very much with fruit trees, unless there be loam intermixed. They will succeed much better on a chalk bottom.

3346. *The sorts of fruits adapted for orchards* are the more hardy apples, pears, cherries, and plums; the medlar, mulberry, quince, walnut, chestnut, filbert, berry, and some others. According to Forsyth, a complete orchard ought to have, besides apple, pear, plum, and cherry trees, quinces, medlars, mulberries, service trees, filberts, and berberies; as also walnuts and chestnuts; the two latter of which are well adapted for sheltering the others from high winds, and should therefore be planted in the boundaries of the orchard, a little closer than ordinary, for that purpose. In an orchard for raising crops for sale Abercrombie says, that fruit is the most profitable for which there is the greatest demand. Apples are first in utility; but pears, cherries, plums, and most other fruits in the subjoined selected list, are acceptable, for making pies and puddings, for preserving, or for pickling, as well as in the dessert. According to the extent and nature of the ground, mulberries, medlars, quinces, services, walnuts, chestnuts, and all the sorts which will ripen their produce sufficiently on standards, may be introduced.

3347. *The varieties of the common orchard fruits* recommended by Mr. Thompson are as follows, the sorts marked with an asterisk (*) being preferable:—

<i>Apples.</i> *Early red Margaret, *Irish peach, *Summer golden pippin, *Olin, Duchess of Oldenburgh, White Astrachan, *Spring Grove codlin, Dutch codlin, Kilkenny codlin, *Manks codlin, *Kewick codlin, Alexander, *Blaworthodes, Holland- bury, *Walsley pippin, *King of the pippins, Blenheim pippin, *Golden renette, *Pear's pippin, *Franklin's	golden pippin, Hughes's golden pippin, Hick's fancy Gravenstein, *Court of Wick, Downton, *Bescherwell, *Dutch Mirocane, Scarlet pearmain, *Ribston pippin, Golden pippin, *Margil, *Syke House russet, Sam Young, Barctona pearmain, Kirby's Lord Nelson, *Pen- nington's seedling, *Adam's pearmain, *Hubbard's pearmain, *Herefordshire pearmain, *Golden Harvey, Coe's gol-	den drop, *Court-pendu plat, *Boston russet, Lamb abbey pearmain, *Reinette de Canada, *London pippin, Newtown pippin, *Stradick's nonpareil, *Down- ton nonpareil, *Old nonpareil, *Scarlet nonpareil, *Cornish gillyflower, *Dane- low's seedling, Royal russet, *Ardison, *Bedfordshire foundling, *Brabant bellefleur, *Rhode Island greening, Hambledon deax ans, Gloria mundi.
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Pears.
 *Citron des Carreaux, *Ambrose, Vallée
 Française, *Summer St. Germain, (Gen-
 dresain), *Flemish beauty, *Marie
 Louise, *Duchesse d'Angoulême, Belle
 et bonne, *Doyenné blanc, *Doyenné gris,
 *Beurré de Capiaumont, *Fondante d'
 automne, *Autumn Colmar, *Beurré
 Diel, *Bon Chrétien fondante, Louise
 bonne (or Jersey), *Beurré Rose, *Fla-
 cots incomparable, *Napoleon, *Winter
 Nellie, *Père Nelli, *Glout morceau,
 *Pomme-Colmar, Ne plus Meuris, *Père
 Sablon, *Easter Beurré, *Beurré rance.
Obs. A greater quantity of the Glout
 morceau, Easter beurré, and Beurré

rance should be planted than of any of
 the other sorts. In fact, the supply will
 chiefly depend on them for the half of the
 season; and consequently a proportionate
 number of trees of these varieties should
 be planted. Formerly many gardens
 had not a single winter or spring pear,
 though they possessed a superabundance
 of autumn ones. In future this will cor-
 rectly be provided against; and, especially
 if the proper means be resorted to
 for preserving the fruit during winter and
 spring; that is, picking them in earthen-
 ware vessels in dry fern, and placing
 them in a cool dry cellar.

Cherries.
 *May duke, *Royal duke, *Knight's
 early black, *Eaton, *Bigeon, *Black
 eagle, *Bovyer's early heart, Early purple
 gage, *Late duke, *Kentish, *Morello,
 Cerise d'Ostheim, Downton.

Plums.
 *Green gage, *Purple gage, *Wash-
 ington, *Joe's, *Blue drop, *Blue
 impatience, White
 *Kirt's, *Co's fine late red, *Drap d'or,
 *Diapre rouge, *Nectarine, Virgin,
 *Shropshire damson, Orleans, *Early
 Orleans, Mirabelle.

3348. *The sorts of plants made choice of for orchards are invariably standards, and, half-standards, and commonly such as are not more than one or two years from the graft.* Abercrombie and Nicol prefer "maiden plants, or such as are only two years from the bud or graft, of all the above kinds, to older trees: having boles or stems of three or four feet in length; the apples being worked on crab, and the pears on free stocks."

3349. *The ultimate distance at which apple and pear trees should stand in an orchard is, according to the same author, from thirty to forty feet, less or more, according to the quality of the soil; taking as the medium thirty-six feet.* In a poor soil, and a bleak exposure, where the trees may not be expected to grow very freely, thirty feet are sufficient; whereas in good soil, and in a sheltered situation, forty may not be too much. Cherries and plums may be planted at from twenty-four to thirty-six feet, according to soil and situation, as above; taking, as medium, thirty feet for the ultimate distance at which they are to stand clear of one another. But it would be advisable, in the first instance, to plant four trees for one that is intended ultimately to remain; planting the proper kinds at the above distances first, and then temporary plants between them each way; which temporary plants should be of the free-growing sorts that begin to produce fruit soon after planting. These should be considered, and be treated, as temporary plants from the beginning, and must give place to the principal trees as they advance in growth, by being pruned away by degrees, and at last stubbed up entirely. If orchard trees be planted among shrubbery, &c., they may be planted at any distance, exceeding forty feet, that may be thought proper; but they should not be planted nearer, otherwise they will too much confine the shrubs. In this case it will not be necessary to plant temporary trees, as the principals will be nursed by the shrubs. In bleak situations, if forest and other hardy trees be planted among the fruit trees, it may not be necessary to plant so many (if any) temporary fruit trees; or these may chiefly consist of the hardier sorts which produce fruit the soonest. "In a good soil," Abercrombie observes, "the final distances at which the plants should stand are, twenty or twenty-five feet for full standards, of those kinds which reach but moderate size as trees; and thirty or forty feet for the larger-growing sorts. Temporary plants of such kinds as bear fruit soon may be planted at half the final distances, in order to be pruned down, and at last removed, when the principals require it."

3350. *The mode of planting best adapted for standard trees is unquestionably that of mudding in, and next that of fixing by water (§ 2910, 2911.); one or other of these methods should be adopted, where success and immediate growth is an object, and should be succeeded by staking, panning, mulching, clothing the stems, and watering.*

3351. *Staking and protecting.* "If the stem of a tree is rocked by the wind, the root is prevented from shooting new fibres; the ground is also opened, so that in winter frost penetrates, and in summer hot drying winds blowing set up a firm stake to catch, twist a part of a hay-band round the tree to prevent it from galling, and with the remainder tie it securely to the stake (Abercrombie.) Forsyth and Nicol agree in recommending staking to prevent the trees from being wind-waved. In respect to protection, Nicol observes, "If the orchard be not completely fenced, every care should be taken to guard the plants from hares, by properly bushing them round with thorns; which, I think, is the most effectual method, and that least injurious to the trees."

3352. *Panning and mulching.* Let a small basin or hollow be made round the stem of each tree, a foot or eighteen inches in diameter, and two or three inches deep, according to the extent of its roots. Fill this basin with littery dung, to the thickness of five or six inches, over which sprinkle a little earth, just enough to keep it from being blown about. This both nourishes the young fibres, and keeps the ground about them moist in hot weather, if wetted freely once a week. (Nicol's Kat., 220.) To protect the roots of autumn-planted trees from the frost of the succeeding winter, and from drought in the summer, Abercrombie directs to "lay mulch about the stem, to the distance of two feet round, and six inches in thickness; or substitute a thin layer of turf in summer." Forsyth says, "If it prove dry the spring after planting, dig up some turf and lay it round the stem of the young trees with the grassy side downwards; this will keep the ground moist, and save a deal of watering: if the trees have taken well, this need not be repeated, as they will be out of danger the first year. The turf should be laid as far as the roots of the trees extend; and when it is rotted, it should be forked in, which will be of great service to them."

3353. *Clothing the stems of standard trees by an envelope of moss, or short grass, or litter wound round with shreds of matting, is of great use the first year after planting, to keep the bark moist, and thereby aid the ascent and circulation of the sap in the albumum.* This operation should be performed at or soon after planting, and the clothing may be left on till by decay it drops off of itself: it is of singular service in very late planting; or when, from unforeseen circumstances, summer planting becomes requisite.

3354. *Watering.* Newly planted orchards must be attended to in respect to watering, which should be repeated the oftener as the season advances, till the trees strike into the soil. "If the planting is performed early in autumn," Abercrombie observes, "while the weather is yet hot and dry, a little water may be given to assist the roots to strike; but they ought not to be soaked with water, nor need watering be repeated. At planting late in spring, should the ground be dry, give a moderate watering; which repeat about once a fortnight during the hot months. Supposing the plantation to have

been made in winter, should a very dry spring follow, a few waterings may be necessary until the plants strike."

3355. *The best season for planting an orchard* is the autumn, as soon as the trees have ripened their wood and dropped their leaves. If the work be properly executed at this season, the trees will push out fresh fibres the same year, and be ready and able to push out shoots of considerable vigour in the spring. When autumn planting is impracticable, the next best is in the beginning of February, or as early as the season will permit.

3356. *The subject of cyder and perry orchards* we consider as belonging more to agriculture than horticulture. (See *Encyc. of Agriculture*, Part III.) For a variety of details on fruit trees, &c. see *Gard. Mag.*, vol. i. p. 153.; vol. vi. pp. 52—55. 434. 693. 702.; vol. vii. pp. 316. 323. 327.; vol. viii. pp. 165. 582.; and vol. ix. pp. 287. 319. 331.

CHAP. IV.

Of the general Cultivation and Management of a Kitchen-garden.

3357. *The cultivation of a garden* includes the performance of all those things that are requisite to a reasonable and prolific production of the various vegetables and fruits grown therein. By the management of a garden, is to be understood the keeping it in such order, as that it may not fail to give those impressions of pleasure it is calculated to afford. A kitchen-garden, as well as a garden professedly ornamental, may and ought to be agreeable to walk in, as well as profitably cultivated. A gardener may be well acquainted with the culture of individual vegetables and fruits, and yet very deficient in the general cultivation and management of his garden. The following sections relate entirely to general practices conducive to these objects, and they deserve to be carefully studied by the young gardener who aspires at any degree of eminence in his art.

SECT. I. *Culture and Management of the Soil.*

3358. *The soil*, Marshall observes, "must be first attended to, always to keep the fruit-borders in heart, and the compartments in a proper state for use, when required to receive either seeds or plants. Ground should never lie long without stirring; for the soil of a garden should be in a free, sweet, and rich state, by proper digging, &c. or no great things can be done, as to early, handsome, or well flavoured productions. It should be free, that the roots of plants may not be impeded in the quest of food; sweet, that the food may be wholesome; and rich, that there may be no defect of nutriment."

3359. *Trenching the vacant ground in a garden* does good to all soils in the autumn and winter seasons; and that in proportion to its strength, being indispensably necessary for clays to separate and ameliorate the parts. The light soils may do by being only rough dug, which is a method that stronger soils will be also benefited by. The soil would be still farther improved, by re-trenching, or rough-digging, once or twice more in the winter, if the opportunity offers, particularly if strong or stubborn. Let the ridges lie E. and W., except the ground be a slope, when they may correspond.

3360. *The trenching of vacant ground*, Abercrombie observes, "should be forwarded as much as possible in winter, and early in spring. By repeatedly exposing a new surface to the action of the frost, a greater quantity of the soil is ameliorated. In every case where it is intended that the ground shall lie fallow any time, it is advisable, in digging trenches, to turn up the earth roughly in ridges; forming, parallel to each trench, a single ridge of the same width, in order that the soil may be the more effectually mellowed, pulverised, and renovated by the weather. These ridges can be expeditiously levelled, for the reception of seeds and plants; which is a further improvement of the ground."

3361. *To preserve the fertility of kitchen-garden soil*, the mode adopted by Nicol and practised by the best Scotch gardeners, is the most scientific of any. Nicol observes, that, as kitchen-vegetables do best on what is termed new land, it is a common complaint among gardeners that their ground, by being, as it were, worn out, will not produce certain kinds of vegetables; not that it is poor and hungry, or altogether unfitted to the production of them, having formerly produced them in great abundance, but that the surface has become tired of these crops, or, according to the modern theory, poisoned by them, in the same way as a field sown with the same sort of grain for two or three years in succession ceases to produce that grain in perfection. The method which he practised with success is as follows:—

3362. *First, it is necessary to have a depth of soil, from twenty-four to thirty-six inches*; in which case it is obvious that, if the depth of the natural soil is deficient, twenty-four inches must be made good by carrying in soil from fields of good quality. Then take three crops off the first surface, and afterward

trench three spits deep, by which the bottom and top are reversed, and the middle remains in the middle. Take three crops off this surface, and then trench two spits; by which the top becomes the middle, and the middle the top. Take also three crops off this surface, and then trench three spits; whereby that which was last the middle, and now top, becomes the bottom; and that which is now the bottom, and was the surface at first, now becomes surface again, after having rested six years. Proceed in this manner alternately; the one time trenching two spits deep, and the other three; by which means the surface will always be changed, and will rest six years, and produce three.

3363. *Hence there will always be new soil in the garden, for the production of wholesome vegetables; and hence also will much less manure be required, than when the soil is shallow, and the same surface constantly in crop.* Nicol adds, that he would not advise the soil to be more than three feet deep, as the surface might be buried too deep from the action of the weather and influence of the sun. Where the soil is only so deep as to allow of trenching two spits, by trenching every third or fourth year the ground will rest half its time; and if judiciously managed, and cropped in proper rotation, wholesome vegetables may be produced on it for many years successively. It is not intended that the whole garden should be trenched over the same season, "one half, or a third part at a time may be more advisable, and also more convenient." (*Kalendar*, p. 16)

SECT. II. Manure.

3364. *When manure is applied, the ground is not to be glutted with dung; for, as Marshall observes, "a little at a time, well rotted, is sufficient, so that it comes often enough, as opportunity and the nature of the cropping may dictate. It is indeed a sort of rule with gardeners, that ground should be dunged every second year; but circumstances may make more or less of it necessary, and rules should never be indiscriminately applied. If dung is pretty well rotted, a less quantity will do, and it should not be buried too deep; but if it is otherwise, lay it low, to be dug upwards another time, when it is more consumed. It is an excellent way of manuring, where the superficial soil is much exhausted, to dig slightly, and spread over rotten dung, late in autumn, in the winter, or early in spring, and so let it remain, till the ground is wanted, before it is dug in. This method is particularly to be recommended for crops of onions, leeks, and similar superficial rooting plants."*

3365. *Dung used in great quantities, and lying in heaps, harbours worms, grubs, and insects, and makes plants grow too rampant and rank-flavoured.* Carrots it cankers, and it disagrees with many things; is apt also to make the ground parch, and burn the crops sown upon it in a hot summer. On these accounts some persons have been induced to dress their gardens only with rich fresh earth; which, if the ground be not overcropped, will do very well, being accompanied with good tillage, which alone is of much use, and is essential to due cultivation. Vegetables are always sweeter the less dung is used, and little need be used when the natural soil is good and deep; for the earth may be so dug, that what is at the top one year may be at the bottom the next, a manœuvre evidently advantageous, as a good part of the strength of the top soil washes downwards. The method just recommended, of letting dung lie on the surface for a time, is good also, as it abates the rankness of it. Lime sweetens.

3366. *The periods for applying manures necessarily depend on the soil and the mode of cropping. If the original soil be poor, it may require aid from dung every year; but, in general, the compartments in which annuals and biennials are cultivated will want to be thus recruited at least once in two years, when the last autumn crops are off the ground. Beds occupied by perennials cannot sometimes receive any material accession of new earth or compost for a number of years; and, therefore, when the stools are worn out, the repairs of the soil should, in proportion, be substantial, and go deep. Dung is fit to manure beds for receiving many sorts of plants, when it has lain in a heap from three to six months, and is beginning to be well rotted; but for particular purposes, it should lie from one to two years. Apply it for annuals, two or three inches thick; and for perennials that are to stand long, six or eight inches thick; spreading it equally, till the bed into which it is to be dug is covered; then trench it in a moderate spade deep, that it may be within easy reach of the roots of the plants. In preparing ground for perennial stools, a portion of the dung should be deposited six inches deeper. (*Abercrombie*.)*

3367. *Manures are to be applied either as simples or compounds; but the latter method Nicol considers the most eligible. He agrees with Jethro Tull in stating, that if they have not undergone a proper fermentation, their effects are, giving a rank and disagreeable flavour to fruits and vegetables; and if an immoderate quantity be applied, of producing a considerable degree of unwholesomeness, and tainting the juices of all plants.*

3368. *A mixture of stable-dung, sea-weed, lime, and vegetable mould, which has lain in a heap for three or four months, and has been two or three times turned during that period, will make an excellent manure for most kinds of garden land. Also, cow-dung, hog-dung, and sheep-dung, mixed with soot or with wood-ashes. Pigeon-dung and vegetable mould, well mixed, will also make an excellent manure for heavy land; or even for lighter soils, provided the pigeon-dung be used sparingly.*

3369. *Neats-dung and hog-dung, slightly fermented, are very fit and rich manures for light dry soils. For those of a dry absorbent nature none answer better or last longer; because they retain moisture for a greater length of time, and also ferment more slowly than other dungs.*

3370. *Pigeon-dung, lime, soot, ashes, &c., should never be applied as simples; the quantity required being comparatively small, and the regular distribution of them difficult, without the admixture of other matter. They should be generally applied to compost of good earth, turf, or sward, or of cow or other dung of a cool nature; applying them in quantity according to the cold or the hot nature of the soil to be manured, allowing the compost a sufficient time to incorporate, and mixing it thoroughly.*

3371. *Mari is a good manure for almost any soil; and it may be applied as a simple, with as much propriety as any of the kinds of cattle-dung, or even of vegetable earth. The kind called shell mari is much to be preferred, and should be freely applied to strong lands, but more sparingly to light; the loamy kind being best adapted to light lands.*

3372. *Stable-dung, if used as a simple, should not be applied in too rank a state, nor should it be much fermented. It should generally lie in a heap for four or five weeks; during which time it should be turned over once or twice. A ton of it in this state is worth three of that which has been used in a hotbed, and is a year old. This manure, and indeed dung of any kind, when applied as a simple, should never be carried from the heap to the ground, till it is to be dugged in; as, by exposure to the air, part of its virtues evaporate, and it is the less effectual.*

3373. *Sea-weed should be applied instantly after landing. If used as a simple, it should be applied sooner than stable-dung, as it very soon corrupts, and its juices being carried down into the soil are lost. If this*

manure be used as a compound, the heap in which it is placed should be more frequently turned on its account; that none of the juices may be lost, but that the other part of the compost may absorb them.

3374. *Horse-dung, and the dung of sheep, deer, and of rabbits* are most eligible for cold wet soils; and all these, or any of these in compost with lime, will be found beneficial. For such soils also, a compost of coal-ashes, pigeon-dung, and lime; or of wood-ashes, whin-ashes, fern-ashes, and stable-dung; or of deer-dung, rabbit-dung, soot, and burnt sward, will make a good manure.

3375. *Manures are to be applied in quantity according to their quality.* Hence the dung of pigeons should be applied in much smaller proportions than that of horses, it containing a greater quantity of volatile salts; and so the ashes of vegetables containing a portion of fixed alkaline salts, being more powerful, are to be applied in still smaller quantity. So, also, lime, being the most powerful of the calcareous kind, should be applied, in ordinary cases, in much smaller quantity than marl.

3376. *Vegetable mould may either be used as a simple or as a compound, and may be applied with equal propriety to all soils.* None can be hurt by it in any degree, since almost every plant will grow luxuriantly in it alone, without the aid of any soil or manure whatever. It seems to be the ambrosia, and the dung-hill drainings the nectar, of vegetable life. The latter, however, if too freely indulged in, is rather of an intoxicating nature. (*Kal.*)

3377. *Where economy rather than the flavour of culinary crops is an object, recent dung* is unquestionably to be preferred (1936.), and, in fact, is so by most market-gardeners: John Wilmot, an extensive market-gardener at Isleworth (*Hort. Trans.* vol. iv. p. 55.), bears testimony to this fact. A given weight of recent stable dung, he says, will not only go farther than the same weight of rotten dung from old hotbeds, but will serve as a manuring for the succeeding crop, which, with old dung, is not the case.

SECT. III. Cropping.

3378. *A change of crops* is founded on the generally acknowledged fact, that each sort of plant draws a somewhat different nourishment; so that after a full crop of one thing, one of another kind may often be immediately sown; or, in the language of more recent discovery, that one plant, after being some time on one spot, excretes what is poisonous to it, but not always to plants of a different genus, tribe, or order. "Nothing tends more to relieve the soil," Abercrombie observes, "than a judicious succession of crops; for plants of different constitutions not only strike to different depths, and in different directions, with their roots, but the terminal fibres or feeders of the roots appear to take up separate and peculiar constituents of the soil, and to be indebted for support to some property imparted by the earth in very different degrees. The duration of the vegetable, its short or protracted existence, is a great cause of diversity of effect as to the quantity of aliment drawn from the soil. Another mark of distinctness in constitution is the character of the root, as it may be fibrous and tender, or fibrous and woody, — or bulbous, or tuberous, — extended or compact; another, the form and magnitude of the herb, and the proportion of fibrous or ligneous substance in the stem and branches. A fourth index of a separate nature is the succulency or hardness of the leaves, and the quantity of pulpy or farinaceous matter in the parts of fructification, — as the leaves may be the edible part, before the plant is matured; or the seed-vessels, as in pulse, may hold the produce for the table; or the esculent part may consist of fruit-enclosing seeds. To apply this practically: — we will suppose a strawberry-plantation requires to be renewed; and the stools seldom continue fully productive more than three or four years; — instead of introducing young strawberry-plants into the same bed, entirely eradicate the old plantation, and let it be succeeded by a crop of beans, or of some other esculent as different as may be in constitution and habit. In the same manner, let the new plantation of strawberries follow some light crop which left the ground in a good state, or which allowed it to be trenched and followed for an interval, whether it were an annual or biennial. It is a rule, from which only extraordinary circumstances can warrant a departure, never to plant a new set of perennial stools on the ground whence a plantation of the same or a similar species, having worn itself out, has just before been removed. On the contrary, crops which strike deep, and occupy the ground long, should be succeeded by plants which pierce but a little way under the surface, are drawing in the least degree, and soon come off from the short term of their vegetable life."

3379. *A studied rotation is advisable*, in all cases, according to Nicol; so that no crop of the same class may immediately follow another. To facilitate this measure, the kitchen-ground should be divided into a number of portions, and a journal or note-book should be kept, with a reference to the numbers. In this journal, whatever relates to their cropping, manuring, trenching, or fallowing should be recorded, for reference and guidance as to future cropping. Nicol, while practising as head gardener at Raith, Wemyss Castle, and other places, kept a regular journal of this sort; he published it in his *Kitchen-Gardener* in 1802, and he tells us, in 1816, that it had been approved and adopted by many practical gardeners.

3380. *By planting out currants, gooseberries, and raspberries in compartments*, instead of growing them in single lines, particularly if these be properly managed, an opportunity of changing crops might further be afforded; as these should not stand longer than seven or eight years together, before the plantations are renewed.

3381. *Strawberry-plantations*, under proper management, should be renewed every four or five years; and thus likewise an opportunity of changing crops may be afforded.

The same object may be attained by the renewal of artichoke and asparagus plantations, which should be done every seven or eight years. In managing all the above-named articles on a large scale, new plantations should be made every year, to a certain extent, which would throw a certain proportion of ground regularly into the rotation.

3382. *Esculents might be cultivated in classes*, and thus a sort of rotation, though not very complete, might be produced; and the brassica tribe, the leguminous family, the tuberous and carrot-rooted kinds, the bulbous or onion kinds; and the lighter crops, as salads and herbs, might succeed each other.

3383. *Close crops*, as onions, leeks, carrots, &c. are conveniently and neatly cultivated in rows on beds of from four to five feet widths, with alleys of a foot to eighteen inches between them.

3384. *Resting garden-ground.* Market-gardeners, Nicol observes, who are generally good managers, and must of necessity make the most of their ground, in order to maintain their families, and be able to pay high rents, have found out the utility of resting their land, and of following a regular rotation in cropping it, at least in the culture of the principal articles, and as far as the nature of the thing will admit. The best managers sow out a portion of their ground every season in grass, clover, or barley, which is used as green food for their horses and cows. Very generally the barley is sown along with the clover, merely to nurse and shade it, being cut down and not allowed to ripen. The clover is sometimes dug up after the first season, if land for market-crops be scarce, but more generally it is allowed to lie a second year. By good managers, the ground is never sown down in a hungry state. Land that has been under esculent crops for many years together, and is, perhaps, glutted with manure, may be cleaned, as it is termed, by a scouring crop of oats, wheat, or rye, which, if thought necessary, may be repeated. If trenched to its full depth afterwards, it will again be fit for the production of culinary crops in great perfection.

3385. *The seasons proper for furnishing the ground with every particular vegetable* should be well attended to, that each may be obtained as early as its nature will permit; and of the seeds and plants we use, care must be taken to procure the best of the kind, lest, after all the trouble of cultivation, disappointment as to vegetation or quality should ensue. The principal time for sowing and planting the articles raised in the kitchen-garden is in the spring months. It is necessary to lodge some sorts in the ground as early as January; but February, March, and April are the months in which the principal supplies for summer crops are provided. From April till September, and even October, many sorts are sown and planted, in smaller portions, for successive crops. Particular hardy esculents are also sown or transplanted principally in autumn, for a supply as well in winter as in spring and early in summer. Other kinds are inserted occasionally as late as November and December, to stand wholly over the winter, in rising growth, for early crops and for main crops the following summer; such as peas, beans, cabbages, and cauliflowers. To obtain early crops of favourite esculents which are more tender, several kinds are sown and planted in hotbeds in winter and spring.

3386. *The quantity sown and planted* is to be determined jointly by the demands of the family and the portion of ground that can be spared: but it should be always a rule, to sow and plant more than probably enough for the family, as more may happen to be wanted than expected, and a cross season or other accident may occasion a failure. As exact rules cannot be laid down, the exercise of a little judgment will be necessary, in order to proportion crops alike; for to have too much of one thing, and too little of another, is disagreeable and discreditabie. Respect should be paid to the natural duration of crops, some going off soon, and others being lasting, and that too according to the season in which they are propagated. The pea requires the greatest breadth of surface; and next to this the cabbage tribe. The spaces for asparagus, artichokes, strawberries, sea kale, &c. are in some degree fixed from the comparative permanency of these crops. Pot and sweet herbs require the least space, and, ascending from these to breadths necessary for the pea and cabbage tribe, the proportions are as various as the kinds to be grown; and these can only be acquired properly by experience, and observation of what takes place in different gardens.

3387. *Seeds and plants should be adapted as much as possible to the soil and situation which best suits them*; for in the same garden some difference will be found, not only as to sun and shelter, but the earth; as some will be richer, some poorer, some deeper, some shallower, some perhaps heavier, and some lighter, in due attention to which advantage is to be reaped. (Marshall.)

3388. *The ordering of seeds from the seedsman* is generally a matter of some difficulty to the young gardener, and Abercrombie is almost the only author who has endeavoured to remove it. The information afforded by his work, entitled *The Seed Estimate*, will be found in the Horticultural Catalogue; where, under every culinary vegetable raised from seed, will be found the quantity, either stated in weight or measure, requisite for a certain space of ground; and this space generally that which is deemed sufficient for a considerable garden.

SECT. IV. Thinning.

3389. *The thinning of seedling crops*, Marshall observes, "should be done in time, before the young plants have drawn one another up too much. All plants grow stronger, and ripen their juices better, when the air circulates freely round them, and the sun is permitted to have an immediate influence upon them; an attention to which should be paid from the first appearance of plants breaking ground. In thinning close crops, as onions, carrots, turnips, &c., be sure that they are not left too near; for, instead of reaping a greater produce by so doing, there would be a loss. When they stand too close,

they will make tall and large tops, but are prevented from swelling in their roots : it is better to err on the wide side for, though there are fewer plants, they will be finer and better flavoured."

3390. *Thinning the leaves of fruit trees.* "The leaves," Abercrombie observes, "have too essential an office as organs of growth to the entire plant, to be lightly parted with; and, where the climate is not deficient in heat, compared with the habitat of the plant, or the portion of the year in which its season for vegetating falls, their shade is more likely to be serviceable than detrimental, even in the last stage of fruiting. Thus, cherries, raspberries, strawberries, currants, and other species whose full term of fructification is more than comprehended in our summer, reach perfect maturity, and acquire the colour proper to each, though ever so much covered with leaves: whereas, for those kinds which ripen with difficulty here, because the direct rays, and most intense reflection of the sun, is scarcely equal to the heat in the shade during the full summer of their native climate, — it is proper, when the fruit has nearly attained its full size, and is naturally losing its absolute greenness, to remove some of the leaves which shade it too much. Were the leaves thinned sooner, it would prejudice the growth of the fruit; and should they even now be swept off unsparingly, the growth of the year's shoots might be arrested. The leaves which cover the fruit, whether peaches, grapes, late pears, or other exotics, must be removed gradually; that is, at two or three times in the course of five or six days; otherwise the unusual full heat of the sun darting upon the fruit would occasion the rind to crack."

3391. *Thinning stone-fruits.* Thinning the over-abundantly set fruit on apricot, nectarine, peach, and plum trees is a necessary duty; as many of these, in good seasons, set more than they can nourish or bring near to perfection. If the fruit be very thickly set all over the tree, let it be generally thinned off to half its extent the first time; deferring the final thinning till the *stoning* be over; that is, till the shells be quite hard, and the kernel be formed. Most trees, especially those anywise unhealthy, drop many of their fruit at the time of stoning; so that the thinning had better be performed at two or three different times; always observing to reserve the fullest, brownest, and best-formed fruit. (*Nicol.*) If the bearing shoots of stone-fruits be properly shortened, there is little danger of many falling off, unless the kernel has been injured by untimely spring frosts, or excessive droughts (which, however, ought to be guarded against). The first thinning should, therefore, be fearlessly gone about; and the second should not be too long delayed.

3392. *With respect to the quantity or number of fruit proper to be left on a tree,* "much," according to Nicol, "must depend on its size and strength, and whether it be full grown, or be yet in training. A full-grown tree, in a healthy state, may be allowed to produce considerably more than one in a weak condition. And if a tree yet in training, that is, one not having filled the space allotted to it, be allowed to ripen all the fruit it may set, its extension will be much retarded in consequence. On the Moorpark apricot, and the larger kinds of peaches in a healthy full-bearing state, a fruit to every foot square of the superficial content, or surface of the tree, may be taken as a good medium; that is to say, a tree covering a space fifteen feet by twelve, may be allowed to ripen about two hundred fruit. The smaller kinds of apricots and peaches, and of nectarines in general, may be allowed to produce a third part more, if in a healthy state. The larger and better sorts of plums may be thinned in proportion, and according to their size; and may be thinned out to from three to six inches apart, if on the shoots of last year; or so as to hang quite free of one another, if on spurs. I am aware that many will think thinning to this extent an extraordinary measure; but I would have such be convinced of the propriety of doing so, by comparison. If they have two trees of a kind, both healthy and well loaded, let the one be thinned as above, and allow the other to produce as it has been wont; or thin it even to half the extent. It will be found that the tree fully thinned will produce an equal, if not a greater weight of fruit, and these incomparably more beautiful, and higher in flavour. Observe, the comparison must be made the same season, else it would not be fair; as the size and flavour of the fruit might be very different, according to the goodness or badness of the weather in different years."

3393. *Apples and pears should be moderately thinned,* and good account would be found in the practice. This should be done when the fruit is about half grown, or when all apprehension of its dropping is over. Nothing tends more to keep fruit trees in good health than regularly to thin their over-abundant crops, and that always before they begin to swell off for ripening; for if this be delayed till they are nearly full grown, the mischief is, in a great measure, already done, both to the tree and to the fruit left. (*Nicol.*)

SECT. V. *Pruning and Training.*

3394. *Pruning and training,* being frequently practised together, and in aid of each other, may be advantageously treated of under the same head.

3395. *Pruning newly-planted trees.* Trees planted one year from the graft, or two from budding, must be pruned as though still in the nursery, in order to furnish them with a head. At the end of March, or the beginning of April, as the wood-buds begin to shoot, one of these courses must be taken; either shorten the shoots of the preceding summer, or head down the tree to two, three, or four eyes, taking all those shoots off. The latter course is most commonly expedient on the peach tree, or nectarine, or apricot. If the first shoots happen to be unexceptionably placed for beginning the figure, instead of heading down the stem, cut these into two or three eyes. On wall trees and espaliers, rub off the fore and back wood buds.

3396. *Seasons for pruning newly-planted trees.* On all trees during the tender stage of infancy, spring is the fittest time of pruning, even for wood, and for proceeding in the formation of a head, as successive

sets of new branches are yearly obtained by shortening the last. Something may also be done in summer to promote this object. If between the end of May and the end of June, a pair of shoots have not started as desired, one on each side from a stem headed down, or from the mother branches shortened; and, in lieu of such, one solitary shoot has arisen, or two, both on one side, or not equally proper to be retained, the desired end may yet be attained, and a season saved. Pinch down the solitary shoot two or three eyes: this will force out new shoots in the course of summer. In the case of two shoots, one of which is evidently unfit for beginning the head, take off the one rejected without delay, and pinch down the other to two or three eyes. Of two shoots on the same side, equal in regard to strength and direction, to preserve the lower, or wall trees and dwarfs is a rule to which an exception can scarcely be imagined. The summer pruning of heads progressively forming will afterwards fall in with that of established trees.

3397. *Summer pruning of trees in bearing.* The buds and shoots to be preserved claim the first attention; for, if the precious germs of future fruit or wood are carelessly destroyed, the work of reparation is difficult and tedious: whereas the removal of spray not of service as branches or bearers, though necessary to prevent confusion, and to strengthen the plant, is to be conducted in subservience to the vital object of fertility. In some kinds, to avoid the destruction of wood-buds, or the germs of fruit-spurs, the disbudbing ought to be postponed until the wood-shoots can be distinguished from spurs, and pinched off without injuring the fruit-buds. The species which alternately produce spurs on the one-year-old shoots are, the apple, pear, apricot, cherry, and plum. The peach and nectarine rarely emit spurs. While you avoid displacing infant spurs on plants which bear on such, be as careful to discourage the wood-buds and shoots on old spurs, for shoots from these are cumbersome and unprofitable. If any spray that wants displacing has got woody, use the knife, lest the bark of the mother branch be torn.

3398. *The mode of bearing, and the duration of the bearers,* are the first things to be adverted to for regulating the proportion of new wood to be retained. Thus, in the kinds which bear on spurs, a less quantity of advancing wood is necessary for future supply, according to the time that a bearing branch continues fruitful; but as the fruit shoots on some of these kinds are two, three, four, and even five years in coming into bearing, the difficulty of exercising a proper foresight is increased. Of the sorts which bear on the shoots of last year, although a great reserve, and constant annual succession are wanted, it is more easy to suit the provision to the expected vacancy. In both classes, the leader to a stem yet under training as a wall tree is to be carefully preserved: also a surplus number of buds to the right and left must be suffered to sprout, till it can be known whether shoots will spring at the desired places; and afterwards a selection from these must be left for forming the tree: further, the leading shoot to each side branch should be always left, if the limits admit. Well-placed shoots, between the origin and the extremity of a lateral, are to be retained in pairs, until a good leader has sprung, and is sufficiently established to be laid in; when they are to be cut away close, unless a vacancy requires their permanent cultivation. As the new laterals fit to be preserved extend, lay them close to the wall in a straight easy direction, at a convenient average distance; nailing them farther onward as the extremities want support.

3399. *Three revisions are included in a summer's pruning:* one beginning at the end of April, another in July, and the third in September: all which have a preparatory reference to the winter pruning. Stone-fruit trees, if much wounded in summer, are apt to gum; so that, if superfluous shoots have not been removed before they get woody, it is best to defer the retrenchment of these to the winter pruning. A weak tree is strengthened by reducing its spray; let it, however, be low and compact, rather than naked. To keep a luxuriant tree full of wood tends to make it less rampant: but a crowded intricacy is to be avoided; for the air stagnates in a thicket of spray and foliage, while the sun cannot penetrate it: hence the new shoots grow long-jointed, and do not ripen thoroughly; and the blossom-buds forming on the bearers for the following year will be fewer and less plump. All the shoots rising after midsummer are to be displaced, unless a vacancy cannot be furnished without reserving some of them, or unless the excessive luxuriance of a plant makes it proper to cut it as little as possible, and to let the sap expend itself in numerous channels. The spring shoots laid in are generally to be preserved at full length, as far as the limits will permit, until after the fall of the leaf: because to stop them in summer would cause them to shoot from almost every eye, and fill the wall with spray; hence, when a vacancy wants several branches to furnish it, it is a good resource to shorten a strong contiguous shoot to three or four eyes. This is the exception to the rule.

3400. *Winter pruning of trees in bearing.* Now a final selection is to be made from the last year's shoots retained during the summer. On established trees which have fully ripened their shoots, and of which the young wood is not succulent, and therefore not susceptible of injury from frost, there is a wide latitude of time for the principal or winter pruning, extending from the fall of the leaf to the time of the rising of the sap, or just before. To prune in autumn strengthens a plant, and will bring the blossom-buds more forward: to cut the wood late in spring, tends to check a plant, and is one of the remedies for excessive luxuriance. At the opening of spring the blossom-buds can be certainly distinguished, which is a great guide to the judgment in many critical cases; but, on the other hand, if the blossom-buds get much swelled, they are liable to be bruised or knocked off, in the various operations of untacking, cutting, and re-nailing the branches. Supposing the common course of winter pruning to be divided into three periods — autumn, the cold months of winter, and the beginning of spring — the plants to be excepted from the first two, are the fig uniformly, when not in a forcing-house, and the vine for the most part, because the autumn is seldom hot and fine sufficiently long to ripen the year's shoots. Some except the peach and nectarine from the middle period, but not from the first; because they say that, if a severe frost happen immediately to follow the pruning, the points of the unripened shoots, and particularly the wood-bud next to the cut, are generally so much hurt, that there must be a second shortening, farther in than was intended, to furnish these shoots with leaders.

3401. *The number of good shoots to be retained* is limited by the character of the tree, the size to which the fruit grows, and the compass to be given to the head. The branches of a wall tree may be from five to ten inches asunder, according to its strength and the size of the fruit. Of fruit-shoots, those are the best which are short-jointed, and show a competent number of blossom-buds, and on which the series of blossom-buds commences nearest to the origin of the shoots, especially on that class which must have the bearers annually shortened. Spongy or disproportionately large and gouty shoots are bad allies for wood and fruit; but good shoots for wood may be above, if the buds are well defined, and the best shoots for fruit may incline to slenderness, if not wiry and sapless: disproportionately large shoots are seldom fruitful. In choosing large supplies for wood, other things being equal, the lowest new branches on the tree, and the last year's laterals nearest to the origin of a branch, are to be preferred. Begin at the bottom and middle of the tree; keep these furnished without intricacy; and the extremities will be easily managed. Such shoots as are preserved, whether to come in immediately as bearers, or to fill up naked parts in the figure, or to furnish future supplies of wood, are to be treated according to the mode of bearing.

3402. *Class bearing on distinct branches.* On those species which bear at the ends of the branches, or on spurs for several years in succession, the leading shoot of a fruit-branch is always to be retained, and the fruit-branches are not to be shortened where they do not exceed the assigned limits for the tree; because, if stopped, these would send out strong wood-shoots, where blossom-buds or fruit-spurs would otherwise have been produced.

3403. *Exceptions to this rule.* On young trees under training, to be furnished with a head, shorten the branches until the designed figure is complete: again, though a tree be established, occasionally shorten a branch, to bring out wood to fill a vacancy. The surplus of the last year's shoots, which would crowd,

or disfigure, or too much weaken the tree, or occupy it without promise, are to be cut out clean to the parent branch; also cut away any old branches which appear decayed, or of which the spurs begin to get barren. Finally, take off close the naked barren stumps left at previous amputations.

3404. *Class bearing on last year's wood only.* On trees which bear on the last year's wood, there is a necessity for annually shortening alternate divisions of the branches, in order to provide a supply of new shoots for bearing the next season. We prune the longer branches of a luxuriant plant, and the shorter of a weak plant, in an inverted proportion. Were the strong tree much cut in, it would produce only the more wood; while the weak tree, unless relieved by short pruning, would not long continue to bear. Very strong shoots may be left eighteen inches long, or lose but a fourth of their length; extremely weak shoots should be retrenched to half their length, whether that be five, six, eight, or ten inches, prune shoots of medium growth to the extent which best consults the double object of leaving as many blossom-buds as may be on the shoot, and of forcing out new wood at a well-placed eye. In shortening, cut at a leaf or wood-bud that is likely to yield a leading shoot. Leaf-buds are distinguished by being oblong, narrow, and depressed; blossom-buds by being rounder and bolder. If a leaf-bud at a suitable distance is found between twin blossom-buds, so much the better. A leading shoot at the point of a bearing branch draws nourishment for the intervening fruit. The thinning of rejected shoots, and decayed or worn-out bearers, is nearly as for the other class.

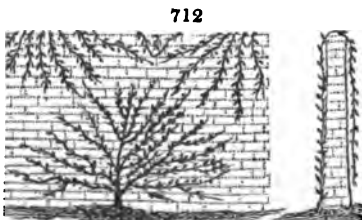
3405. *Mixed class.* There is a small anomalous class which bears frequently on spurs of several years' continuance as well as on annual shoots, but chiefly on the latter. Shoots of this class are to have a mixed treatment, preserving the fertile spurs as much as may be. Having finished pruning a wall tree, lay in the branches and shoots directly; tacking them in a neat manner to the wall or trellis. (*Abercrombie.*)

3406. *Winter pruning to be revised.* Revise the pruning when a sufficient time has elapsed to see it with another eye; or when the expansion of the blossoms decides the competition between probationary fruit-shoots which have been laid in too close. In those stone-fruit trees which bear on the last year's shoot, such as the peach and most kinds of the apricot, it is particularly necessary to revise the winter pruning at the time of blossoming; because, if on any branch the blossoms are observed to have been spoiled either by gum, by blight, or spring frost, that branch is quite useless as a bearer, and unless it has made some shoots which may prove bearers the following year, is to be entirely cut away: but if the blighted branches have made well-placed shoots, shorten them to these. (*Abercrombie.*)

3407. *Methods of training.* The two principal methods of training wall-trees which are followed in Britain, are the fan and the horizontal modes. "When walls exceed seven feet in height," Neill observes, "the best gardeners seem to concur in giving the preference to the fan training, variously modified: in this way they find that a tree can much sooner be brought to fill its allotted space, and the loss of a branch can much more easily be supplied at any time. For lower walls, the horizontal method is preferred; and the same plan is adopted almost universally on espalier rails." Hitt strongly recommends this mode for most sorts of wall-trees; and for pears he adopts what is called the screw stem, or training the stem in a serpentine manner, the branches going off horizontally as in the ordinary straight stem. (*Edin. Encyc. art. Hort.*) Nicol agrees with most experienced gardeners, in preferring *fan training* to all other methods; and it may be observed, that this form comes nearer to the mode recommended by Knight, as affording "evidence of a more regular distribution of the sap" than any other mode. It agrees with the excellent general principles of pruning laid down by Quinteney, who first reduced this branch of gardening to scientific principles—to the practice of the celebrated growers of peaches at Montreuil, near Paris, and to the practice of French and German gardeners generally.

3408. *Knight* remarks, that when trees are, by any means, deprived of the motion which their branches naturally receive from the winds, the forms in which they are trained operate more powerfully on their permanent health and vigour than is generally imagined. "In this sentiment," says Nicol, "I perfectly agree; and I may be allowed to add, that I have been engaged in the training of fruit trees these twenty-five years, and have trained them in a great variety of forms. Some in the Dutch style, running out two branches first, perfectly horizontal, right and left, to the extent of three or four yards each way, and from these training shoots perfectly upright, at nine inches apart, to the top of the wall; some with screwed stems and horizontal branches; some with upright stems and horizontal branches; some with stems six feet high, with pendent, upright, and horizontal branches, so as to appear like a star; and others in the fan manner; which last, I confess, I prefer to all other methods of training wall trees. I have altered many from the above forms to this both on walls and espaliers."

3409. *Modes of training to check over-vigorous growth* are various; but all of them



depend on depressing the shoots, either throughout their whole length, or operating on the young shoots only. When opportunity admits, or want of space on one side of a wall requires, it is found conducive to moderation of growth and the production of fruit, to train the branches of trees over the wall and down the other side. (*fig. 712.*) This is found to increase the prolificacy of vigorous growing kinds; as the pear; and it also succeeds well with the apple, cherry, and vine.

3410. *Modes of training to encourage the growth of shoots* proceed on the opposite prin-

ciple, and while over-luxuriant shoots are depressed, weak ones, which it is deemed proper to encourage, are elevated and brought nearer to the perpendicular.

3411. *Pruning and training, as applied to edgings and garden-hedges*, is performed by clipping or cutting *en masse*, with the hedge-bill. (§ 3146.) Hedges must be cut in autumn when the wood is ripe: sometimes it is done in summer, which is admissible as far as respects the health of the plants, and consequent durability of the hedge, when the lower ends of the shoots are nearly ripe. If this is not the case, the operation is injurious. The judicious gardener will weigh the circumstances of the case, and decide accordingly.

SECT. VI. *Weeding, Stirring the Soil, Protecting, Supporting, and Shading.*

3412. *Eradication of weeds.* The means of removal, are hoeing and weeding; and of destruction, exposing them, when hoed or pulled up, to the sun and air; or, what is in all cases better, taking them at once to the dunghill or compost-yard, to be destroyed by fermentation. These operations require to be performed almost every month in the year; but more especially in the beginning of summer, when the earth is teeming with vegetable life. Weeding in time, Marshall observes, is a material thing in culture, and the hand is generally more certain than the hoe.

3413. *Stirring the ground among crops* is nearly as essential as weeding, and is in some degree performed by the operation of hoeing. But the most effectual mode of stirring, and that now adopted by the best gardeners, is by the two-pronged fork or two-pronged hoe. (fys. 299. 316.) Every crop, whether planted in rows, or sown broadcast, ought to be subjected to this operation once, or oftener in the course of its progress to maturity. Small crops, where the distances between the plants are not wide, ought to be stirred by a fork of two prongs, or even one prong. A narrow hoe is the usual instrument, but this always tends to harden the ground below, and to form a sort of floor, which in many soils is impervious to air or rain. "Breaking the surface," Marshall remarks, "keeps the soil in health; for when it lies in a hard or bound state, enriching showers run off, and the salubrious air and solar heat cannot enter. Ground," he adds, "should be frequently stirred and raked between crops, and about the borders, to give all a fresh appearance. There is a pleasantness to the eye in new-broken earth, which gives an air of culture, and is always agreeable." This last observation is particularly meant to apply in autumn, that the garden may not become dreary too soon, and so bring on winter before its time.

3414. *Earthing up* ought to go hand in hand with stirring in many cases; but rarely in the case of those plants which form their bulbs above the surface, as turnips and onions. This operation supports the stems of some crops, as the bean, cabbage, &c. and encourages the fertility or improves the quality of others, as the potatoe, leek, celery, &c. In winter also it protects them from the frost, and may then be applied to the turnip as no longer in a state of growth.

3415. *Protecting, supporting, and shading.* These operations are too little attended to, or attempted in a slovenly manner, by many gardeners. The grand subjects of protection are fruit-trees; and we have already (3024, &c.) given an enumeration of the various modes to which recourse is had. The simplest, and perhaps the best protection for general purposes, is that of throwing a net, either an old fishing-net or one formed on purpose of woollen yarn, over the whole tree, if a standard; or placing it against it, if trained to a wall, before it begins to blossom, and letting it remain there till the fruit is set. Marshall recommends this mode, justly observing, that after much expense and trouble to preserve blossoms from inclement weather, the business is often done to no purpose, or a bad one. Nicol's opinion is not materially different. Single plants, as the raspberry, are to be supported by sticks or rods, and rows of climbers, by rods, spray, or branches, as peas, kidneybeans, &c.

3416. *Shading* is but little attended to, excepting in the case of transplantation; but it is of great importance in the fruiting season to certain plants which naturally grow in shady situations, as the strawberry and raspberry; and properly applied and accompanied with watering, tends to swell these fruits and others, as the gooseberry; also the heads and roots of certain vegetables in hot weather, as the cauliflower, turnip, onion, radish; or the whole vegetable, as in the case of lettuce and other salads. The advantages of shading small fruits were pointed out by Haynes (*On the Culture of the Strawberry, Raspberry, and Gooseberry*, 8vo. 1812.), and are very strikingly displayed in the gardening of the south of France and Italy.

SECT. VII. *Watering.*

3417. *Watering*, Marshall observes, "is a thing of some importance in cultivation, though not so much as many make it. It is a moot point, whether more harm than good is not on the whole done by it. In a large garden it is a Herculean labour to water every thing, and so the temptation generally prevails, either wholly to neglect it, or to

do it irregularly or defectively. To water nothing is erring on the dry side; but watering too much spoils the flavour, and renders esculents less wholesome." It may be observed, that the practice of the market-gardeners near London and Paris, and that of many private gardeners in the southern counties, is somewhat at variance with the opinion of this experienced and very judicious author. The reason may probably be, that the region of his experience, Northamptonshire, is high and moist. He adds, however, that "strawberries and cauliflowers should generally be watered in a dry season; strawberries more particularly when in bloom, in order to set the fruit; and the cauliflowers when they show fruit, in order to swell the head: in a light soil this ought never to be omitted. In very dry weather seedlings, asparagus, early turnips, carrots, radishes, and small salads, will need an evening watering." He adds, "Water to the bottom and extent of the roots, as much as may be. The wetting only the surface of the ground is of little use, and of some certain harm, as it binds the earth, and so prevents showers, dews, air, and sun, from entering the soil, and benefiting the roots as they otherwise would do; the ground about plants which are frequently watered should be occasionally stirred and raked. Many things are impatient of being kept wet about the stalks, and therefore watering such plants should be generally at a little distance." He recommends "watering the roots of wall-trees in dry weather effectually; watering wall-trees with an engine in the evening refreshes them much, and helps to rid the trees and wall of insects and filth. Late in the summer, when the nights begin to get cold, it is time to leave off all watering, except things in pots and frames, which should have it then only in the morning. By wetting the surface of the ground in a summer's evening, a dew is formed, which pervades the leaves, and helps to fill their exhausted vessels."

3418. *Watering over the leaves of wall-trees and espaliers is essentially necessary*, because these trees by their position are deprived, in a great degree, of the natural showers which would fall on them, if their branches were freely diverged in the open garden.

3419. *Abercrombie, Forsyth, and Nicol* strongly recommend watering the leaves of wall fruit-trees in dry weather, every other day, in the evening. Forsyth recommends watering infected trees with clear lime-water over the leaves, which, he says, will soon destroy the red spider. Nicol uses water only; leaves off when the fruit approaches to maturity; and, after it is gathered, recommences.

3420. *Substitutes for watering can only be found in contrivances to lessen evaporation from the soil.* Mulching is much used for this purpose in all the departments of the gardens of Italy and Spain. Even the Paris nurserymen cover the spaces between their lines of young trees with litter or leaves, as do the orange propagators at Nervi, and the market-gardeners at Rome and Naples. In this country similar practices are sometimes tried. Maher, at Arundel Castle, during one very hot and dry summer, "sowed his seeds in drills, and covered the intervals between the drills with tiles, letting the edges of the tiles approach within an inch of the drills, and pressing them close into the earth. The tiles effectually preserved the roots from the scorching rays of the sun, and by preventing the evaporation of the moisture under them, afforded support as well as protection." (*Hort. Trans.* vol. iv. p. 51.)

Sect. VIII. *Vermin, Insects, Diseases, and Accidents.*

3421. *Such vermin as moles, mice, and birds* are to be caught by some of the traps or snares before described. (2271. and 2325.) Of all the various devices that have been suggested and practised for keeping under the grub, caterpillar, and snail, the most certain is gathering them by hand at their first appearance every season. The grub, wire-worm, and maggot must be sought for by removing the earth from the roots of the plants affected. The caterpillar should be gathered from the leaves early in the season. The best mode of getting rid of caterpillars is to take off, in the winter season, when the trees are being pruned, as many of their eggs, which, in the most common British species, are laid in rings round the stems of the trees, as can be observed; then watch at the time of their hatching in the spring, when the young leaves begin to unfold, and if any have been missed, destroy them whilst they yet travel in family groups, for, in a more advanced stage, they separate, and spread over the tree in all directions. The snail should be picked from the leaves or stalks of plants; or, in the case of new-sown crops, allured by strewing the ground with cabbage-leaves, or decaying leaves or haulm of any sort (the process of decay inducing a degree of sweetness in vegetables); the snails will attach themselves to their under surface in the night, and may be picked off in the morning. Where the earth-worm is too abundant, they may be gathered in digging; or their casts removed, and the ground watered with clear lime-water. Earwigs, wood-lice, and similar insects, may be caught in hollow stalks of vegetables, in the beetle-trap, or in pots turned down over a little hay or moss. Wasps are best destroyed by suffocating them in their nests; when this cannot be done, recourse must be had to bottles of honied water, or other common modes. Watering is an effectual mode of destroying the red-spider. Fumigation is generally resorted to in the case of the aphs

and thrips; but in the open garden, watering and rubbing, or brushing them off, will effect their destruction.

3422. *Diseases* in the vegetable kingdom are rather to be prevented than cured. A good soil on a dry sub-soil is the grand foundation of health, both in trees and herbaceous plants; and, on the supposition of proper culture, the judicious use of the knife to thin out superfluous, diseased, or injured branches, shoots, or leaves; and that of the scraper, to remove mosses and rough bark already cracked and separating, are all that can be done to be depended on. Various unctions, oils, washes, compositions, and plasters, have been tried and recommended for curing the canker, mildew, blight, blotches, barrenness, gum, &c.; but few or none of them can be depended on. For the mildew, strewing with sulphur is in a few cases considered a specific; for the canker, &c., the most effectual mode of procedure is to correct the faults of the sub-soil and soil, renewing the latter entirely, if necessary; to cut out as far as practicable the diseased or wounded part; and in the case of barrenness, to cut in or shorten even the healthy wood. Wherever amputation takes place, the wound will heal, if the air is excluded by prepared clay or any adhesive mixture, provided always, that the principle of life exists in tolerable vigour in the tree. Every thing, indeed, in plants as in animals, depends on the *vis medicatrix nature*, that is, the healing strength of nature.

Sect. IX. Gathering and Preserving Vegetables and Fruits, and sending them to a Distance.

3423. *Gathering should commence as early and continue as late as possible* with all kitchen crops. At the same time, no vegetable ought to be gathered till it has attained the requisite degree of maturity, or offered for use when it has begun to decay. What this degree is, often depends on the particular tastes of families, or their domestics: thus cabbages are most esteemed in Edinburgh when fully headed and blanched; while in London, they are preferred open and green, &c. Equal differences in taste as to peas, celery, lettuce, and, indeed, most other kitchen crops, might be noticed. The operations of gathering kitchen-crops are either cutting off the part desired, breaking or pulling it off, as in the case of peas, beans, &c., or pulling or rooting up, as in the case of onions, turnips, potatoes, &c. Each of these operations ought to be performed with due regard to the plant, where that is to remain, as in the case of the pea; and to the adjoining plants of the same sort, as in the case of pulling turnips, onions, &c. As soon as any plant has furnished its crops or produce, the root and other remains ought to be immediately removed to the dung or compost heap. (See 2790.)

3424. *Gathering fruit.* This operation in the case of the small fruits, as the gooseberry, strawberry, &c., is generally performed by the under-gardeners; but wall and espalier fruit ought to be gathered by the head gardener. Where the utmost delicacy is desired, the berry-gatherer (*fig.* 409.) ought to be adopted for the small fruits, and also for plums, apples, and other fruits on espaliers. For the finer fruits, as the peach, nectarine, &c., the peach-gatherer (*fig.* 410.) lined with velvet, ought always to be adopted.

3425. *Preserving esculents.* The ice-house, as we have repeatedly observed, is found particularly useful for preserving esculent roots, and likewise celery during winter. "Where parsneps and beet-roots are left in the ground over winter," Neill observes, "they must be taken up at the approach of spring, as they become tough and woody whenever there is a tendency to form a flower-stalk. These roots may, therefore, at this season, be placed in the ice-house, and preserved there for a considerable time. In the summer season, during hot weather, various kinds of vegetables, as peas, kidneybeans, cucumbers, &c., can be kept fresh in this manner for several days; and fruits gathered in the morning, which is the most proper time, may be here kept cool, with all their freshness and flavour, until required for the dessert in the afternoon." (*Supp. to Encyc. Brit. art. Hort.*)

3426. *Packing fruit and vegetables to be sent to a distance* frequently forms a part of the gardener's duty. Fruits of the most delicate sorts, it is well known, are sent from Spain and Italy to England, packed in jars with sawdust from woods not resinous, or otherwise ill tasted. One large bunch of grapes is suspended from a twig or pin laid across the mouth of the jar, so that it may not touch either the sides or bottom; sawdust or bran is then strewed in, and when full, the jar is well shaken to cause it to settle: more is then added, till it is quite full, when the supporting twig is taken away, and the earthen cover of the jar closely fitted and sealed, generally with fine stucco. In this way grapes may be sent from the most remote parts of Scotland or Ireland to the metropolis. When the distance is less, they may be sent enveloped in fine paper, and packed in moss. For extraordinary large bunches of grapes, the mode adopted by the Jewish spies (*Numbers*, chap. xiii.), and afterwards by Speechly, may be followed; that of carrying them suspended on a pole or staff resting on men's shoulders. The simplest mode for short

distances is to wrap each bunch in fine soft paper, and lay it on a bed of moss in a broad flat basket with a proper cover.

3427. *The more common fruits*, cherries and plums, may be packed in thin layers, with paper and moss between each. Peaches, apricots, and the finer plums, may each be wrapped separately in vine or other leaves, or fine paper, and packed in abundance of cotton, flax, fine moss, or dried short grass. Moss, it will be recollected, is apt to communicate its flavour to fine fruits, and so is short grass, if not thoroughly dried and sweetened. Cotton is best for preserving the bloom on peaches and plums.

3428. *Common culinary vegetables* are seldom sent to a great distance. The great art is to preserve them fresh, for which purpose they ought to be laid loose in a close box, in the manner of botanic specimens; or closely packed in hampers, so as to exclude the air. The *Brassica* and lettuce tribes, if pulled up by the roots, and, as it were, replanted in a box of sand, with a wickerwork cover, may be sent a journey of two or three weeks without injury, as practised in Russia. Celery, turnips, &c., may be packed in sand; potatoes and other roots, loose; legumes, and other summer crops, generally in moss, fern, or dried turfy peat.

SECT. X. Miscellaneous Operations of Culture and Management.

3429. *The miscellaneous operations and duties of the gardener* are numerous, and in the foregoing general view of kitchen-garden culture many particulars are necessarily omitted. Among these may be mentioned propagation of various kinds for the renewal of crops, mulching perennials, blanching leaves and stalks, rolling walks, preparing composts, regrafting trees to introduce better sorts, or a variety of sorts on one tree, performing operations on their roots or stems to render them more fruitful, &c. These, and other practices described in Part II. Book IV. of this work, must be applied according to the judgment of the practitioner.

3430. *A garden may be managed so as to produce good crops, and yet not so as to be agreeable to the eye.* In general, it may be observed, that the English gardeners excel in the former, and the Scotch in the latter part of practice. The Dutch and Flemish seem, in some degree to combine both, and this ought to be attempted, and persevered in till perfection is attained, by every British gardener.

3431. *The first requisite to good management is a proper establishment of labourers, and resources, as to manure, seeds, repairs, &c. adequate to the extent and character of the garden.* The next thing necessary is the entire independence of the gardener, as far as respects his province. The constant irksome interference of masters and mistresses, stewards, or others, is justly complained of by every gardener who understands his business. Where the proprietor is, as it were, head gardener, in that case he ought to make use of mere workmen, or of such gardeners as are not over ambitious in their profession. In general, it may be observed, that gardens so managed, are ill managed, and often not well cultivated.

3432. *The next requisite is a taste for order and neatness.* This taste is generally acquired in youth from the instruction or imitation of parents or masters; but it may be greatly increased in grown-up persons, when they perceive its advantages, and in head gardeners, when a demand for it is created by their employers.

3433. *Industry and steadiness* are perhaps in no kind of life more necessary than in that of a gardener. Whole crops may be easily ruined by a day's neglect; and not only whole crops, as in the case of neglecting cucumber frames, for example, but the whole produce of a year, or of several years, as in the case of neglecting a peach-house for one hot day.

3434. *Unremitting attention and application.* Unless a man is endowed with, and has well cultivated the faculty of attention, he can never excel in any thing. Without an ever-active attention, a gardener will not see what is out of order, or unsightly in his garden, and of course will not think of correcting it. Many people are so deficient in this respect, that their knowledge is entirely confined to the few objects with which their mode of procuring a living obliges them to be conversant. Something more than this is wanting in a gardener who would be master of his business; and it must be confessed, to the honour of many gardeners, that they excel in point of general observation and knowledge.

3435. *The management of a garden*, Marshall observes, consists in attention and application; the first should be of that wary and provident kind, as not only to do well in the present, but for the future; and the application should be of so diligent a nature, as "Never to defer that till to-morrow which may be done to-day." Procrastination is of serious consequence in gardening; and neglect of times and seasons is fruitful of disappointment and complaint. It will often happen, indeed, that a gardener cannot do what he would; but if he does not do what he can, he will be most justly blamed, and perhaps censured by none more than himself. (*Introd. to Gard.*, p. 59.) For a variety of details on the subject of this chapter see *Gard. Mag.*, vol. i. pp. 89. 174. 399. 424; vol. ii. pp. 62. 233. 264. 274.; vol. iii. pp. 34. 290. 311.; vol. iv. p. 448.; vol. v. pp. 60. 62. 108. 414.; vol. vi. p. 693.; vol. vii. pp. 40. 314. 322.; vol. viii. pp. 580, 581; vol. ix. pp. 39. 217. 317. 321.

CHAP. V.

Of the general Management of Orchards.

3436. *A private orchard* is, sometimes, treated entirely as a kitchen garden, in which case the foregoing chapter contains the general outline of management. Vegetables and small fruits, however, are seldom well-flavoured when grown under the shade and drip of trees, and, therefore, orchards are commonly either but slightly cropped, or laid down in pasture, after the trees have been a few years established.

SECT. I. *General Culture.*

3437. *Stirring the soil.* It was formerly laid down as a rule by nearly all the best authors on gardening, that orchards bore better when dug or cropped; but experience proves both digging and cropping have a tendency to injure the fibrous roots of the trees, and to prevent them from extending themselves close beneath the surface of the ground. It has also been found that trees bear much better when the fibrous roots lie near the surface. It is, however, beneficial to loosen the ground with a fork to the depth of two or three inches, to admit the rain and air to the roots.

3438. *Manuring.* The natural defects of the soil, the habits of fruit trees, and the preference of a species for a particular soil or manure, are to be considered. The hotter dungs are not liked by fruit trees; and those of the horse and the sheep, if not wanted where they would be beneficial alone, should be mixed with twice as much of the cooler dungs, and three times as much fresh earth or road-drift; or with twice the bulk of earthy matter, if the cooler dungs are not to be obtained. The residuum of neats' dung, properly reduced by keeping, is a good simple manure for most fruit trees, and excellent in a compost; but where the soil is naturally cold, a little ashes of coals, wood, straw, or burnt turf, or a minute proportion of soot, ought to be incorporated with it. Hog dung is accounted to have a peculiar virtue in invigorating weak trees. Rotted turf, or any vegetable refuse, is a general manure, excellent for all soils not already too rich. One of the best correctives of too rich a soil is drift-sand. For an exhausted soil, where a fruit tree that has been an old profitable occupant is wished to be continued, a dressing of animal matter is a powerful restorative; such as hog's or bullock's blood, offal from the slaughter-house, refuse of skins and leather, decomposed carrion: also urine diluted with water. The drainings of dung laid on as mulch are highly serviceable. In a soil which does not effervesce with acids, a little lime, forked in about a spit deep, is beneficial to fruit trees. (*Abercrombie.*)

3439. *Forsyth* says, "Orchards ought to be dunged once in two or three years." *Marshall* allows of some rotten dung being forked in, or of sprinkling the whole over with soot and pigeon's dung; he adds, "It is not advisable to give trees much dung; a little lime, only surface-dug, is good."

3440. *Cropping.* *Marshall*, *Abercrombie*, and *Forsyth* allow of moderate cropping among standard fruit trees; but the following observations of *Nicol* are the most definite on this subject:—

3441. *It is proper to crop the ground among new-planted orchard trees* for a few years, in order to defray the expense of hoeing and cultivating it; which should be done until the temporary plants are removed, and the whole be sown down in grass. But it is by no means advisable to carry the system of cropping with vegetables to such an excess as is frequently done. If the bare expense of cultivating the ground, and the rent, be paid by such cropping, it should be considered enough. As the trees begin to produce fruit, begin also to relinquish cropping. When by their productions they defray all expenses, crop no longer. I consider these as being wholesome rules, both for the trees and their owners.

3442. *Rule.* "Crop to within two feet of the trees the first year; a yard the second; four feet the third; and so on until finally relinquished; which of course would be against the eighth year, provided the trees were planted at thirty or forty feet apart, with early bearing sorts between. By this time, if the kinds have been well chosen, the temporary trees will be in full bearing, and will forthwith defray every necessary expense while they remain, or until the principal trees come into a bearing state, and it become necessary to remove them; after which the ground should be sown down in grass. But until then, the ground should be properly cultivated, though not cropped close to the trees; and a moderate quantity of manure should be forked or dug in every second or third season." (*Kal.* p. 262.) The less the ground of a full-grown orchard is stirred and cropped, the better will the trees bear, other circumstances being alike.

SECT. II. *Pruning Orchard Trees.*

3443. *In pruning a newly-planted orchard or standard tree*, the first object is the formation of a head. According to *Abercrombie*, this ought in most kinds to be "circular,

compact, and proportioned to the strength of the stem, with the branches well distributed, and sufficiently open in the centre to admit the free circulation of air."

3444. *In the first spring* "after a young standard has been planted, examine the primary branches, to see whether they will be sufficient, with the secondary laterals to be forced out by shortening, to form a good head. The primary branches should be so placed as to balance each other, and be equally distributed round the tree. Thus, three in a triangle; four at right angles; five, six, and even seven, shooting at pretty equal distances, might be retained; but it is seldom that more than four well placed offer, which is a good number. These first branches, if there be no secondary laterals, or none well placed, should be shortened down to two or four eyes each; or reduce a strong shoot to one third of its length, and a weak shoot to two thirds. The second spring again revise the branches and secondary shoots, and reserve only as many as are vigorous and well distributed. Afterwards, leave the head to form of itself, cutting out superfluous and ill placed shoots, and shortening for the production of new laterals only to fill a vacancy. Luxuriant limbs, which are likely to be disproportionably large, should be rejected as weakly shoots. In the third or fourth year after planting a maiden tree, the foundation of a good head having been obtained by judicious shortening, and the plant sufficiently strengthened, it will become proper to let the tree proceed to bearing with no greater check from the knife than is unavoidable. To this end, the lower branches should not be shortened at all, and the upright leaders very little; but where two shoots cross, let the worst be cut out. Moderate-sized and slender shoots are more fruitful than strong luxuriant wood."

3445. *The object of pruning young standard trees*, Nicol observes, "is to form a proper head. Generally speaking, the shoots may be pruned in proportion to their length, cutting clean away such as cross one another, and fanning the tree out towards the extremities on all sides; thereby keeping it equally poised and fit to resist the effects of high winds. When it is wished to throw a young tree into a bearing state, which should not be thought of, however, sooner than the third or fourth year after planting, the leading branches should be very little shortened, and the lower or side branches not at all; nor should the knife be used, unless to cut out such shoots as cross one another, as above hinted."

3446. *Pruning bearing trees*. "After an orchard-tree is come into bearing," Abercrombie observes, "continue at the time of winter-pruning, either every year, or every two, three, or four years, as an occasion is perceived, to cut out unproductive wood, crowded spray, and decayed parts. Also reduce long and outrunning ramblers, and low stragglers, cutting them to some good lateral that grows within limits. Where fruit-spurs are too numerous, then cut the strongest and most unsightly. Also keep the tree pretty open in the middle. If it be necessary to take off large branches from aged trees, use a chisel or saw, and afterwards smooth the wound with a paring-knife. In case old wood is to be cut down to young shoots springing below, to make the separation in summer will be of more advantage to those young shoots, though it is not a common practice, on account of the liability of many stone-fruit bearers to exude gum, when a large branch is lopped in the growing season. Observe to keep the stem clear from all lateral shoots, and eradicate all suckers from the root."

3447. *In pruning aged trees* that have run into a confusion of shoots and branches, and whose spurs have become clustered and crowded, the saw and the knife may be exercised with freedom; observing to cut clean away all useless spray, rotten stumps, and the like excrescences. Thin out the spurs so as to let the air circulate freely among the leaves and fruit in the summer season, and to admit the rays of the sun, so as to give the fruit colour and flavour.

3448. *Mauvill* strongly recommends "thinning the branches of orchard trees for the same objects," adding, "that it is in general much neglected." He recommends "a little pruning of standards every year, and a general one (rather free) every three or four years, to cut out what is decayed, and some of the older wood, where a successional supply of young may be obtained to succeed, as the best way to keep the trees in vigour, and have the best of fruit; for that which grows on old wood gets small and austere." The same author judiciously remarks, that trees with heavy fruit, as the apple and pear, should have, if possible, their branches rather upright; but that light-fruited trees, such as the cherry, will admit of drooping branches.

3449. *The season for pruning orchards* is generally winter, or early in spring—not later than February, according to Abercrombie and Nicol. Quintiney says, "A weak tree ought to be pruned directly at the fall of the leaf." And Abercrombie, "To prune in autumn strengthens a plant, and will bring the blossom-buds more forward; to cut the wood late in spring tends to check a plant, and is one of the remedies for excessive luxuriance."

3450. *Treatment of deformed or diseased trees*. Where a tree is stunted, or the head ill shaped, from being originally badly pruned, or barren from having overborne itself, or from constitutional weakness, the most expeditious remedy is, to head down the plant within three, four, or five eyes (or inches, if an old tree) of the top of the stem, in order to furnish it with a new head. The recovery of a languishing tree, if not too old, will be further promoted by taking it up at the same time, and pruning the roots; for as, on the one hand, the depriving too luxuriant a tree of part even of its sound healthy roots will moderate its vigour, so, on the other, to relieve a stunted or sickly tree of cankered or decayed roots, to prune the extremities of sound roots, and especially to shorten the dangling tap-roots of a plant, affected by a bad sub-soil, is, in connection with heading down or very short pruning, and the renovation of the soil, and draining, if necessary, of the sub-soil, the most availing remedy, that can be tried. (Abercrombie.)

3451. *A tree often becomes stunted from an accumulation of moss*, which affects the functions of the bark, and renders the tree unfruitful. This evil is to be removed by scraping the stem and branches of old trees with a scraper; and on young trees a hard brush will effect the purpose. Abercrombie and Nicol agree in recommending the finishing of this operation by washing with soap-suds, or a medicated wash of some of the different sorts for destroying the eggs of insects. In our opinion lime-water, or even water alone, is better than any of these applications.

3452. *Wherever the bark is decayed or cracked*, Abercrombie and Forsyth direct its removal. Lyon, of Edinburgh, has lately carried this practice to so great a length as even to recommend the removal of a part of the bark on young trees. Practical men, in general, however, confine the operation to the cracked bark which nature seems to attempt throwing off; and the effect, in rendering the trees more fruitful and luxuriant, is acknowledged by Neill in his *Account of Scottish Gardening and Orchards*, and by different writers in the *London and Edinburgh Horticultural Transactions*.

3453. *The other diseases to which orchard-trees are subject*, are chiefly the canker, gum,

mildew, and *blight*, which, as we have already observed, are rather to be prevented by such culture as will induce a healthy state, than to be remedied by topical applications. Too much lime, Sir H. Davy thinks, may bring on the canker, and if so, the replacing a part of such soil with alluvial or vegetable earth, would be of service. The gum, it is said, may be constitutional, arising from offensive matter in the soil; or local, arising from external injury. In the former case, improve the soil; in the latter, apply the knife. The mildew, it is observed by Knight and by Abercrombie, "may be easily subdued at its first appearance, by scattering flour of sulphur upon the infected parts." This, however, only applies to superficial mildew, or that description of fungus which lies on the surface of leaves; and by no means to that description of mildew which consists of fungi growing out of the substance of the leaf. (See an excellent paper on this subject in *Gard. Mag.* vol. ix. p. 325.)

Sect. III. *Of Gathering and Storing Orchard Fruits.*

3454. *The gathering of orchard fruits*, and especially apples, from standards, should be performed in such a manner as not to damage the branches, or break off the spurs. Too frequently the fruit is allowed to drop, or they are beat and bruised by shaking the tree, and using long poles, &c. Nicol directs that "they should never be allowed to drop of themselves, nor should they be shaken down, but should be pulled by the hand or apple-gatherer. (1347.) This may be thought too troublesome a method; but every body knows that bruised fruit will not keep, nor will it bring a full price. The expense of gathering, therefore, may be more than defrayed, if carefully done, by saving the fruit from blemish." (*Kal.* 257.)

3455. *Forsyth* says, "As apples shaken or beaten down with a pole never keep in winter, they ought all to be hand-picked by a person standing on steps made on purpose. The step-ladder should be light, in two pieces, to disengage the back at pleasure, by drawing the bolt; and they should have a broad step at top for a man to stand on, and to place a basket by his feet. In the larger baskets or hampers, in which the fruit is to be placed to be wheeled away, lay some short grass mowings, perfectly dry (which ought to be provided in summer, and kept dry), to prevent the fruit from being bruised."

3456. *In respect to the time of gathering*, Nicol recommends "that pears and apples should not be pulled till their seeds are of a dark brown, or blackish colour." The criterion of ripeness, adopted by Forsyth, is their beginning to fall from the tree. He says, "Observe attentively when the apples and pears are ripe; and do not pick them always at the same regular time of the year, as is the practice with many. A dry season will forward the ripening of fruit, and a wet one retard it; so that there will sometimes be a month or five weeks difference in the proper time of gathering. The method that I have practised is, to observe when the fruit begins to fall (I do not mean what we call windfalls, or the falling of such as are infested with the caterpillar, &c., but sound fruit); I then put my hand under it; and if it comes off without any force being used, I take it for granted that the fruit is perfectly ripe; unless the tree be sickly, which is easily known by the leaves or fruit being shrivelled. If the foregoing observations are attended to, the fruit will keep well, and be plump; and not shrivelled, as is the case with all fruit that is gathered before it is ripe."

3457. *Marshall* says, "Gather pears of the summer sorts, rather before they are ripe, as when thoroughly so they eat mealy, if kept above a day or two; even when gathered as they ought to be, in a week or less they will begin to go at the core. They should not, however, be gathered when they require much force to pull them off. Autumn pears must also not be full ripe at the time of gathering, though they will keep longer than those of the summer. Winter pears, on the contrary, should hang as long on the trees as they may, so as to escape frost, which would make them flat in flavour, and not keep well. Generally they may hang to the middle of October on full standards, a week longer on dwarfs, and to the end of the month on walls; but yet not after they are ripe. The art of gathering is to give them a lift, so as to press away the stalk, and if ripe they readily part from the tree. Those that will not come off easily, should hang a little longer; for when they come hardly off, they will not be so fit to store, and the violence done at the footstalk may injure the bud there formed for the next year's fruit. Let pears be quite dry when pulled, and in handling avoid pinching the fruit, or in any way bruising it, as those which are hurt not only decay themselves, but presently spread infection to those near them: when suspected to be bruised, let them be carefully kept from others, and used first: as gathered, lay them gently in shallow baskets."—"The jargonelle pear," Forsyth observes, "keeps best on the tree, as, if gathered, it rots almost immediately."

3458. *With regard to keeping of orchard fruits*, the old practice, and that recommended by Marshall and Forsyth, commences with sweating. Nicol and most modern gardeners omit this process, and spread the fruit thinly on shelves or the floor of the fruit-room. At the garden of the London Horticultural Society the fruit is kept on shelves. As to the keeping of apples, Marshall observes, "those which continue long for use should be suffered to hang late, even to November, if the frost will permit: for they must be well ripened, or they will shrink. Lay them in heaps till they have sweated a few days, when they must be wiped dry. Let them then lie singly, or at least thinly, for about a fortnight, and be again wiped, and immediately packed in boxes and hampers, lined with double or treble sheets of paper. Place them gently in, and cover them close, so as to keep air out as much as possible. Preserve them from frost through the winter. Never use hay for the purpose. Some of the choicest sorts of table apples may be treated as directed for the best pears."

3459. *Sweating and storing winter pears.* Winter pears, according to Marshall, "should be laid in a dry airy room, at first thinly for a few days, and then put them in heaps to sweat; in order to which, a blanket thrown over them will help. The fermentation must be watched, and when it seems to have passed the height of sweating, wipe the fruit quite dry gently with fine flannel, or clean soft linen, and store them carefully. The storing is thus: those to be used first, lay by singly on shelves, or on the floor, in a dry southern room, on clean dry moss, or sweet dry straw, so as not to touch one another. Some, or all the rest, having first lain a fortnight singly, and then nicely culled, are to be spread on shelves, or on a dry floor. But a superior way is, to pack in large earthen, or china, or stone jars, with very dry long moss or dried fern, at the bottom, sides, and also between them, if it might be. Press a good coat of moss or fern on the top, and then stop the mouth close with cork, or otherwise, which should be rosinod round with about a twentieth part of bees' wax in it. As the object is effectually to keep out air (the cause of putrefaction), the jars, if earthen, may be set on dry sand, which put also between, round, and over them, to a foot thick on the top. In all close storing, observe, there should be no doubt of the soundness of the fruit. Guard in time, from frost, those that lie open. Jars of fruit must be soon used after unsealing."

3460. *Sweating and storing apples and pears, as practised by Forsyth.* "When the fruit is carried to the fruit-room, lay some of the dry short grass on the floor, in the area of the room; then take the fruit gently out of the baskets, and lay it in heaps on the top of the grass, keeping each sort in a separate heap; the heaps may be from two to three feet high, or according to the quantity of fruit that you have. When the heaps are completed, cover the tops at least two inches thick with short grass, in order to sweat them. Let them lie a fortnight; then open the heaps and turn them over, wiping each apple or pear with a dry woollen cloth, which should be frequently dried during the process, observing now to lay in the middle the fruit which before was at the top. Let the heaps now remain eight or ten days, covered as before; by that time they will have thrown out the watery crudities which they may have imbibed during a wet season; then uncover the heaps, and wipe the fruit carefully one by one, as before, picking out every one that is injured, or has the least spot, as unfit for keeping. During the time that the fruit is sweating, the windows should be left open, except in wet and foggy weather, to admit the air to carry off the moisture which perspires from the fruit. The perspiration will sometimes be so great, that, on putting your hand into the heap, it will come out as wet as if it had been dipped into a pail of water: when in this state, it will be necessary to turn and wipe the fruit."

3461. *In laying up fruit,* the common practice has been to lay it on clean wheat straw; but Forsyth observes, that, when any of the fruit begins to decay, if it be not immediately picked out, the straw, by imbibing the moisture from the decayed fruit, will become tainted, and communicate a disagreeable taste to the sound fruit. "The fruit on shelves," he adds, "should be turned two or three times during the winter; as delicate and tender fruit, by lying long without turning, is apt to rot on the under side, even if perfectly sound when laid up. Be particularly careful, however, to pick out all the damaged fruit. When the fruit is laid in, put the earliest sorts on the lower shelves, or in the lower drawers, according to their time of coming in, beginning with the nonesuch, golden rennet, and Juneating apples, and bergamot and beurré pears; thus, by proper management, you may have a constant succession of fruit from one season to the other. Those who keep their fruit in storehouses, for the supply of the London and other markets, as well as those who have not proper fruit-rooms, may keep their apples and pears in baskets or hampers; putting some soft paper in the bottoms and round the edges of the baskets, &c., to keep the fruit from being bruised; then putting in a layer of fruit, and over that another layer of paper; and so on, a layer of fruit and of paper alternately, till the basket or hamper be full: covering the top with paper, three or four times double, to exclude the air and frost as much as possible. Each sort of fruit should be packed separately; and it will be proper to fix a label to each basket or hamper, with the name of the fruit that it contains, and the time of its being fit for use."

3462. *But the best way of keeping fruit is to pack it in glazed earthen jars.* "The pears or apples must be separately wrapped up in soft paper; then put a little well-dried bran in the bottom of the jar, and over the bran a layer of fruit; then a little more bran to fill up the interstices between the fruit, and to cover it; and so on, a layer of fruit and bran alternately, till the jar be full; then shake it gently, which will make the fruit and bran sink a little; fill up the vacancy at top with more bran, and lay some paper over it, covering the top with a piece of bladder to exclude the air; then put on the top or cover of the jar, observing that it fits as closely as possible. These jars should be kept in a room where you can have a fire in wet or damp weather."

3463. *Nicol's opinion as to the sweating of fruits* is thus given:—"I consider it an error to sweat apples, as it is termed, previous to storing them, either in the common way with straw or hay, or, as recommended by Forsyth, by the use of short grass. The fruit ever after retains a bad flavour. It should never be laid in heaps at all; but, if quite dry when gathered, should be immediately carried to the fruit-room, and be laid, if not singly, at least thin on the shelves; the room being properly fitted up with shallow shelves on purpose, being well aired, and having a stove in it, that damp may be dried off when necessary." He adds, "If the finer fruits are placed on any thing else than a clean shelf, it should be on fine paper. Brown paper gives them a flavour of pitch. The finer large kinds of pears should not be allowed even to touch one another, but should

be laid single and distinct. Apples, and all pears, should be laid thin; never tier above tier. Free air should be admitted to the fruit-room always in good weather, for several hours every day; and in damp weather a fire should be kept in. Be careful at all times to exclude the frost from the fruit, and occasionally to turn it when very mellow."

3464. *Gathering and storing nuts.* Walnuts are generally beaten off the tree with poles; but it does not appear that any harm would result to the fruit from leaving them to drop, or be shaken off by winds, or in part shaking them off. Sweating may be applicable to them, in order to the more ready separation of the outer or soft skin from the hard shell. This effected, they are to be spread thin till quite dry, when they may be preserved in bins, or boxes, or heaps.

3465. *Walnuts for keeping.* Forsyth observes, "should be suffered to drop of themselves, and afterwards laid in an open airy place till they are thoroughly dried; then pack them in jars, boxes, or casks, with fine clean sand, that has been well dried in the sun, in an oven, or before the fire, in layers of sand and walnuts alternately; set them in a dry place, but not where it is too hot. In this manner, I have kept them good till the latter end of April. Before you send them to table, wipe the sand clean off; and, if you find that they have become shrivelled, steep them in milk and water for six or eight hours before they are used; this will make them plump and fine, and cause them to peel easily."

3466. *The chestnut* is to be treated like the walnut, after the husk is removed, which, in the chestnut, opens of itself. Knight (*Hort. Trans.*, vol. i. p. 247.) preserves chestnuts and walnuts during the whole winter, by covering them with earth, as cottagers do potatoes.

3467. *Almonds* may always be gathered by hand, and should afterwards be treated as recommended for walnuts. Forsyth recommends packing nuts, intended for keeping, in jars or boxes of dry sand.

3468. *Other fruits.* The *berberry* and *cornel*, or *dogwood berry*, are used immediately, when gathered, as preserves. The medlar is not good till rotten ripe. It is generally gathered in the beginning of November, and placed between two layers of straw, to forward its maturation. "Others," Marshall observes, "put medlars in a box, on a three-inch layer of fresh bran, moistened well with soft warm water; then strew a layer of straw between them, and cover with fruit two inches thick; which moisten also, but not so wet as before." In a week or ten days after this operation, they will be fit for use. Quinces are gathered in November, when they are generally ripe. After sweating in a heap for a few days, they are to be wiped dry, and placed on the fruit-shelf at some distance from each other. The service or sorb apple never ripens on the tree in England. Where grown, it is gathered late in autumn, in a very austere state, and laid on wheat-straw to decay. It thus becomes eatable in a month.

SECT. IV. Packing Orchard and other Fruits for Carriage.

3469. *In packing fruit to be sent to a considerable distance*, great care is requisite. It should not, Forsyth observes, be packed in baskets, as they are liable to be bruised among heavy luggage, and the fruit, of course, will be injured. He recommends boxes made of strong deal, of different sizes, according to the quantity of fruit to be packed. The following are the dimensions of the boxes in which he sent fruit by the coach to Windsor and Weymouth, for the use of George III. and the royal family: — The largest box was two feet long, fourteen inches broad, and the same in depth. The smallest box was one foot nine inches long, one foot broad, and the same in depth. These boxes were made of inch deal, and well secured with three iron clamps at each corner: they had two small iron handles, one at each end, by which they were fastened to the roof of the coach; in these boxes were sent melons, currants, pears, peaches, nectarines, plums, and grapes, packed so as always to have the heaviest fruit at bottom. The melons are wrapped up in soft paper: the pears, peaches, nectarines, plums, and grapes are first wrapped up in vine-leaves, and then in paper. The cherries and currants are packed in a flat tin box, one foot four inches long, ten inches broad, and four deep.

3470. *In packing, proceed thus:* — First, put a layer of fine long dry moss in the bottom of the tin box, then a layer of currants or cherries, then another layer of moss, and so on, alternately, fruit and moss, until the box is so full that, when the lid is hinged down, the fruit may be so firmly packed as to preserve them from friction. Make a layer of fine moss and short, soft, dry grass, well mixed, in the bottom of the deal box; then pack in the melons with some of the same, packing it tight in between all the rows, and also between the melons in the same row, till you have finished the layer; choosing the fruit as nearly of size as possible, filling up every interstice with the moss and grass. When the melons are packed, lay a thin layer of moss and grass over them, upon which place the tin box with the currants, packing it firmly all round with moss to prevent it from shaking; then put a thin layer of moss over the box, and pack the pears firmly (but so as not to bruise them) on that layer, in the same manner as the melons; and so on with the peaches, nectarines, plums, and, lastly, the grapes, filling up the box with moss, that the lid may shut down so tight as to prevent any friction among the fruit. The boxes should have locks, and two keys, which may serve for them all; each of the persons who pack and unpack the fruit having a key. The moss and grass should always be returned in the boxes, which, with a little addition, will serve the whole season, being shaken up and well aired after each journey, and keeping it sweet and clean. After the wooden box is locked it will be necessary to cord it firmly. Cotton may be substituted for moss, as it is very cheap; more especially if it be returned with the packages, so as to be reused, which it can be for a much greater number of times than moss.

3471. *Miscellaneous points of orchard culture.* As in treating of kitchen-garden culture, so here various lesser points of culture and management are omitted, which the judicious gardener will not overlook in practice; provided he has, or ought to have, the

whole art and science of gardening, as it were, stored up in his mind, and ready to apply on every occasion. Among these points may be named the occasional grafting of orchard trees, with a view either to introduce new or preferable sorts, or to fill up the head of a tree; thinning out temporary trees; introducing young trees in intervals of old orchards to succeed the old; guarding from thieves; and a variety of other matters, which circumstances will always suggest to the observing eye and fertile mind of a gardener attached to his profession. Among these things, one of the first consequence is attention to order and neatness.

3472. *In regard to neatness and order*, see 3184. to 3202.; and with respect to recent improvements, which have not been fully sanctioned by extensive adoption, they have been already enumerated in Part II. Book IV. *On the Operations of Gardening*. See, on the subjects of this chapter, *Gard. Mag.*, vol. i. pp. 144. 268.; vol. iii. p. 81.; vol. iv. p. 263.; vol. vi. pp. 57. 700.; vol. vii. pp. 316. 319. 322. 332.; vol. viii. pp. 580. 581.; and vol. ix. pp. 217. 301.

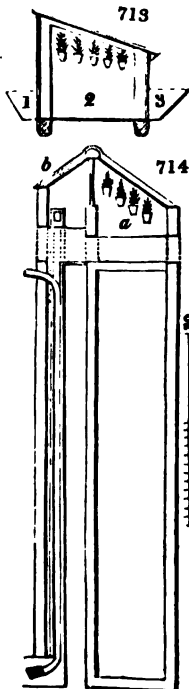
CHAP. VI.

Construction of the Culinary Forcing Structures and Hot-houses.

3473. *The general principles of design in forcing and hot-house structures* have been already laid down (2450. to 2472.); and, therefore, the object, in this chapter, is to detail the most approved practice in regard to the particular construction of such as belong to the culinary and fruit gardens. These are the *pinery*, *vinery*, *peach-house*, *cherry-house*, *fig-house*, *culinary pits*, *frames*, and *mushroom-houses*.

SECT. I. *Construction of the Pinery.*

3474. *The external form of a pinery* varies less than that of any other description of hot-house. The necessity, in glass structures, of placing all plants intended to thrive near the glass, and the circumstance of a bed of bark or leaves for plunging pots being most convenient when flat or gently sloping, have led, in almost all cases, to a low and rather flat roof, nearly parallel to the bark-bed. This gave rise, many years ago, to the growing of pines in pits, as practised by the Dutch, and generally on the Continent; and as now adopted in this country. Having already (2396. to 2412.) described several pits well adapted for this purpose, we shall here subjoin the very economical form adopted by Baldwin, one of the first pine-growers, who, by his large fruit and abundant crops, brought this mode of growing pines into reputation.



3475. *The pinery of Baldwin* consists of two structures, the succession-bed and the fruiting-house. The succession bed or frame (*fig. 713.*), in which the young plants are to remain both winter and summer, should be constructed of timber, seven feet wide, and seven feet three inches high at the back, the front being in the same proportion. The method of preparing the bed is as follows:—"Sink your pit (2) three feet three inches deep, and of such length as you may require, and make it sufficiently broad to admit of linings on each side (1, 3); there should be a good drain at the bottom of the pit, to keep it dry; then set posts, about the dimensions of six inches square, in the pit, at convenient distances (say about the width of the top lights), and case it round with one inch and a half deal wrought boards above the surface, and below it with any inferior boards or planks. The dimensions of Baldwin's own succession beds or frames were thirty-nine feet long and seven feet wide; containing two hundred and seventy-three square feet, which held three hundred and fifty suckers, from the end of September till the seventh of April." (*Cult. of Anan.*, p. 11.) The fruiting-house (*fig. 714.*) is a pit with a walk behind; "in it the glass should be closely puttied, to keep out the cold air, and to retain the warm; and in the back there should be three lids (b), to admit air, the dimensions of each to be three feet long and one foot deep. The flue makes only one course in the passage behind." (*Cult. of Anan.*, p. 19.)

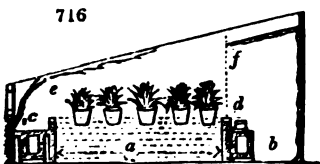
3476. *Aiton's pine-pits* at Kensington (*fig. 715.*) are constructed exactly in Baldwin's manner, with this difference, that, the subsoil at Kensington being moist, they are raised



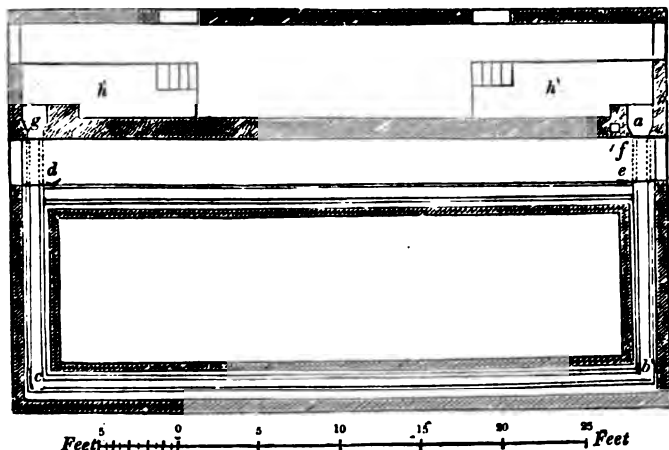
on a small platform (*a, b*) above the surface, instead of being sunk under it, as Baldwin's are. They have also the addition of a gutter in front, which, though at first sight it may appear a trifling addition, yet, in practice, is of very material consequence, by keeping the lining dry, and not chilling and interrupting the heat in the very part where it should penetrate to the interior of the pit.

Occasionally some plants are fruited in these pits, especially at Kew, but in general they are removed to a low house (*fig. 716.*) of a most economical and judicious construction, and calculated both for the growth of pines and vines. This house is fifteen feet wide within the walls; the pit (*a*) is nine feet wide; the back path (*b*) forms a border for the roots of the vines; the pit is surrounded by a flue (*c d*), and in others, by steam or hot-water pipes; the curb is two feet three inches from the glass in front (*e*), and four feet eight inches from it behind (*f*); the vines are

planted in the back border (*b*), and trained under the roof directly over that border, and over the back flue; and others are planted in the front border (*g*), and trained up the rafters. The length of the houses in the royal gardens at Kensington varies from thirty-three to fifty feet (*fig. 717.*): each house has two furnaces; one for



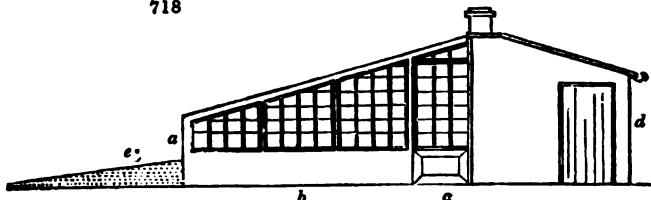
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constant use, and another for giving an extra supply of heat in very severe weather. The first (*a*) proceeds directly to the front corner (*b*), thence along the front to the opposite end (*c*), then along the back of the pit (*d e*), passing under the back path, or border, and terminating in a chimney (*f*) beside the furnace. The other furnace is placed at the opposite end of the house (*g*); has a short flue under the back path, which conducts it to the back course of the principal flue (at *d*), which it joins, and the smoke of the two fires moves in the same tunnel (from *d* to *e*), and passes out by the same chimney. When this second furnace is not in use, its connection with the flue of the first is cut off by a damper at the point of junction (*d*). A very small fire made in this furnace, in severe weather, not only adds to the heat of the house by its own power, but by increasing the draught, or rate of burning, of the fire in the other furnace. In addition to the fire heat, a steam apparatus has been also erected, and the tubes conducted round the houses on the tops of the flues (*fig. 717. d, e*); this is found to give a great command of heat, and also to admit of filling the house with vapour at pleasure. The height of the house, from the ground to the top of the back wall, is only nine feet (*fig. 718.*); the rafters of the roof are placed about four feet apart, centre from centre; or about twenty-four sashes are given to every hundred feet; the front sashes (*a*) are only eighteen inches high, and slide past each other; the middle end sash (*b*) also slides; the sill of the door (*c*), and the back path, or border, are on a level with the outer sur-

face of the ground, to admit the easy wheeling in of tan, &c. ; the front border (*d*) is raised considerably above it, on account of the wet bottom; the back sheds are low

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and neat ; and the furnaces sunk three feet below the surface (*fig. 717. h h*), to give them a better draught ; and this also serves to drain the back border. The houses are placed in pairs ; the furnaces for general use at the extreme ends of the range, and the auxiliary ones in the middle, where the steam boiler is also placed, but worked by a fire apart : on the whole, no plan of pine-stove that has yet appeared is more simple, neat, economical, and complete than this ; the only objection we have to it is, that, owing to the great thickness of wood employed in the bars of the sashes, the pits are rather dark and gloomy within ; but this might easily be remedied by the substitution of light iron rafters with wooden-framed sashes sliding in them, and with the bars of the sashes formed of iron. We have been thus particular in describing these pits and houses, because we know none of a superior construction, or better adapted for growing both pines and grapes. They have been under our eye for upwards of twelve years, and not a single year has passed, during that period, that they have not produced, first under the care of Mr. Burnet, and afterwards under that of Mr. Plimley, large fruit and excellent crops. Grapes are generally cut from the vines planted in the back path in the month of April. Were the houses to be re-erected, all the alteration that need be made would be the adoption of lighter framework for the roof, and hot water as a mode of heating.

SECT. II. Construction of the Vinery.

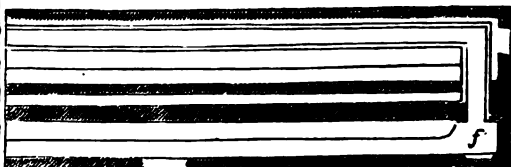
3477. *The vinery affords the greatest latitude of construction ; for the fruit tree the most easily cultivated of all that are grown under glass is the vine. For a crop which is to be forwarded by the natural influence of the sun, chiefly or alone, almost any form will suffice, provided the plants are trained near the glass. For very early crops, small houses with steep roofs (figs. 719, 720.), in order freely to admit the sun in the winter and spring months, are most desirable ; and the section (fig. 719.) of the*

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steep-roofed house used by the Dutch is not surpassed by any form adopted in this country. It is commonly supposed that pits are the best buildings for early forcing ; and, as far as respects artificial heat, they are not much inferior to the Dutch vinery ; but as to light, without which forced productions are not worth using, they are, from the low angle of their roof, greatly deficient. A house for early forcing (*fig. 720.*) may be thirty feet long, eight feet wide ; the glass (*a*) twelve feet high, placed at an angle of 15° to the perpendicular ; the flue, or tube of hot water or steam, entering at one end (*f*), may pass under the front glass (*b*), and afterwards make two or three returns in the back wall (*d*) ; the vines may be trained on a trellis nearly parallel to the glass, between the flue and the back

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wall (*c*), and the shed behind may be fitted up with shelves (*e*), and used as a mushroom-house. Such a house, being small, will be very easily managed in the most severe winters.

3478. *A vinery for a crop to ripen in July, Knight recommends to be roofed at an angle of 35° , Wilkinson (Hort. Trans.) and Miller (Dict. in loco) 45° , which is the slope adopted most commonly for summer crops, both of grapes and peaches. Abercrombie says, "The diagonal side of a glass case, designed for a short periodical course of forcing, to begin the 21st of December, may be 55° ; 22d January, 60° ; 31st February, 46° ; 21st March, 43° ." He adds, "Too much importance must not be attached to*

the angle of inclination in the glass-work." It is of some consequence to remark, that the roofs of vineries may be fixed, provided there are shutters in the front and back wall for ventilation.

SECT. III. Construction of the Peach-house.

3479. *A peach-house, not intended for early forcing*, may be of any shape, provided that the trees are either standards, or trained near the glass. Knight and many practical gardeners are of opinion, that the roofs of all peach-houses should be made to take off, in order to colour the fruit, and afterwards to expose the trees to the weather for the sake of destroying insects.

3480. *A peach-house for the earliest forcing*, to be heated by one fire, acting either by smoke flues, or by hot water or steam, may be of any length between thirty and forty feet, eight or nine feet wide, and twelve feet high. It should have no upright glass. The parapet may be about eighteen inches in height, and the rafters should rest immediately upon it. The intention here is, to train the peaches and nectarines up the roof, in the same manner as vines, only a little nearer to the glass, and none against the back wall. The front flue, or steam or hot water pipes, may run within two feet of the parapet, and should return by the back wall, being separated from it by a three-inch cavity. The parapet and front flue, or pipes, must stand on pillars, three feet deep under the ground-level, in order to give full scope to the roots of the plants.

3481. *A succession peach-house* to the above, that is, not to be forced so early, may be of a like length, ten or eleven feet wide, and thirteen or fourteen feet high; also without upright or front glass; and otherwise may be constructed in all respects as the above.

3482. *A late peach-house*, to be managed by one fire, may be forty or forty-five feet long, thirteen or fourteen feet wide, and fourteen or fifteen feet high. It may either have, or not have, upright glass in front; which should not, however, exceed four feet or four feet and a half in height, including the parapet. The flues, or pipes, may be conducted as above specified for the early houses. The intention here is, to train plants on trellises against the back wall, and likewise half-way up the roof, in the manner of vines; so that it may be termed a double peach-house.

3483. *The peach-house of M^r Phail* was made sixty-four feet long, and ten feet wide; the height of the back wall was four feet, and that of the front five feet, in pillars of brickwork four feet each in length, which supported the sill to support the frame for the lights to rest upon; so that there were in the front eight vacuities in width, four feet each between the said pillars, for the roots of the trees to extend into the border. "In the inside of the pit," he says, "I had a wall built the whole length of the pit, and thirty inches distant from the front pillars. The wall was nine inches thick, and three feet six inches high, about one foot lower than the pillars of brick. I then made a border of good loamy earth, mixed with some very rotten dung, four feet deep, which left a vacancy between the pillars and the sill of nearly one foot, which was filled up with the earth of the border, which reached to the nine-inch wall within the pit, so that thirty inches wide of the border was in the inside of the pit. I had the border made fourteen feet wide."—"I got the floor of the pit paved with bricks, and in the back side, between the pavement and the trees, there was between five and six feet, so that a person had room to walk under to prune and manage the trees." The door was made in the back wall, at the west end; and at the east end a fireplace was made in the back wall, about three feet high, without a return. M^r Phail began to force in the middle of March, and ripened abundant crops of fruit in the month of July.

SECT. IV. Construction of the Cherry-house and Fig-house.

3484. *Any form will answer for a cherry-house*. Some market-gardeners grow them in houses placed south and north, glazed on all sides, as Andrews at Lambeth; others in pits, and some in movable glass cases.

3485. *A cherry-house*, to be worked by one fire, may be from thirty to forty feet in length, from ten to twelve feet wide, and twelve or fourteen feet high. The parapet a foot or eighteen inches, and the front glass two feet or two feet and a half high. The front flue, or pipes, to stand on the same foundation with the parapet, and the return to be by the back wall; but both flues, or pipes, to be separated from the walls by a cavity of three inches. The front parapet and flue, or pipes, to stand on pillars; which pillars should be thirty inches deep under the surface; the depth, or rather more than the depth, requisite for the border. The back wall to be trellised for training cherries to; and the border to be planted with dwarf cherries, or with dwarf apricots and figs, or with all three. The front and end flues, or pipes, to be crib-trellised (i. e. shelves of lattice-work to be placed over them), for pots of strawberries, kidneybeans, or the like.

3486. *The fig-house may be of any form not very lofty*. One constructed like the cherry-house will answer perfectly well. The figs may be trained to the trellis at back, and either dwarf figs, apricots, or cherries, or other fruits, may be planted in the border. As figs are not a popular fruit in Britain, a sufficient number for most families may be grown in pots and tube, placed in the other hot-houses.

SECT. V. Construction of Hot-houses in Ranges.

3487. *The culinary hot-houses are very frequently placed in a range*, by which it is supposed something is saved in the expense of the ends, some heat gained, and greater convenience of management obtained. In the arrangement of the different divisions of a

line of culinary hot-houses, those which require most heat are placed towards the centre, that their ends may be protected by the others; and those which require most light and least heat, such as peach-houses, at the ends. One of the most complete ranges of this kind any where to be met with, is that erected by Mr. Forrest at Syon, of which a copious and most instructive account will be found in the *Gardener's Magazine*, vol. v. p. 502. The preparation of the borders, the manner of planting and training, and, indeed, all the details in that account, are most excellent.

Sect. VI. Construction of Culinary Pits, Frames, and Mushroom-houses.

3488. *Culinary pits* may be constructed either with or without flues, or steam or hot-water pipes; and either of such a height behind as to admit of a walk, or so low as to be managed like a common hot-bed frame. The intention of these pits, as far as culinary gardening is concerned, is, first, to force fruit-trees, as peaches, grapes, cherries, figs, apples, &c. in pots; and, in this case, the design which admits of a passage behind, from which to water and manage the plants, will be found preferable; and, secondly, to force strawberries, kidneybeans, potatoes, asparagus, sea kale, rhubarb, &c., for which a pit sunk in the ground, and to be managed from without, will suffice, and is even preferable, because the plants may be brought close under the glass.

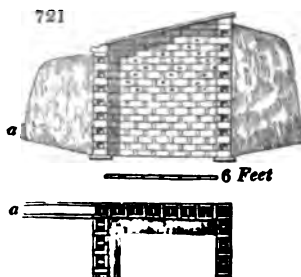
3489. *The pit for fruit shrubs* may be forty feet long, eleven feet wide, within the walls; the angle of the roof from 15° to 90° ; the back path two feet wide, the furnace placed at one end, and the flue, or pipe, passing along the front, separated by a three-inch vacuity from the tan bed, and returning close under the back wall. These dimensions will give a bark bed six feet wide, thirty-seven feet long; and, supposing the surface of the pit to be kept level, it may be raised to any convenient height, according to that of the trees to be forced. The sashes for this pit may be in two lengths, one sliding over the other, as in hot-house roofs.

3490. *The pit for forcing herbaceous vegetables* may be in all respects of the same dimensions as the above, but with the angle of the glass not more than 15° . On this plan and angle, the back of the pit will be two feet higher than the front; but the simplest plan is to omit the passage, and lessen the width of the pit two feet; retaining the slope of 15° , and the compound or double sashes between each rafter.

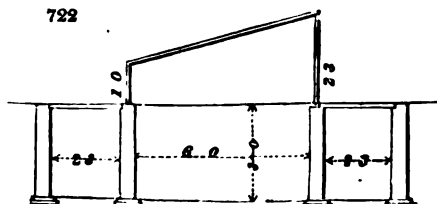
3491. *Pits without fire heat*, to be worked by that arising from the bed of bark or dung, may be of any length, six or seven feet wide within, and with the glass at an angle of 15° .

3492. *Other pits and fixed frames.* West's pit (2401.), Mearns's pit (2393.), Thompson's, and others, are structures deserving introduction where neatness is an object; and it is to be hoped that these and similar structures (see *Hort. Trans.*, vol. iv. and v.) will soon come into more general use, and elevate the melon-ground from a disorderly dung-yard, to a scene fit for general inspection.

3493. *Knight's melon-pit* (fig. 721.), and



which may also be applied to the culture of cucumbers, young pines, or other low vegetables, is surrounded by a cellular wall. The front wall is four feet, and the back wall five feet six inches high, enclosing a space of six feet wide, and fifteen feet long, and the walls are covered with a wall-plate, and with sliding lights, as in ordinary hotbeds. The space included may be filled to a proper depth with leaves or tan, where it is wished to promote the rapid growth of plants; Knight, however, did not use dung internally, but grew the melon plants in large pots, and trained them on a trellis at a proper distance from the glass. The wall is externally surrounded by a hotbed composed of leaves and horse-dung, by which it is kept warm, and the warm air contained in its cavity is permitted to pass into the enclosed space through many small perforations in the bricks. At each of the lower corners is a passage (a), which extends along the surface of the ground, under the fermenting material, and communicates with the cavity of the wall, into which it admits the external air, to occupy the place of that which has become warm and passed into the pit. The entrances into these passages are furnished with grates, to prevent the ingress of vermin of every kind. The hotbed is moved and renewed in small successive portions, so that the temperature may be permanently preserved, the ground being made to descend a little towards the wall on every side, that the bed in shrinking may rather fall towards than from the walls; and Knight entertains "no doubt but that the perpetual ingress of warm air, even without an internal leaf-bed, will prove sufficient to preserve pine-apple plants without the protection of mats, except in very severe weather." (*Hort. Trans.*, vol. v. p. 234.)



3494. *The Edmonstone pine or melon pit* (fig. 722.) is eighteen feet and a half long, by six feet in breadth; the height of the back is five feet, the height of the front three feet nine inches; the declivity for the glass one foot three

inches. The pits for the dung are on the outside of the frames, and are sunk level with the surface of the earth, or gravel, on the outside. The height of these pits is three feet, their breadth two feet. The outside of the pits for the dung is built with a nine-inch wall up to the surface, with one course of hewn stone on the top. One inch is cut out for the boards that cover the space allotted for the linings to rest upon: that appearance of litter and dung, which is so offensive in ordinary hotbeds, is thus prevented. The boards that cover the dung are one inch thick, by two feet two inches in breadth. They are of the length of the pit, and have rings at each end for lifting them with. The pits should be well drained, to carry off the under water, and a small grate should be made at the end of the drains. The kind of matter which is generally employed to fill these pits, is a mixture of new horse and cow dung: sometimes tree leaves and short grass are used, which do very well, provided they be duly prepared, by throwing them up in a high heap, to remain eight or ten days, that they may ferment to an equal temperature. To maintain seventy degrees of heat with horse and cow dung, or leaves of trees, is no difficult matter, and it is easy to preserve the plants in health, and in a fruitful state, during the severest winter, by covering the pits with mats in time of frost. (*Caled. Hort. Mem.*, vol. iii. p. 336.)

CHAP. VII.

General Culture in Forcing Structures and Culinary Hot-houses.

3495. *By general culture*, we are here to understand the formation of the soil, the arrangement of the trees or plants, and their general treatment when planted, in regard to temperature, air, water, training, and other points of management.

SECT. I. *Culture of the Pinery.*

3496. *The pine-apple* is a native of the tropical regions of Asia, Africa, and South America; and thus, from its original habitation and nature, it requires a higher degree of heat than any other culinary or fruit-bearing plant at present cultivated. It is by no means, however, so delicate as many imagine; for as it will bear a higher degree of heat continued for a length of time than either the vine or the peach, so, at any period of its growth, it will bear, without injury, a degree of cold for a space of time which, though short, would have destroyed the foliage of a vine or peach-tree in a state of vegetation. "This incomparable fruit," Weeks observes, "can be obtained even in frames without fire-heat, having only the assistance of tan and dung; and is more easily brought to maturity than an early cucumber. Though liable to the attacks of insects, it is less so than the peach, and is less speedily injured by them than the common cabbage; it is also subject to very few diseases. The pine is generally grown in pots, and plunged in a bed of tanner's bark or other matter in a state of fermentation. The fruit is reckoned the most delicious of all, and in Britain gardeners are valued by the wealthy in proportion to their success in its cultivation."

SUBSECT. 1. *Varieties of the Pine, and General Mode of Culture.*

3497. *The most esteemed varieties of the pine-apple* for general cultivation are the following:—

Queen
Ripley queen
Ripley

Moscow queen
Welbeck seedling
Black Jamaica

New Jamaica
Brown leaved sugar-loaf
Kenville

St. Vincent's
Black Antigua
Trinidad.

For the purpose of quick fruiting, the first four sorts in the above selection are to be recommended. As very large sorts, the Trinidad and Black Antigua should have the preference; and to these, the Otaheite and White Providence may be added, where size is more the object than flavour. The Black Antigua, however, is very good, as well as very large.

3498. *Plan of culture.* As the pine plant is a triennial, bearing fruit once only, unlike the peach and vine, and other fruit-bearing plants, its propagation, rearing, and fruiting are necessarily all carried on in every garden where it is cultivated. Its culture generally commences in a common hotbed frame, heated by dung; at the end of a period varying from six to nine months, it is removed to a larger framed hot-bed, or pit, generally called a succession bed or house; and after remaining there from eight to twelve months, according to circumstances, it is removed to its final destination, the fruiting bed, pit, or house. Here it shows its fruit, continues in a growing state during a period varying from six to twelve months, according to the variety grown, mode of culture, &c.; and finally ripens its fruit, and dies, leaving the crown or terminal shoot of the fruit, and one or more suckers or side-shoots as successors. The production of a single pine-apple, therefore, requires a course of exotic culture, varying from eighteen months to three years, and generally not less than two years.

SUBSECT. 2. *Soil.*

3499. *The pine-apple soil of Speechley* is as follows:—"In the month of April or May, let the sward or turf of a pasture, where the soil is a strong rich loam, and of a reddish colour, be pared off, not more than two inches thick: let it then be carried to the pens in sheep pastures, where sheep are frequently put for the purpose of dressing, which places should be cleared of stones, &c. and made smooth; then let the turf be laid with the grass side downwards, and only one course thick; here it may continue two, three, or more months, during which time it should be turned with a spade once or twice, according as the pen is more or less frequented by the above animals, who, with their urine and dung, will enrich the turf to a great degree, and their feet will reduce it, and prevent any weeds from growing. After the turf has lain a sufficient time, it should be brought to a convenient place, and laid in a heap for at least six months (if a twelvemonth it will be the better), being frequently turned during that time; and after being made

pretty fine with the spade, but not screened, it will be fit for use. In places where the above mode cannot be adopted, the mixture is made by putting a quantity of sheep's dung (or deer's dung, if it can be got) and turf together. But here it must be observed, that the dung should be collected from the pastures when newly fallen; also, that a larger proportion should be added, making an allowance for the want of urine. 1. Three wheelbarrows of the above reduced sward or soil, one barrow of vegetable mould from decayed oak leaves, and half a barrow of coarse sand make a compost mould for crowns, suckers, and young plants; 2. Three wheelbarrows of sward reduced as above, two barrows of vegetable mould, one barrow of coarse sand, and one fourth of a barrow of soot, make a compost mould for fruiting plants. The above composts should be made some months before they are wanted, and very frequently turned during that time, that the different mixtures may get well and uniformly incorporated. It is observable, that in hot-houses, where pine plants are put in a light soil, the young plants frequently go into fruit the first season (and are then what gardeners term runners); on the contrary, where plants are put in a strong rich soil, they will continue to grow, and not fruit even at a proper season: therefore, from the nature of the soil whence the sward was taken, the quantity of sand used must be proportioned: when the loam is not strong, sand will be unnecessary in the compost for young plants."

3500. *The soil for the pine-apple, recommended by M^r Phaul*, "is any sort of rich earth taken from a compartment of the kitchen-garden, or fresh sandy loam taken from a common, long pastured with sheep, &c. If the earth be not of a rich sandy quality, of darkish colour, it should be mixed well with some perfectly rotten dung and sand, and if a little vegetable mould is put among it, it will do it good, and also a little soot. Though pine plants will grow in earth of the strongest texture, yet it is found by experience that they grow most freely in good sandy loam not of a binding quality."

3501. *Griffin's pine-apple soil*. Procure from a pasture, or waste land, a quantity of brown, rich, loamy earth, if of a reddish colour the better, but of a fattish mouldy temperature; that by squeezing a handful of it together, and opening your hand, it will readily fall apart again: be cautious not to go deeper than you find it of that pliable texture; likewise procure, if possible, a quantity of deer's dung: if none can be conveniently got, sheep's dung will do, and a quantity of swine's dung. Let the above three sorts be brought to some convenient place, and laid up in three different heaps, ridgewise, for at least six months; and then mix them in the following manner, covering the dung with a little soil before it is mixed: four wheelbarrows of the above earth; one barrow of sheep's dung, and two barrows of swine's dung. "This composition," he adds, "if carefully and properly prepared, will answer every purpose for the growth of pine plants of every age and kind. It is necessary that it should remain a year before applied to use, that it may receive the advantage of the summer's sun and winter's frost; and it need not be screened or sifted before using, but only well broken with the hands and spade, as when finely sifted it becomes too compact for the roots of the plants." (*Tr. on the Pine-apple*, p. 50.)

3502. *Baldwin's soil for the pine-apple* is still more simple than Griffin's. "From old pasture or meadow ground strip off the turf, and dig to the depth of six or eight inches, according to the goodness of the soil; draw the whole together to some convenient place, and mix it with one half of good rotten dung; frequently turn it over for twelve months, and it will be fit for use. This is the only compost dung for young and old plants." (*Cult. of Ananas*, p. 8.) Weeks's soil agrees with Baldwin's: he takes unexhausted earth and some rotten dung, and gives them a twelvemonth's preparation, by turning and mixing previously to using. (*Forcer's Assistant*, p. 50.)

SUSSECT. 3. Artificial Heat.

3503. *Bottom heat*. The pine, when originally introduced into England, was cultivated without bottom heat, on stages, like other succulents. Ingenuity, however, soon suggested, and experience approved the advantage of the latter, first, in preserving a moist equable heat; and, secondly, in preventing the plants from feeling so much as they otherwise would, any casual declension in the fire-heat, or sudden vicissitude in the temperature or moisture of the external air. Not that they cannot be grown without bottom heat; but that, according to the present arrangements of gardens, they are grown with it at less expense, with less trouble to the gardener, and with greater certainty of success, than by any other mode hitherto practised.

3504. *Bark-pits* are filled with tan which has previously undergone a course of draining and sweating. The heat thus produced will last from three to six months, when it is sifted, and again put into a state of fermentation, by replacing the deficiency occasioned by decay, and separation of the dust by sifting with new tan. In this way the bark-bed is obliged to be stirred, turned, refreshed, or even renewed, several times a year, so as to produce and retain at all times a bottom heat of from 75° to 85° in each of the three departments of pine culture.

3505. *Dung-heat*. Pines are grown to the greatest perfection by many gardeners without either bark or fire-heat, simply by the use of dung. A frame double the usual depth, and also about a third part broader than the common cucumber frames, is placed on a bed of dung, or of dung and tan, or dung and ashes, or even dung and faggots, mixed, or in alternate layers. This bed of itself supplies heat for a while, and when it begins to be exhausted, linings are applied in the usual way, and continued for a year or more, reviving and renewing them as may become requisite, till the bottom bed becomes too solid for the ready admission of heat. The frame and pots are then removed to a prepared bed, and this old bottom is taken away, or mixed up with fresh materials. In this way, as Weeks observes, every one that can procure stable-dung may grow pines.

3506. *Fire-heat* for the atmosphere. The high temperature requisite for the pine, in every stage of its growth, renders it necessary to have recourse to fire-heat for eight or nine months in every year; unless, indeed, the plants are grown in pits heated by linings of dung; in which case, these linings become necessary every month in the year in order to keep up the bottom heat. What respects the management of fires being also common to the culture of this plant in all its stages, we have placed the directions as in the case of bark-pits under such as are general. (See SUSSECT. 8.)

3507. *Heat from hot water or steam*, with or without any of the other modes of heat-

ing, has been tried extensively, as far as respects heating the air of the house, and with the most perfect success. As a bottom heat, steam has been tried in different places by turning it into vaults of air, or cisterns of water, or chambers of large rough stones (which imbibe the heat and give it slowly out to the bed above) with different degrees of success, but not such as to induce cultivators to relinquish fermenting substances in its favour, where they can be procured at a reasonable expense. (See § 2519.)

SUBJECT. 4. *Propagation of the Pine-apple.*

3508. *The pine is generally propagated by crowns and suckers*, though, in common with every other plant, it may be propagated by seed. Speechly prefers suckers, because generally larger than crowns, and those produced near the middle of the stem he considers the best. He does not, however, reject crowns; but selects the largest, which, he says, when nine inches in circumference at their bottoms, equal any suckers. (*Treatise on the Pine-apple*, 2d edit. p. 22.) Abercrombie says, "Suckers which rise from the extremities of the roots, at a distance from the stem, though they have radical fibres, are apt to have ill-formed hearts. With Speechly, he prefers stalk-suckers and strong crowns." (*Pract. Gard.*, p. 631.) Andrews uses suckers only, not from any objection to crowns, but from the difficulty and trouble of getting them returned from the fruiterers, and the risk of different kinds being mixed through the carelessness of servants. M'Phail, Nicol, Griffin, and Baldwin, do not express any preference.

3509. *Planting crowns and suckers.* Nicol plants his suckers in summer and autumn as the fruit is gathered, sticking them into the front part of the bark-bed, "where they will strike root as freely as any where. If a large proportion of the crop come off early, the crowns and suckers may be potted at once, and plunged into the nursing-pit; or they may be twisted from off the stocks, and may be laid by, in a dry shed or loft, for a few days, till the other operations in the pinery be performed, and the nursery-pit be ready to receive them and the crowns (collected as the fruit have been gathered); which, if rooted, may be potted, and may be placed for the above time, either in a frame, or in a forcing-house of any kind, as they will sustain no injury, though out of the bark-bed, for so short a time. Such crowns as have not struck root, may be laid aside with the suckers." Griffin generally plants his crowns in the bark till they have struck root; but the suckers he pots at once, unless they are small and green at bottom, when he treats them like the crowns. Baldwin says, "Towards the end of September, take off the suckers from the fruiting plants, and lay them in any warm place for about three days; then strip off a few of their bottom leaves, and they will be ready for planting. Plant them in the old tan, on the surface of the bed, without pots, about four or five inches apart, according to the size of the plants; observing, that the tallest be placed at the back of the frame, and the shortest in the front. In this state let them remain till the following April." (*Cult. of Anon.*, p. 13.) Andrews pots his suckers in September, and plunges them in a bark-bed during the winter.

SUBJECT. 5. *Rearing the Pine-apple in the Nursing Department.*

3510. *The rearing of the pine-apple* requiring different modes of treatment at different stages of its progress to maturity, established practice has adopted three houses or pits, through each of which the plants pass in succession. They are usually named the *nursing*, *succession*, and *fruiting houses*, or pits. The nursing-pit is used for bringing on crowns and suckers until they are established in growth, and for this purpose they generally remain there one year.

3511. *Nursing-pit with fire heat.* The nursing-pit is generally flued, but some adopt a common dung hotbed, and others the flued pit or bed recommended by M'Phail, and which answers extremely well. The minimum depth of the bark bed in the nursing-house Abercrombie states to be three feet; "the maximum three and a half. The less depth is the right, when bark alone is employed to produce the bottom heat; and the greater, when tree leaves are substituted, on account of their weaker influence. In either case, the pit may be six inches shallower than that in the fruiting-house; because the requisite altitude in the different pits partly depends on the perpendicular dimension of the pots, and on the thickness to which a layer of old bark must reach from the surface, to keep the pots from contact with the new bark, that the roots may not be burnt. In the nursery-pit, the neutral layer need not be deeper than eight inches." "If the bark bed has been in action to bring forward a previous set of plants, now removed to the succession pit, recruit it by taking away the wasted bark, to the extent of a sixth, fourth, third, or half part, and by substituting an equal quantity of fresh. A lively bottom heat is requisite to make pine offsets strike freely.

3512. *Nursing-pit without fire heat.* "Hot-beds used for growing suckers," Speechly observes, "should be well prepared, and the violence of the heat allowed to be fully over before the suckers are taken off. It is then to be levelled and covered with eight or ten inches of tan, into which to plunge the pots." (*Treat. on the Pine*, p. 34.) M'Phail, who, when gardener to the Earl of Liverpool, was reckoned one of the best pine growers in England, recommends the brick bed of his invention as answering well for small succession plants. "A pit," he says, "built on the same construction, but of larger dimensions, without cross flues, is a suitable one for growing pine-apple plants of any size; for by linings of dung the air in it can be kept to a degree of heat sufficient to grow and ripen the pine-apple in summer, as well as it can be done with fire heat; only it will require a little more labour, and plenty of dung." Baldwin, as already observed, grew both his nursery and succession plants in a bark bed excited by external linings of dung.

3513. *Culture of nursing-plants.* Whether pits or hotbeds be adopted, the potting, temperature, air, water, &c., are nearly the same.

3514. *Potting.* Plant suckers and crowns in pots five inches in diameter, and four inches deep; and very strong ones in pots seven and a quarter wide by six and a half deep. Baldwin planted his nursing plants in the bark bed, without pots.

3515. *Temperature of nursing-plants.* "The artificial heat in the nursing-pit is 55° for the minimum. This will keep the plants, in winter, secured from a check, and a few degrees above a dormant state. It is enough to aim at this minimum, when dung heat is employed; for, as its decline is never abrupt, there is no danger in going pretty close to the lowest extreme. The maximum artificial heat, in winter, need not go beyond 65°; but as the season for excitement advances, this becomes the minimum. When the plants are growing vigorously in autumn, or spring, the artificial maximum is 70°. In winter, the maximum, with the aid of sunshine, should not be allowed to rise higher than 70°, because the benefit of airing would be lost: in summer, the maximum, under the effect of strong sunshine, may rise to 85°; to keep it down to this, give, in July and August, the benefit of air freely." (*Abercrombie*.) M'Phail says, "The heat of the air in the nursing-pit, exclusive of sun-heat, is not required to be greater than from 60° to 65°." But at first planting of crowns and suckers, he gives them "a great heat and no air till they begin to grow." (*Gard. Rem.* 51. 519.)

3516. *Covering at nights.* One great advantage of growing pines in pits is, that they may easily be covered with mats, or by other means, in winter. Abercrombie considers covering not positively indispensable to flued pits, in which the minimum degree of fire-heat is regularly maintained; but it will add to the security of the plants, and admit of some retrenchments in fuel, if some warmer screen, in addition to that of the glass, is applied at night, during all the season when frost prevails, or may be expected. For this purpose, provide either double mats, or a strong canvass cover. The latter is commodious, because it can be mounted on rollers, and let down at will, or drawn up under a weather-board. Remove the covering at sunrise, that the essential benefit may not be obstructed.

3517. *Air.* When the weather is warm, Speechly admits "a great deal of air" to nurse plants. Having potted unstruck offsets, Abercrombie admits little or no air until the plants begin to grow; but as soon as the leaves show that the root has struck, he gives plenty of air, in order to make the leaves expand, and the entire plant robust. (*Pr. G.*, p. 628.) Speaking of the winter treatment of pines, M'Phail says, "Admit air in fine days into every place where pine plants are." In warm summer weather, he admits some all night. (*G. Rem.*, p. 142.)

3518. *Watering the nursing-pit.* Speechly waters offsets over the leaves after they have begun to strike, but gives to all pines much less water in a moist than a dry season, depending on the humidity of the air. (*Tr. on Pine*, p. 37.) He waters once a week or fortnight in September and October, and then leaves off till the middle or end of January, depending on the moisture of the tan, and the state of inaction of the plants. In frosty weather, he sometimes plunges the pots so deep in the tan that their rims may be covered two or three inches in order to give heat, and prevent the surface of the mould from becoming too dry. In March, he waters once in a week or ten days, and advances to twice a week in summer. (*Tr. on Pine*, p. 47.)

SUCCESS. 6. Succession Department.

3519. *The culture of succession pine plants* necessarily coincides in many particulars with that of nurplings; but less heat is generally allowed the former, in order not to draw them; and they are allowed plenty of room in the bed, frequently shifted, and abundance of air admitted, in order to make them broad-bottomed and bushy: thus strengthening the heart or root part, in order that it may throw up a strong fruit the second or third year.

3520. *Growing succession plants without fire-heat.* M'Phail says, "Succession pine plants grow exceedingly well in pits covered with glazed frames, linings of warm dung being applied to them in cold frosty weather. The north wall of a pit for this purpose had best be only about four feet above the ground; and if about two feet high of it, the whole length of the wall, beginning just at the surface of the ground four feet below the height of the wall, be built in the form of the outside walls of my cucumber bed, the lining will warm the air in the pit more easily than if the wall were built solid. The linings of dung should not be lower in their foundation than the surface of the tan in the pits in which the plants grow (for it is not the tan that requires to be warmed, but the air among the plants): and as during the winter the heat of the air in the pit among the plants, exclusive of sun-heat, is not required to be greater than from sixty to sixty-five degrees, strong linings are not wanted: one against the north side, kept up in cold weather nearly as high as the wall, will be sufficient, unless the weather get very cold indeed, in which case a lining on the south side may be applied. In cold, frosty weather, a covering of hay or straw, or of fern, can be laid on the glass above mats in the night-time."

3521. *Shifting and potting.* The middle of March Speechly considers the most eligible time for shifting and potting such nurse plants as are to be removed to the succession-house. "If the work is done sooner," he says, "it will prevent the plants from striking freely; and if deferred longer, it will check them in their summer growth."—In this shifting, he "always shakes off the whole of the ball of earth, and cuts off all the roots that are of a black colour, carefully preserving such only as are white and strong. He

then puts the plants into pots eight inches and a half in diameter at the top, and seven inches deep, in entirely fresh mould. The bark-bed is renewed, the pots plunged to the rim, the house is kept pretty warm, till the heat of the tan arises; the plants are then sprinkled over the leaves with water, and watered first once a week and afterwards twice a week, till next shifting in the beginning of August, when they are shifted into fruiting-pots with their balls entire. The size of these pots is eleven inches and a half at top by ten inches deep."

3522. *The practice of shaking off the balls of earth, and cutting off the lower roots of pines in the second year's spring shifting, has at first sight an unnatural appearance; and various theorists, and some gardeners, recommend shifting the plants from first to last with their balls entire. On attentively examining the pine plant, however, it will be found, that, in its mode of rooting, it may be classed with the strawberry, vine, and crowfoot, which throw out fresh roots every year, in part among, but chiefly above, the old ones. This done, the old ones become torpid and decay, and to cut them clear away, if it could be done in all plants of this habit, would no doubt be assisting nature, and contribute to the growth of the new roots. At the same time, it is to be observed, that encouraging, in an extraordinary degree, the production of roots, though it will ultimately increase the vigour of the herb and fruit, will retard their progress.*

3523. *On shifting with the balls entire, Speechly has the following judicious observations, which coincide with those we have above submitted:—First, it is observable, that the pine plant begins to make its roots at the very bottom of the stem, and, as the plant increases in size, fresh roots are produced from the stem, still higher and higher; and the bottom roots die in proportion: so that, if a plant in the greatest vigour be turned out of its pot as soon as the fruit is cut, there will be found at the bottom a part of the stem, several inches in length, naked, destitute of roots, and smooth: now, according to the above method, the whole of the roots which the plant produces being permitted to remain on the stem to the last, the old roots decay and turn mouldy, to the great detriment of those afterwards produced. Secondly, The first ball, which remains with the plant full two years, by length of time will become hard, cloddy, and exhausted of its nourishment, and must, therefore, prevent the roots afterwards produced from growing with that freedom and vigour which they would do in freer and better mould. Thirdly, The old ball continually remaining after the frequent shiftings, it will be too large when put into the fruiting-pot, to admit of a sufficient quantity of fresh mould to support the plant till its fruit becomes ripe, which is generally a whole year from the last time of shifting.*

3524. *Temperature. Most authors and practical gardeners approve of rather a low top and bottom heat for pines in the winter season. "There is nothing so prejudicial to the pine-apple plant (insects and an overheat of the tan excepted), as forcing them to grow by making large fires, and keeping the hot-house warm at an improper season, which is injudiciously done in many hot-houses. It is inconsistent with reason, and against nature, to force a tropical plant in this climate in a cold, dark season, such as generally happens here in the months of November and December; and plants so treated will in time show the injury done them: if large plants for fruiting, they generally show very small fruit buds with weak stems; and if small plants, they seldom make much progress in the beginning of the next summer." (Speechly.)*

3525. *Air. Speechly considers a due proportion of air as essential to the goodness of pine plants. The want of it will cause them to grow with long leaves and weak stems; and too great a quantity, or air given at improper seasons, will starve the plants, and cause them to grow yellow and sickly. Little air will be wanted in winter; but letting down the glasses, even for a few minutes in the middle of the day, should never be neglected in fine weather, to let out the foul air. This will cause the plants to grow with broad leaves, and stiff and strong stems, provided they have room in the bed. Air may be admitted all night in the hot season, care being taken that the glasses are left in such a manner as to prevent the rain, in case any falls, from coming on the plants. (Tr. on the Pine, p. 75.)*

3526. *Water. Speechly disapproves of ever giving a great quantity of water at one time to the pine-apple plant, in any stage, or at any season. Too much causes the mould in the pot to run together and become hard and cloddy; and, independently of this, glutting a plant with water will rob it of its vigour, and reduce it to a weak state. Hence, though keeping of plants too dry is certainly an error, it is not attended with the same fatal consequences as the contrary practice. Watering the walks and flues, &c. in an evening, in order to raise a kind of artificial dew, is in imitation of what takes place in the West Indies, where no rain falls in the summer for many months together, and the plants are wholly supplied with moisture from the dew. Gentle summer waterings over the top are founded on this principle. "Plants lately shifted into the pots, till their roots get matted, do not require so much water as before their shifting. Plants that are in large-sized pots, in proportion to the size of the plants, do not require*

so much water as plants that are under-potted. Plants that are in hard-burnt pots, made of strong clay, do not require near so much water as plants in pots less burnt, and made of clay with a good proportion of sand intermixed. The latter are greatly to be preferred. Plants in a vigorous growing state require very frequent and gentle waterings. But plants with fruit and suckers upon them require most of all. When plants are watered over their leaves, it should be sprinkled upon them only till every part is made wet, which may easily be distinguished, as the water immediately changes the colour of them to a sad green. As the leaves stand in different directions, the best method is to dash the water upon them backwards and forwards, on every side of the bed. Summer waterings should always be given late in the afternoon; but, in the spring and autumn, the forenoon is the proper time. Less water should be given in moist than in dry weather, for reasons already given; and there should be always such a degree of temperature and ventilation kept up, as will prevent water from stagnating in the hearts of the plants. Pond or river water, or water collected from the roof of the hot-house, and retained within the house till it has attained its temperature, is to be preferred. (*Tr. on the Pine*, p. 81, 82.)

3527. *Shading.* "Succession pine-plants," Speechly observes, "do not make half the progress in violently hot weather, in the middle of summer, that they do later in the season. In order to obviate the above inconveniences, some persons cover their hot-houses in the middle of the day, when the heat of the sun is violent, with bast mats fastened to a rope, which may be moved up and down with great ease; but a better mode, and which is frequently practised, is, to cover the glasses with a large net, which admits the air to pass freely, and at the same time breaks the rays of the sun, and retards their force, especially if the meshes of the net be not large. If vines were judiciously trained up to the rafters of the hot-house, there would be no need of either of the last-mentioned coverings. The vines should be planted in the front of the hot-house, and not more than one shoot trained to each rafter, part of which should be cut down to the bottom of the rafters every season, by which means the roof of the hot-house may constantly be kept thinly covered with young wood, and, by having only one shoot to each rafter, the vine-leaves will afford a kindly shade, and never incommode the pines; for the leaves fall, and the vines are pruned, at a season when the hot-house most requires sun."

SUBJECT. 7. *Fruiting Department.*

3528. *The culture of the fruiting department* embraces much of the culture of the nursing and succession pits: but little difference, for example, is made in temperature, air, and watering, till the last stage of the maturation of the fruit. The pits are proportionately larger than those for succession plants.

3529. *Shifting and potting.* Most gardeners shift into fruiting-pots in August, and afterwards, in the following March, divest the plants of a few of their bottom leaves, renew the mould on the tops of the pots as deep as can be done without injuring the roots, and fill up with fresh compost earth. There is in general no second shifting; but the plants remain in the pots assigned to them at their coming from the succession-pit till the fruit is ripened.

3530. *Temperature.* "The fruiting-house, during the winter, should be kept at about 70°; it may be left in the evening at about 75°, and it will be found in the morning at about 65°, so that no attendance during the night will be required." (*Cult. of Anan.*, p. 19.)

3531. *Air.* When the plants are showing fruit, admit air freely into the hot-house, the want of a due proportion of which causes the stems to draw themselves weak, and grow tall, after which the fruit never swells kindly.

3532. *Water.* Most writers recommend that, as the fruit and suckers begin to advance in size, the plants should have plenty of water to support them, which may be given them at least twice, and sometimes three times, a week. As soon as the fruit appears full swelled, the watering such plants as produce them should cease; though it is a general practice (in order to have the fruit as large as can be got), to continue the watering too long, which produces large fruit at the expense of flavour.

3533. *Time required to fruit the pine.* Till Baldwin's time, almost all cultivators of the pine-plant required from two and a half to four years from the planting of the crown or sucker to perfecting its fruit. The general period was from two and a half to three years; for example, a fruit of the queen pine, being gathered in August, 1829, and its crown planted a few days afterwards, was expected in the July, August, or September, 1832, to produce fruit. A strong sucker from the same plant taken off, as is frequently the case, a month before the fruit ripens, and planted, will, in the end of 1831, or early in the spring of 1832, ripen its fruit. Baldwin, however, accomplishes this by both crowns and suckers in a shorter period. "The New Providence, black Antigua, Jamaica, Enville, and the other large sorts of ananas," he says, "require the cultivation of three

years to bring them to perfection; but the old queen and Ripley's new queen may be brought to perfection in fifteen months. To effect this, it must be observed, that some of the plants will fruit in February or the beginning of March, and, consequently, that the suckers may be taken off in June or the beginning of July. Make then a good bed of tan with lining of litter round the outside, to keep in the tan; make the bed to fit a large melon-frame; put the suckers into pots of about nine inches diameter, filled with the compost; plunge them in the bed, prepared in regular order, and throw a mat over them in hot weather, for shade, till they have taken root; let them remain till the end of September, and then shift them into pots of about twelve inches diameter, and plunge them in the fruiting-house." (*Cult. of Anan.* p. 38.)

3534. *Growing the fruit of an extraordinary size.* Speechly and M'Phail say, "In March, to make some of your fruit swell very large, prevent all suckers from growing on the plants. You may destroy them by twisting out their hearts with a sharp-pointed stick, or a piece of iron about eighteen inches long. This, however, should not be made a general practice."

3535. *Cutting ripe pines.* "It is easy to know," Speechly observes, "when the pine becomes ripe by its yellow colour, yet they do not all change in the same manner, but most generally begin at the lower part of the fruit; such fruit should not be cut till the upper part also begins to change, which sometimes will be many days after, especially in the sugar-loaf kinds. Sometimes the fruit will first begin to change in the middle, which is a certain indication of its being ripe; such fruit should be cut immediately."

3536. *Retarding and keeping fruit.* "It sometimes happens," Speechly observes, "that great part of a stove of plants will show their fruit at or near the same time, and, with the same treatment, would consequently become ripe too nearly together. To prevent this, and bring them into a regular succession, when the fruit is nearly ripe, part of the plants may be taken out of the stove, and set in a dry shady place; as, for instance, the stove-shed, where the pots should be covered with moistened moss, but no water given them: it must be observed, that every one of the plants must be taken into the hot-house again, and set in the tan-bed for a week or ten days before the fruit is cut, to give it a good flavour. When there is a variety of hot-houses, this caution is not necessary."

SUSSECT. 8. Insects.

3537. *Various hot-house insects* are injurious to the pine-apple, but more particularly those of the coccus genus; among which the white scaly species is the most destructive. We have no evidence to show whether this species of coccus has been examined by naturalists, or whether it is the same that infests the vine and other green-house plants; neither has any writer entered farther into its history than to point out the injury it occasions, and to project schemes for its destruction. Two other very distinct species likewise infest the pine. One is the brown or turtle coccus (*Coccus hesperidum L.*), so called from its colour, and the oval enlargement of the back, which resembles the shell of the turtle. The other is white and mealy, tinged with crimson, and is supposed by some to be the same as the white scale first mentioned. This, however, appears very doubtful; or, if correct, it may be the gravid female. According to Speechly, it wedges itself between the protuberances of the fruit, rendering it unsightly, robbing it of its juices, and spoiling its flavour. (*Tr. on Pine*, p. 193.)

3538. *Destroying the coccus.* The natural history of these insects never having been thoroughly investigated, the remedies that have been recommended must be considered more as palliative than as efficient processes. A recipe that might, at a certain season, prove efficacious for one species, will be totally unavailing when applied to another, or even to the same in a different state of existence. Every insect has an economy peculiar to itself, and that economy we must first study, before we can possibly devise any certain method of conquering the evil. Until this subject has been more thoroughly investigated, we shall content ourselves with giving those receipts most in use among modern gardeners.

3539. *Nico's recipe.* Take soft soap, one pound; flowers of sulphur, one pound; tobacco, half a pound; aux vomica, an ounce; soft water, four gallons: boil all these together till the liquor is reduced to three gallons, and set it aside to cool. In this liquor immerse the whole plant, after the roots and leaves have been trimmed for potting. Plants in any other state, and which are placed in the bark-bed, may safely be watered over-head with the liquor reduced in strength by the addition of a third part water. As the bug harbours most in the angles of the leaves, there is the better chance that the medicated water will be effectual, because it will there remain the longest, and there its sediment will settle. The above is a remedy for every species of the coccus; and for most insects, on account of its strength and glutinous nature. Its application will make the plants look dirty; therefore, as soon as the intended effect may be supposed to be produced, whatever remains of the liquor on the leaves should be washed off with clean water. It would be improper to pour a decoction charged with such offensive materials over fruiting plants. Further, this peculiar dose for a tenacious insect is not to be applied indiscriminately to exotics in a general stove, as it might make the more delicate leaves of shrubs drop off.

3540. *M'Phail's mode* consists in the application of a powerful moist heat; and we shall only here observe, that it proceeds on the fact, experimentally proved, that a degree of heat and moisture, which is speedily fatal to animals, will not immediately destroy or injure vegetable life, and this the more especially of plants of such a robust nature as the pine.

3541. *Griffin's recipe.* To one gallon of soft rain-water add eight ounces of soft green soap, one ounce of tobacco, and three table spoonfuls of turpentine; stir and mix them well together in a watering-pot, and

let them stand for a day or two. When you are going to use this mixture, stir and mix it well again, then strain it through a thin cloth. If the fruit only is infested, dash the mixture over the crown and fruit, with a squirt, until all is fairly wet; and what runs down the stem of the fruit will kill all the insects that are amongst the bottom of the leaves. When young plants are infested, take them out of their pots, and, shaking all the earth from the roots (tying the leaves of the largest plants together), plunge them into the above mixture, keeping every part covered for the space of five minutes; then take them out, and set them on a clean place, with their tops declining downwards, for the mixture to drain out of their centres. When the plants are dry, put them into smaller pots than before, and plunge them into the bark-bed. (*Tr. on the Pine*, p. 84.)

3542. *Baldwin's recipe.* Take horse-dung from the stable, the fresher the better, sufficient to make up a hotbed three feet high to receive a melon-frame three feet deep at the back; put on the frame and lights immediately, and cover the whole with mats, to bring up the heat. When the bed is at the strongest heat, take some faggots, open them, and spread the sticks over the surface of the bed on the dung, so as to keep the plants from being scorched; set the plants or suckers, bottom uppermost, on the sticks; shut down your lights quite close, and cover them over well with double mats, to keep in the steam; let the plants remain in this state one hour, then take out the plants, and wash them in a tub of cold water, previously brought to the side of your bed; then set them in a dry place, with their tops downwards, to drain, and afterwards plant them. This treatment is sure to kill every insect. You will observe, likewise, that the crowns and suckers in the beds heated by linings of dung without fire-heat, will have all their insects killed, or be kept free of them, if they were clean when planted, by the effluvia of the dung. (*Cult. of Asparagus*, p. 33.)

3543. *Miller's recipe.* Miller recommends turning the plants out of the pots, and cleaning the roots; then keeping them immersed for four and twenty hours in water in which tobacco-stalks have been infused: the bugs are then to be rubbed off with a sponge, and the plants, after being washed in clean water and dripped, are to be repotted. Muirhead, a gardener at Invermay, in Perthshire, has described a similar mode (*Calcd. Hort. Soc. Mem.*, vol. i. p. 203), only, in the place of tobacco-stalks, he directs flowers of sulphur to be mixed with the water. With a bit of bast mat fixed on a small stick, and dipped in water, he disposes as many of the insects as he can see. He then immerses the plants in a tub of water, containing about 1 lb. of flowers of sulphur to each garden-potful. They remain covered with the water for twenty-four hours, as described by Miller. They are then laid with their top downwards to dry, and are repotted in the usual manner. What share of the cure in either of these ways may be due to the sulphur or to the tobacco-liquor does not clearly appear; the rubbing off or loosening the insects is evidently important; and it is not unlikely that immersion in simple water, so long continued, may alone be sufficient to destroy them. Indeed, the experience of one of the best practical gardeners in Scotland (Hay) leads him to conclude, that even moderate moisture is destructive to these insects. During many years, he regularly watered his pine-plants over head with the squirt, during the summer-months: this was done only in the evening; it never injured the plants; and the bug never appeared upon them. (*Ed. Socy. Art. Hort.*)

3544. *Knight's suggestion.* "Baldwin recommends the steam of hot fermenting horse-dung: I conclude the destructive agent, in this case, is ammoniacal gas; which Sir Humphry Davy informed me he had found to be instantly fatal to every species of insect; and if so, this might be obtained at a small expense, by pouring a solution of crude muriate of ammonia upon quicklime; the stable, or cow-house, would afford an equally efficient, though less delicate, fluid. The ammoniacal gas might, I conceive, be impelled, by means of a pair of bellows, amongst the leaves of the infested plants, in sufficient quantity to destroy animal without injuring vegetable life: and it is a very interesting question to the gardener, whether his hardy enemy, the red spider, will bear it with impunity."

3545. *Steam.* One of the simplest and, at the same time, most effectual modes of destroying the pine bug, without disturbing the plants, or in the slightest degree deranging the house, is to keep it incessantly filled with steam for several days together, thus raising the temperature considerably above 100°; which, though in the shade it will not injure the pine-apple, is yet found to be destructive to every species of animal life.

3546. *Cleaning and refitting the house.* Every department of the pinery must be kept at all times sweet and clean. At the period of removing sets of plants that have completed specific stages (or oftener, if necessary), purify the house thoroughly, and have the flues swept, or the pipes painted, the plaster whitewashed, the woodwork and glass washed at all events, and the latter painted if necessary, all broken glass mended, and every other substantial or casual reparation effected. If insects are supposed to be harboured in the building, the following wash is to be introduced with a brush into the cracks and joints of the woodwork, and the crevices of the wall: "Of sulphur vivum, take 2 oz.; soft soap, 4 oz. Make these into a lather, mixed with a gallon of water that has been poured in a boiling state upon a pound of mercury. The mercury will last to medicate fresh quantities of water almost perpetually." (*Abercrombie*.)

SUSSECT. 9. A Course of Culture for a Year.

3547. *A journal of a course of pine-culture for a year* may be of use to the empirical practitioner; and we are enabled to supply one through the kindness of Mr. Thomas Appleby, of Horsforth Hall, an eminent pine-grower near Leeds, as published in the *Gardener's Magazine*, vol. ix. p. 303. We give it in his own words:—"I shall now detail to you all the operations in pine culture for this year, as they were performed daily. Considerable repetition in words, as in the actions, must unavoidably occur. To some, perhaps, this journal may be of more service than general observations. Young gardeners will find it advantageous to copy it, and compare the different modes adopted at other places with the one here described. I do not say that I shall exactly do the same next year, but I shall not vary much. It may happen that the seasons, or other circumstances, may cause a few days' difference, but the general principles will be acted upon. It is necessary to mention that the succession house is called the large stove; the two fruiting houses are distinguished as the Calcutta and melon house, the latter having been put up for growing melons in, but now used as a pine stove: it has two pits in it."

3548. *Temperature.* At the commencement of each month, the temperature is given in which the above course of culture was carried on. In the original article in the *Gardener's Magazine*, the temperature is given in which the above course of culture was carried on. In the original article in the *Gardener's Magazine*, the temperature is given in which the above course of culture was carried on.

denor's Magazine, the state of the thermometer is marked as taken three times daily, and also the state of the external weather for every day in the year; but we have here contented ourselves with the average, and highest, and lowest degrees of heat (the first taken from the two last), for each month. We would advise the young gardener, however, to consult the original paper, which would have occupied too much room in the present work.

January, 1832.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 56	63	80	57	73	78
Highest 61	74	95	73	78	79
Lowest 52	59	55	63	68	65

5. Pines watered with clear water, heated to 80° or 90°, very sparingly: such as were ripening not watered at all.

13. Pines watered with clear water.

20. The bark bed in the melon house having sunk below the kerb-stones, some fresh bark was put in to fill it up. The bark bed in the large stove, renewed last November, having become temperate, the pit was filled up with fresh bark.

24. Pines watered with clear water.

February.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 59	65	86	69	76	73
Highest 65	75	75	75	86	78
Lowest 54	58	58	63	68	67

4. Pines watered with limewater, to kill any worms there might be in or under the pots. To make it, use half a peck of lime to 16 gallons of water; suffer it to settle, and skim off the oily-like substance that floats on the surface.

11. Pines watered with clear water.

21. Pines watered with clear water.

27. The different soils for pine compost got into the sheds to dry, as they are intended to be potted next month. The compost is made as follows: One part loam, one part vegetable mould, and one part well rotted cow-dung, and about one tenth ground bones.

March.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 59	67	67	69	81	73
Highest 68	79	74	77	95	81
Lowest 50	58	60	62	67	64

1. Pines watered with clear water.

5. Commenced the general spring shifting of the pines, by taking the old stumps of fruiting plants out, and pulling off the suckers. The old bark removed out of the front pit in the melon house, and fresh bark got in. Some pines having shown fruit in the succession house, they were taken out and plunged into the pit renewed in the melon house.

6. Calcutta pit renewed, by riddling dust out of the old bark, and mixing the remainder with new.

7. The succession plants tied carefully up with broad bast mat, and removed into the potting shed: a few of the best plunged into the pit in the Calcutta house to fruit. All those intended to fruit top-dressed, by removing part of the exhausted soil, and substituting a very rich compost (made so by mixing it with bone dust) to earth up the plants with.

8. Succession plants potted, the largest into pots 12 in. to 15 in. diameter; the rest into pots in proportion to their size: potted them deep in the pots. Previously to potting, I shook off all the earth of such as were not well rooted, trimmed off all dead roots, and removed a few of the bottom leaves, to allow the more free emission of new roots. No good lively roots taken off at all; did not what is called disroot any: I think it a bad practice. A few clean, very small pebbles put at bottom of each pot, in the larger pots three inches, the smallest half an inch each, to drain the water off: a little moss put over the pebbles, to prevent the drain from filling up. The bark bed in the large stove renewed, by mixing five large loads of fresh bark with the old, keeping about a root of the old at top, to plunge the pines in.

9. The succession plants half plunged in the bark pit of the large stove. I gave them plenty of room, considerably more than they had through

the winter, as I expected they would make free growth through the summer. One row of small plants put in front of the Calcutta pit.

10. As much old bark taken out of the back pit in the melon house as could be removed without disturbing the pots, and the vacuity filled up with fresh bark, to renew the heat. A little clear water given to all the pines, to settle the earth about the plants: I do not approve of much water until they begin to grow again. As much steam as possible raised by watering the flues, in order to encourage fresh growth.
17. Watered the fruiting pines with clear water.
24. Watered all the pines with liquid manure, made of one peck of fowls' dung, a quarter of a peck of quicklime, and a quarter of a peck of soot, pouring upon it three gallons of boiling water, and adding thirteen gallons of soft cold water, which left it at a temperature of about 80°.
31. Pines in the fruiting houses watered with liquid manure; the succession plants watered with clear soft water.

April.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 61	73	68	73	83	76
Highest 65	84	74	83	97	84
Lowest 58	62	62	63	70	69

7. Pines watered with liquid manure.

16. Pines watered with liquid manure.

21. Pines watered with clear water.

29. Watered the pines with liquid manure.

May

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 65	73	71	70	84	76
Highest 70	80	79	78	99	83
Lowest 60	65	63	65	70	70

5. Watered the pines with liquid manure.

12. Pines watered with liquid manure.

18. Pines watered with liquid manure.

26. Pines watered with liquid manure.

30. The winter-fruited pines having all ripened in the front pit of the melon house in the stumps taken out, the suckers pulled off, and the pit renewed.

June.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 67	76	71	68	88	78
Highest 71	85	79	74	110	81
Lowest 63	67	64	62	67	63

1. Examined the bark pit in the large stove, and found the heat moderate, so got a load of fresh bark, and filled it up to the rims of the pots; the old stumps of Providence pines, repotted last August, having produced a good sucker each, they were this day taken out, the sucker carefully pulled off, and stuck in among the bark in the fruiting pits. The row of succession plants, plunged in the front of the Calcutta pit, having grown very well, they were potted; and also such suckers, or crowns, that had rooted among the bark in the fruiting house were potted, and all of them plunged in the front pit of the melon house.

2. Pines watered with liquid manure, except such as were ripening or newly potted.

8. Watered the pines with liquid manure.

15. Pines watered with liquid manure.

22. Pines watered with limewater.

27. Pines watered with liquid manure. The season being now very warm, water was given very freely, so as to make the soil quite wet.

July.

Succession House.			Fruiting House.		
Morning.	Noon.	Night.	Morning.	Noon.	Night.
Average 68	78	68	68	89	74
Highest 69	83	76	73	110	83
Lowest 56	65	61	60	68	63

4. Pines watered with liquid manure.
11. Pines watered with liquid manure.
17. Succession plants tied carefully up with broad bast mat, and taken into the shed to be potted.
18. Succession pines potted in the same manner as in March, which see. The bark pit for them renewed.
19. Half-plunged the succession plants.
20. The old stumps of Providence pines fruited this season, taken out, the leaves shortened, and the balls of earth shaken clean off, all decayed roots cut off, and the stumps re-potted in fresh good earth to produce suckers (this variety being very shy of increase). Plunged them in a part of the pit in the melon house. The two pits in the melon house turned, and four loads of fresh bark put in to raise them to their proper height. The Providence pines to fruit next year plunged up to the rims in the back pit. (This pit never heats too much, it being shallow and narrow.)
21. Some Montserrat pines that were showing fruit, and had been reserved from the succession house, were plunged in the front pit of the melon house for winter fruit. Fruiting pines watered with liquid manure. The rest of the pines newly potted gently syringed over the leaves as usual. Plenty of steam raised morning and evening to encourage fresh growth in the newly potted plants.
22. A pine pit in ainery, called the top stove, filled with fresh bark, and all the suckers (crowns), &c. potted and plunged in it.

August.

- | Succession House. | | | Fruiting House. | | |
|-------------------|-------|--------|-----------------|-------|--------|
| Morning. | Noon. | Night. | Morning. | Noon. | Night. |
| Average 68 | 76 | 71 | 69 | 89 | 75 |
| Highest 72 | 85 | 78 | 74 | 110 | 85 |
| Lowest 64 | 67 | 65 | 64 | 68 | 66 |
2. Pines newly potted watered with clear water, fruiting pines with rich water; such as were ripening not watered at all.
 11. The weather having been very wet, could not water till this day, and then with clear water.
 12. Pines watered with clear water.
 22. Bark pits in the melon house having sunk below the kerb-stones, they were filled up with fresh bark. The large succession pit having become rather temperate, it was partly filled up with fresh bark.
 24. Pines watered with liquid manure.

September.

- | Succession House. | | | Fruiting House. | | |
|-------------------|-------|--------|-----------------|-------|--------|
| Morning. | Noon. | Night. | Morning. | Noon. | Night. |
| Average 66 | 74 | 72 | 71 | 87 | 79 |
| Highest 73 | 83 | 78 | 78 | 100 | 87 |
| Lowest 60 | 66 | 66 | 65 | 74 | 72 |
1. Watered the pines with liquid manure.
 3. Pines watered with liquid manure.
 14. Pines watered with liquid manure.
 21. Pines watered with liquid manure.
 23. Pines watered with clear water.

October.

- | | Succession House. | | | Fruiting House. | | |
|---------|-------------------|-------|--------|-----------------|-------|--------|
| | Morning. | Noon. | Night. | Morning. | Noon. | Night. |
| Average | 64 | 75 | 69 | 69 | 83 | 72 |
| Highest | 70 | 85 | 75 | 78 | 97 | 78 |
| Lowest | 59 | 65 | 63 | 60 | 70 | 67 |
5. Pines watered with clear water.
 11. Bark pit in the succession house filled quite up to rims of the pots and kerb-stones; most of the pines in the Calcutta house being cut, the old stumps removed, the suckers taken off, and the rest tied up. The bark bed filled up with old bark from the front pit in the melon house; this pit being subject to get too hot with new bark, on account of the steam pipes running quite round to supply the other houses.
 12. Front pit of the melon house filled up with fresh bark. The fruiting pines that were in it, and the others tied up yesterday, plunged in the Calcutta house, to swell off their fruit this winter.
 13. Succession plants brought from the top stove, and plunged in the front pit of the melon house.
 16. For the last four or five days there has been dull weather, often rainy, and always very misty, with heavy dews; so did not water until this day, and then with clear water.
 23. Pines watered with liquid manure, intended to be the last time this season. The bark pit in the Calcutta house having become too hot, the pines were moved backward until they stood in hollow cavities. Holes were also made with a thick strong rod, to suffer the heat to escape.
 27. The pit was well watered with limewater, for two purposes: to kill the worms, and cool the bed.
 29. The worms all killed, and a fine moisture arising from the bark with watering.

November.

- | | Succession House. | | | Fruiting House. | | |
|---------|-------------------|-------|--------|-----------------|-------|--------|
| | Morning. | Noon. | Night. | Morning. | Noon. | Night. |
| Average | 57 | 62 | 59 | 67 | 75 | 69 |
| Highest | 65 | 75 | 68 | 75 | 85 | 75 |
| Lowest | 50 | 59 | 50 | 60 | 66 | 64 |
1. Pines watered with clear water, sparingly.
 12. Pines watered with clear water.
 21. Pines watered with clear water.

December.

- | | Succession House. | | | Fruiting House. | | |
|---------|-------------------|-------|--------|-----------------|-------|--------|
| | Morning. | Noon. | Night. | Morning. | Noon. | Night. |
| Average | 54 | 63 | 60 | 67 | 76 | 69 |
| Highest | 61 | 72 | 67 | 74 | 88 | 77 |
| Lowest | 48 | 55 | 53 | 61 | 66 | 63 |
4. Pines watered with clear water.
 13. Pines watered with clear water.
 19. The heat of the large pit continuing pretty strong, it was not thought needful to renew it until the shifting time in March. Part of the old bark removed from the outside, and as much fresh bark as possible put in to fill up the pit.
 22. Pines watered with clear water.

SUBJECT. 10. Recent Improvements in the Culture of the Pine-apple.

3549. The most recent attempts at improvement in the culture of the pine-apple consist chiefly in the revival of the mode of growing this fruit without the aid of bottom heat. Some lesser improvements, such as nourishing the suckers on the parent stem after the fruit is cut, are frequently practised by the best cultivators.

3550. Growing the pine-apple without bottom heat is a practice as old as the introduction of that fruit into England. It was practised by Le Cour, who first cultivated the pine in Holland; and, according to Bradley, was adopted by Sir Matthew Decker, who introduced this fruit into England. This practice was revived, in 1819, by Mr. Knight, the president of the Horticultural Society; and has, we believe, been continued in his garden ever since. The various reports on the practice, from time to time, will be found in the *Gardener's Magazine*; but, as a general result, our opinion is, that it has only confirmed the superiority of the general practice of plunging the pots in some medium which, if not a generator of heat, is yet better calculated for retaining it than air. The opinion which we gave on this subject, in the second edition of this work, prepared in 1822, remains unchanged, and may be here repeated.

3551. That the pine-plant will grow and thrive, without what is technically called bottom heat, is an obvious truth, since no plant in a state of nature is found growing in soil warmer than that of the super-

incumbent atmosphere. To imitate nature, however, is not always the best mode of culture; for the more correct the imitation, the less valuable would be the greater part of her products, at least as far as horticulture is concerned. What would our celery, cabbage, and apples be, if their culture were copied from nature? Though the pine-apple will grow well without bottom heat, it may grow with bottom heat still better; and though the heat of the earth, in its native country, may never exceed that of the surrounding atmosphere, it does not follow that earth heated to a greater degree may not be of service to it, in a state of artificial culture. Besides, as earth has a greater capacity for heat than air, it may, and frequently does, happen, that the temperature of the surface soil exceeds that of the atmosphere by several degrees. Admitting, for the sake of argument, that the pine plant could be grown equally well without as with bottom heat; still it appears to us that the mass of material which furnishes this heat, will always be a most desirable thing to have in a pine stove, as it will afford a perpetual fund of heat for supplying the atmosphere of the house in case of accident to the fuel, or steam or hot-water apparatus. Besides, it appears from nature, as well as from observing what takes place in culture, that the want of a steady temperature and degree of moisture at the roots of plants is more immediately and powerfully injurious to them than atmospheric changes. Earth, especially if rendered porous and sponge-like by culture, receives and gives out air and heat slowly; and while the temperature of the air of a country, or a hot-house, may vary twenty or thirty degrees in the course of twenty-four hours, the soil at the depth of two inches would hardly be found to have varied one degree. With respect to moisture, every cultivator knows, that, in a properly constituted and regularly pulverised soil, whatever quantity of rain may fall on the surface, the soil is never saturated with water; nor, in times of great drought, is it ever burnt up with heat; the porous texture of the soil and subsoil being at once favourable for the escape of superfluous water, and adverse to its evaporation, by never becoming so much heated on the surface, or conducting the heat so far downward as to close compact soil. The full advantages of any soil relatively to plants can never be completely attained by growing plants in pots, and least of all by growing them in pots surrounded by air. In this state, whatever may be the care of the gardener, a continual succession of changes of temperature will take place on the outside of the pot, and the compact material of which it is composed being a much more rapid conductor of heat than porous earth, these changes will soon be communicated to the web of roots within. With respect to water, a plant in a pot surrounded by air is equally liable to injury. If the soil be properly constituted, and the pot properly drained, the water passes through the mass as soon as poured on it, and the soil at that moment may be said to be left in a state favourable for vegetation; but, as the evaporation from the surface and sides of the pot, and the transpiration of the plant, goes on, it becomes gradually less and less so, and, if not soon resupplied, would become dry and shrivelled, and either die from that cause, or be materially injured by the sudden and copious application of water. Thus the roots of a plant in a pot surrounded by air, are liable to be alternately chilled and scorched by cold or heat, and deluged or dried up by superabundance or deficiency of water, and nothing but the perpetual care and attention of the gardener to lessen the tendencies to these extremes, could at all preserve the plant from destruction. To lessen the labour of the gardener, therefore, and to render the plant less dependent on his services; and, above all, to put a plant in a pot as far as possible on a footing with a plant in the unconfined soil, plunging the pot in a mass of earth, sand, dung, tan, or any such material, appears to us a most judicious part of culture, and one that never can be relinquished in regard to fruit-bearing plants with impunity. Even if no heat were to be afforded by the mass in which the pots were plunged, still the preservation of a steady temperature which would always equal the average temperature of the air of the house, and the retention, by the same means, of the steady degree of moisture, would, in our opinion, be a sufficient argument for plunging pots of vigorous growing, many-leaved, or fruit-bearing plants.

3562. *A mode of employing the vigour remaining in the old stock or plant after the fruit is cut, to nourish, for a certain time, the sucker or suckers which may be growing on it, was practised by Speechly; but scarcely to the extent to which it has been carried lately. This we think a considerable improvement, if kept within certain limits; but, if carried too far, what might be gained by the sucker coming earlier into fruit, would be lost by the retardation of its own suckers.*

3553. *A queen pine, grown by Peter Marsland, of Woodbank, near Stockport, was exhibited to the Horticultural Society, on Nov. 3. 1818. It weighed three pounds fourteen ounces, measured seventeen inches in circumference, and was peculiarly well-favoured. The singularity of this pine was its being the produce of a sucker which had been removed from the parent root only six months previous to the time when the fruit was cut. The plant on which the sucker grew had produced a fruit, which was cut in October, 1817; the old stem, with the sucker attached, was allowed to remain in the pine pit till May, 1818; at that time the sucker was broken off, potted, and plunged into a fresh pit, and it soon after showed fruit, which, in the course of four months, attained to the weight and size above stated. Mr. Marsland produced several pines in this way with equal success and expedition. His houses were all heated by steam.*

3554. *Specimens of the New Providence, globe, black Antigua, and Enville, were exhibited on the 17th of October, 1819, all of which were produced in a similar manner to the above; and Mr. Marsland stated, that "though not of the largest description, yet as far as beauty of form and richness of flavour are concerned, they would not yield to fruit of more protracted growth." The success which attended this gentleman's mode of "treating the pine, so as to ensure the production of fruit within twelve months from the cutting of their previous produce, has been perfectly satisfactory;" and the following is his account of it:—"In November, 1819, as soon as the fruit had been cut from the pine-plants, which were then two years old, all the leaves were stripped off the old stocks, nothing being left but a single sucker on each, and that the strongest on the plant; they were then placed in a house where the heat was about 60°, and they remained till March, 1820. At this period the suckers were broken off from the old stocks, and planted in pots from eight to twelve inches in diameter, varying according to the size of the sucker. It may be proper, however, to observe, that the length of time which the young sucker is allowed to remain attached to the mother plant, depends in some degree upon the kind of pine: the tardy fruiter, such as the black Antigua, and others, require to be left longer than the queen, and those which fruit readily. After the suckers had been planted, they were removed from the house, where they had remained while on the old stock, to one in which the temperature was raised to 75°. Immediately upon their striking root, the largest of the suckers showed fruit, which swelled well, and ripened between August and November, being, on the average, ten months from the time the fruit was cut from the old plant, and seven months from the time the sucker was planted. The fruit so produced, though, as may be expected, not of the largest description, I have invariably found to be richer and higher flavoured than that grown on older plants. The suckers of inferior strength will not show fruit in the same season, but in the following they will yield good fruit, and strong suckers for a succeeding year's supply. Those suckers are to be preferred which are produced on plants that have ripened their fruit in November, for those taken from plants whose fruit is cut in August or earlier, are apt to show fruit in January or February, while yet remaining on the mother plant. But whenever this happens, the suckers should be broken off immediately upon being perceived, and planted in a pot so as to form a root of its own, to maintain its fruit." (*Hort. Trans.*, vol. iv. p. 392.)*

3555. *This experiment shows what can be done; though it must be obvious that a considerable part of the saving in time is lost by the small size of the fruit. Baldwin, in our opinion, hit on the proper use of this mode, the principle of which, as already observed, consists in the employment of the otherwise lost vigour of the old stock. He contrived to produce tolerably sized fruit, and to have such a degree of vigour in his suckers, as that they were able, in their turn, to throw out other vigorous suckers to succeed them. In aid of this, he often earthed up the old stock, so as to cover the lower end of the sucker; and, partially*

wrenching it off, he, by these means, obtained for it a good stock of roots before he rendered it an independent plant.

Sect. II. Culture of the Vinery.

3556. On the culture of so important a fruit as the grape, it is not surprising that there should be a great variety of opinions. Without quoting those of the earlier and of foreign authors, neither of which are of much value as to the hot-house culture of this plant, we shall give those of the best modern British gardeners, on the principal points connected with it; viz., on the general modes of culture adopted in ordinary vineries; with regard to particular modes of culture; as to gathering and preserving the fruit; and as to insects and diseases.

SUBJECT. 1. General Culture of the Grape in Vineries.

3557. The culture of the grape in ordinary vineries embraces the subject of soil, sort of grapes, sort of plants, pruning, training, bleeding of the shoot, culture of the borders, time of beginning to force, temperature, air, water, ripening, and resting of the wood.

3558. Soil. The kind of compost specially made use of for the vine border of the hot-house at Welbeck was as follows; viz., "One fourth part of garden mould (a strong loam); one fourth of the swarth or turf, from a pasture where the soil is a sandy loam; one fourth of the sweepings and scrapings of pavements and hard roads; one eighth of rotten cow and stable-yard dung, mixed; and one eighth of vegetable mould from reduced and decayed oak-leaves. The swarth or sward should be laid on a heap, till the grass roots are in a state of decay, and then turned over and broken with a spade; afterwards, it should be put to the other materials, and the whole should be worked well together." (*Tr. on Vines*, p. 25.) Specially covers his vine border with a coat of gravel two inches thick.

3559. *Abercrombie* says, "materials and proportions of a good compost are of top-spit sandy loam from an upland pasture, one third part; unexhausted brown loam from a garden, one fourth part; scrapings of roads, free from clay, and repaired with gravel or slate, one sixth part; vegetable mould, or old tan reduced to earth, or rotten stable dung, one eighth part; shell-marl or mild lime, one twelfth part." The borders he recommends to be from three to five feet in depth, and, where practicable, not less than four feet wide in surface within the house, communicating with a border outside the building, of not less than ten feet wide.

3560. *M^r Phail* directs as follows:—"To make a suitable border where it is required for the grape-vine, provide a large quantity of earth of a loamy nature; that from arable land, or from a ridge in which a hedge-row of hazel, maple, elm, &c. have grown many years, and have been grubbed, is good; or a spit deep from the surface of a common which has been long pastured, or from the head or end lands of a corn-field, will do very well." For forcing early, he adds, "vines do best in a strong deep loam, not destitute of a mixture of sand, and well manured with rotten dung, on a dry bottom of hard clay."

3561. *Nicol*, after premising that the bottom of the border is to be made perfectly dry by draining and paving, says, "the average depth of the border should not be less than a yard. If four feet, so much the better. It is not easy to say how broad it should be; but it should not be narrower, outside and inside of the house taken together, than thirty feet. The soil should be thus composed: one half strong heavily loam, one fourth light sandy earth, an eighth part vegetable mould of decayed tree leaves, and an eighth part rotten dung; to which may very properly be added, a moderate quantity of lime, or of shell-marl.

3562. *Griffie*, who has received the medal of the Horticultural Society for his skill in cultivating grapes at Woodhall, in Hertfordshire, forms his vine borders as follows:—"After being completely drained, the whole bottom is covered with brick, stone, or lime rubbish, about six inches thick, and on this is laid a compost of "half good loamy soil with its turf, one quarter of rich solid old dung, and one quarter of brick and lime rubbish; the turf well rotted, and the whole well incorporated." (*Hort. Trans.*, vol. iv. p. 100.)

3563. *Judd* uses half of rich gritty loam from a common; a quarter of rich old dung; and a quarter of lime rubbish, tan, and leaf-mould, mixed together. These materials were kept separate, and frequently turned during winter, and when afterwards well mixed were laid on a prepared bottom to the depth of three feet. He says he does not use so much dung as is usually done, because, though the vine will bear an extraordinary quantity of manure, yet its growth is thereby retarded, especially when young. He recommends the addition of old tan, from having experienced (with Specially, Mitchell, and others) that the vine will root in that more freely than in any other substance. (*Hort. Trans.*, vol. iv. p. 4.)

3564. The depth of the border must be regulated in all cases by the subsoil and the climate. Where the former is moist and the latter cold, the shallower the soil is the better; on the contrary, where the subsoil is perfectly dry, and the climate hot, as in the south of France, the depth may be unlimited.

3565. Sort of grapes. In our horticultural catalogue will be found a descriptive list of the best sorts of grapes for forcing, or the open wall; from which a selection may be made, according to the taste of the party.

3566. For a mere glass case, in which the fruit is to be ripened by the heat of the sun, the following, which are the hardiest sorts, will succeed best; viz., white muscadine, white sweetwater, black sweetwater, black Hamburg, large black cluster, black July, and Miller grape.

3567. For a small house to be forced, or to which fire-heat is to be applied in spring and autumn, the following sorts are what experienced gardeners recommend, as sure bearers and high-flavoured grapes; viz., black and red Hamburg, black and grizzly Frontignac, black prince, white muscat of Alexandria, Skilwell's white sweetwater, and early white Teneriff.

3568. *M^r Phail*, for general forcing, recommends, as "the best sorts of grape-vines for forcing, the black Hamburg, red Frontignac, black prince, black muscadell, red Lombardy, royal muscadine, white muscadine, white Frontignac, white muscat, white sweetwater, white muscadell, and white Syrian." (*Gard. Rem.*, p. 77.)

3569. For general forcing, the following sorts are recommended by Mr. Thompson:—

White Grapes.	Black Grapes.
White sweetwater, White muscadine, White Frontignac, White Hamburg, White Raisin, White Tokay, Chasselin muscat, White muscat of Alexandria.	Black Hamburg, Black Frontignac, Black prince, Black Damascus, Raisin Fourn's, Black Lombardy, Raisin de Corcos, Black Morocco, Black Constantia.
	Red Grapes.
	Red Frontignac, Grizzly Frontignac, Red muscat of Alexandria, Lombardy.

3570. Sort of plants. Vines are to be had in the nurseries, propagated either from layers, cuttings, or eyes; and, provided the plants be well rooted, and the wood ripe, many agree with us in opinion that it is a matter of indifference from which class the choice is made. Justice prefers plants raised from cuttings, as likely to have ripened roots; and where they have to be sent from a distance, he prefers to plants, cuttings containing an inch or two of the old wood, and twelve or fourteen inches of the new. These he plants at once where they are to remain, as practised in France. Specially prefers plants which

have been raised from the eye, for the following reasons:—"They have more abundant roots, grow shorter jointed, are more prolific, and will, if permitted, come into bearing the second year."

3571. *Cuttings and eyes.* It may be remarked, that the most general mode of propagating the vine at present, in the best nurseries, is from buds or eyes; and that such plants are made choice of by most gardeners. The great objection to layers is, that, being propagated in the open air, they grow till checked by frost; and then do not ripen their roots, which generally die off, so that the plants make very weak shoots the first year after planting. Layers kept in the nursery one year after being separated from the mother plant, are, of course, not so liable to this objection. Plants raised from cuttings or eyes, having no adventitious support, produce no more roots than what the shoot and leaves enable them to ripen; and, at two years' growth, may be justly considered as the best description of plants for stocking a house.

3572. *Expeditions propagation.* The vine roots so readily in every stage of its growth during summer, that various plans have been adopted for getting long shoots from it, furnished with abundant supplies of roots, in the course of one season. The following mode practised by Mr. Rutgers, gardener at Shortgrove, Essex, appears to us one of the best:—"At the pruning season, leave a shoot of strong young wood, over and above what may be wanted for training, of a sufficient length to bind down to any convenient place where a pot can be placed to receive it as a layer; and also for training it during its growth. When the vine begins to push, displace all the buds from the shoot intended for laying, except the leading one. When this is grown to about eight inches or one foot in length, bind it down to the pot, and lay it so that the top joint, whence the young wood has sprung, may be fixed with a strong crook at about one inch under the surface of the mould. As soon as it begins to take root, which may be known by removing a little of the earth, begin to weaken its resources from the mother plant, by making an incision in the wood behind the pot; which enlarge by degrees, as fast as the young plant will bear it, until it be quite separated from the old one. The advantage of the above method is, that the vine may be grown to ten feet, or twenty feet and upwards, in length, the first season, with a pot full of roots; so that it may be planted in any situation where it may be wanted, without being checked in its growth, as is generally the case when grown in the usual way from a layer." (*Gard. Mag.*, vol. vii. p. 576.)

3573. *Propagary selection of plants.* A mode of very general utility is to select the plants in the nursery a year before wanted, and to order them to be potted into very large pots, baskets, or tubs, filled with the richest earth, and plunged in a tan-bed. They will thus make shoots, which, the first year after removal to their final destination, will, under ordinary circumstances, produce fruit.

3574. *Planting inside or outside the house.* Vines are commonly either trained against the back wall, or on a trellis under the glass roof. In the former case, the plants are always placed inside the house; but in the latter, there are two opinions among practical men, one in favour of planting them outside, and the other inside, the parapet wall. Where the vines are to be drawn out when in a dormant state, as is generally the case with those trained under the rafters of pineries, there can be no question that outside planting must be adopted; but for vineries where this practice is not requisite, it seems preferable to plant them inside. In pineries, the vines, instead of being drawn out, are frequently either laid down close along the front wall, or tied up, and matted over against the front glass. In either case the vines must be planted inside the house. (*Gard. Mag.*, vol. vii. p. 580.)

3575. *Mode of planting.* Abercrombie says, "Let the vines be carefully turned out of the pots, reduced the balls a little, and singling out the matted roots. Then place them in the pits, just as deep in the earth as they were before, carefully spreading out the fibres, and filling in with fine sifted earth, or with vegetable mould. Settle all with a little water; and let them have plenty of free air every day, defending them from very severe frost or much wet, till they begin to push young shoots."

3576. *Judd's mode of planting* seems to be excellent in its kind; it is founded on the principle of increasing the number of mouths or spongioles of the roots of plants, so as to enable them to search for and take up food, rather than gorging such as they may have with too much food, or with food of too rich a quality. The vines on which this experiment was tried, being raised from single eyes in March, were in the March of the following year cut down to one eye, and put in bottom heat till they produced shoots of sufficient length to draw through the holes in the parapet of his vinery, or about two feet; afterwards they were hardened in the green-house, where a temperature was kept of about 60°, and there they grew two feet more. Holes were opened in the vine border in the beginning of May, and in about a fortnight after, a wheelbarrowful of old tan, or earth of tan, was put in each hole, in the middle of which the roots of the vines remained after being treated as follows:—"The leaves were cut off from the lower part of the plant, about two feet and a half of its length; the end of the shoot was then drawn very carefully through the hole, so that, the pot being removed, the ball was placed two feet distant from the front of the house, upon its side, so that the stem lay in a horizontal position, about six inches below the level of the surface of the border. When thus placed, the whole of the stem which was to be covered was slit, or tongued, at each eye, like a carnation layer, by passing a sharp penknife at three quarters of an inch below each eye, and on the side of the eye, about one third of the thickness into the wood, and then upwards to the centre of the joint. This being done, the stem was covered with about four inches of old tan, and the other two inches were filled up with the mould of the border." It is essential to the safety of the shoot that the sitting be done the last thing, and whilst it is laid in its position, lest the stem should be broken. "By slitting the stem," he adds, "abundance of roots are produced from every eye: the progress of the shoot is not very great until the roots begin to push out;" after which, however, it is so surprising, that those under Judd's management were from twenty-five to thirty feet in length, and of proportionate strength. (*Hort. Trans.*, vol. iv. p. 4.)

3577. *Season of planting.* As the plants of vines are generally in pots, and may be turned out with balls, they may be planted in almost any month in the year; but the autumn or spring months are of course to be preferred. Nicot says, "I have planted grape-houses in May, and in June, that have succeeded so well, as that the plants have reached the top of the house before November in the same years. They were kept in pots, and so carefully turned out of them in transplanting, that the plants experienced no check, although sprung many inches. I have also done the like with peaches."

3578. *Distance.* Speedily disapproves of the common practice of planting all the different sorts of grapes at the same distances, and advises a larger or less space to be allowed, in proportion to the natural character and qualities of the plant. Vines planted at three or four feet apart he considers as crowded; for though by this mode a house will soon get furnished, and a tolerable crop of grapes be produced in a few years; yet, by crowding many years together, they will be close together, they will be cramped in their growth for want of room, and thereby rendered less productive. (*Treat. on Vines*, p. 102.)

3579. *Temporary plants.* "At first planting a house," Abercrombie observes, "some of the vines may be introduced as temporary plants. After the wood from a good stool is able to cover the space between two or more lights, plants less vigorous, or which bear fruit not so well approved, may be taken quite away. A vinery is better adapted for cultivating a single plant to a considerable extent than a hot-house."

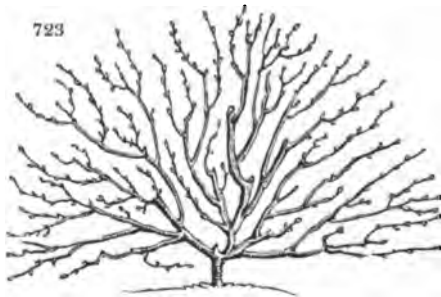
3580. *Pruning and training.* The opinions of authors and practical men on this subject are very various; and each, as M'Phail observes, lays "much stress on his own mode." We agree with this excellent gardener in opinion, that, "to have good crops of grapes, much depends on the soil they are planted in, and the climate in which they are kept, than on any methods of pruning or training that have been, or ever can be, adopted." Three different systems of pruning have their advocates.

3581. *The first method*, according to Abercrombie, is applicable only to vines out of doors; but it may be transferred to plants in a vinery without any material alteration. In this method, one perpendicular leader is trained from the stem, from the side of which, to the right and left, the ramifications spring. When the plant is established, the immediate bearers, or shoots of the growing season, and the mother

bearers, or shoots of the last year's growth, are thus managed:—Soon after the growing season has commenced, such rising shoots as either are in fruit and fit to be retained, or are eligibly placed for mother bearers next season, are laid in, either horizontally, or with a slight diagonal rise, at something less than a foot distance, measuring from one bearing shoot to the next: the rising shoots, intended to form young wood, should be taken as near the origin of the branch as a good one offers, to allow of cutting away, beyond the adopted lateral, a greater quantity of the branch, as it becomes old wood; the new sprung laterals, not wanted for one of these two objects, are pinched off. The treatment of those retained, during the rest of the summer, thus differs. As the shoots in bearing extend in growth, they are kept stopped about two eyes beyond the fruit:—the connate shoots, cultivated merely to enlarge the provision of wood, are divested of embryo bunches, if they show any; but are trained at full length as they advance during the summer, until they reach the allotted bounds: were they stopped in the middle of their growth, it would cause them to throw out troublesome laterals. In the winter pruning, there will thus be a great choice of mother bearers. That nearest the origin of the former mother bearer, or most commodiously placed is retained, and the other or others on the same branch are cut away; the rest of the branch is also taken off, so that the old wood may terminate with the adopted lateral: the adopted shoot is then shortened to two, three, four, or a greater number of eyes, according to its place on the vine, its own strength, or the strength of the vine. The lower shoots are pruned in the shortest, in order to keep the means of always supplying young wood at the bottom of the tree.

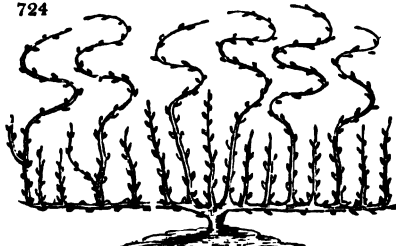
3582. The second method is to head down the natural leader, so as to cause it to throw out two, three, or more principal shoots; these are trained as leading branches; and in the winter pruning are not reduced, unless to shape them to the limits of the house, or unless the plant appears too weak to sustain them at length. Laterals from these are cultivated about two or three inches apart, as mother bearers; those in fruit are stopped in summer, and after the fall of the leaf are cut-in to one or two eyes. From the appearance of the mother bearers, thus shortened, this has been called spur-pruning.

3583. The third method seems to flow from taking the second plan as a foundation, in having more than one aspiring leader; and from joining the superstructure of the first system immediately to this, in reserving well-placed shoots to come in as bearing-wood. Thus, supposing a stem, which has been headed,



“though,” he adds, “I understand by books (*Switzer*, and *The Retired Gardener*) that it was in practice nearly one hundred years ago, and I saw it in practice forty years since.” It is singular that this old method

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of M'Phail should have been described and figured by a German horticulturist, as a new and “experimentally proved superior method of vine culture;” *Versuch einer durch Erfahrung erprobten methode den Weinbau zu verbessern*, von J. C. Kocht, Berlin, 8vo. 1815.

3585. *Forryth's* method of vine-training nearly resembles that of *Speeschy*; but, instead of laying-in the shoots in a straight direction, either upright or horizontal, he bends and attaches them in a serpentine form (*fig. 725*), which has some effect in the open air, or under gentle forcing, of making them break more regularly: though even this is denied by some, who contend that, so treated, they break only at the angles or bends.

3586. *Hayward's* pruning and training proceeds on the opinion, “that the greater length the sap has to pass through the body of the vine, the more abundant, fine, and high-flavoured will the fruit be.” He recommends introducing only one plant in a viney, and training it over the whole trellis, either in horizontal shoots from two main leaders (*fig. 725. a*); or in his wavy manner (*b*); and he can, as the tree advances in growth, gradually convert the latter into the former mode.

3587. *Seton's* training. A very scientific mode of training vines under a glass roof, has been adopted at Stamford Hill, by A. Seton, Esq., one of our most enlightened horticulturists, and practised by him for several years with considerable success. It is thus described:—

3588. The vine having, like other trees, a tendency to produce its most vigorous shoots at the extremities of the branches, and particularly so at those which are situated highest, it generally happens, when it is trained, as is most frequently done, across and upwards, from the front to the back of the house, that the greater portion of the fruit is borne near the top, while the lower parts are comparatively barren. This takes place, whether the branches be made to consist chiefly of vigorous terminal shoots, preserved at considerable length, or the leading shoots be kept short, and lateral spur

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be left for the production of the fruit; but in the latter case, the evil exists in a smaller degree: for the spurs, or short lateral branches, direct the sap in its ascent, producing, by means of its flowing to the extremities, an approximation to the effect of long branches. The same inconvenience would occur, to a certain extent, if the vines were trained in a like manner in the open air, but it is greatly augmented in a house, in consequence of the air being much hotter, as every one knows, at the top than beneath. Having observed that the fruit produced on the vigorous shoots, which usually grow at the extremities of the long branches, is, generally, more abundant, and of a finer quality, than that produced on the short lateral ones, I was desirous to promote the growth and preservation of the former; but the usual mode of training the branches across the house and upwards, being subject to the objection before-mentioned, and little scope being afforded for it in a house of small dimensions, I thought I should obviate these inconveniences, in great part, and attain another object, presently to be mentioned, by training the branches in a horizontal direction, and keeping the whole of the fruit-bearing part of each tree nearly on the same level.

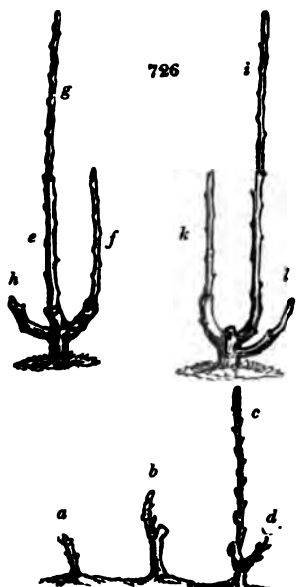
3580. *Five vines were planted at the ends of a house, twenty-five feet in length*, for this purpose, provided with rods placed horizontally under the glass of the roof, twenty inches asunder, and extending from end to end. The first vine, placed at one end, being trained up to the two lower rods, a shoot of it was laid along each of them, and continued successively from year to year, till it reached the other end: then the shoot on the lower rod was turned upwards to the next, and led back upon it towards the stem of the tree, while that on the upper rod was turned down and led back, in like manner, on the lower one. During this process, a sufficient number of spurs, or short branches, was left annually on the old wood, to produce fruit. When the leading shoots, which had been thus trained in a retrograde direction approached towards the end whence the original branches proceeded, preparation was made for a succession of young wood, bringing forward two fresh shoots from the stem of the tree, and leading them along, as to the preceding ones. As these, and the leading shoots of the first branches, which were then on their return, advanced, the spurs on that part of the old wood, to which they had reached, were cut out, to make room for them, the naked stem only being left. When the second series of branches had returned nearly to the end, at which the trunk was situated, the first series, on which there was then but little of the herbage remaining, was cut out at the trunk. Fresh shoots were then brought forward to succeed the second series; and so on without end. It would be superfluous to dwell on the mode of managing the other trees; as it will be perceived that, following the same principle, they must be laid along the higher rods in succession, two rods being allowed to each tree; and when the stem is not at the end of the house, two branches are to be trained eastward, and two westward along the rod. Thus, in a house of twenty-five feet in length, instead of having only fifteen or sixteen feet, to admit of the length of a branch, as would be the case under the usual mode of training across the house, we have a range of thirty feet, which affords ample scope for the long shoots at the extremities; and these, I find, when laid on in the horizontal position, and left from three to five feet long, according to their strength, usually bear fruit at all their back, while the spurs on the old wood are also very productive. By these means, the tree possesses the double advantage of no part of it being robbed of its nourishment, by means of any other vegetation, which is supplied from the same root, being situated either in a higher position or warmer atmosphere. To what extent the former of these circumstances alone may operate, I cannot determine from any actual experiment; but, from the general observations I have made, that the growth of the vine, as well as of other trees, is most luxuriant in the parts that are situated highest, I am inclined to think, that its effects are very considerable. Others, who have made the same observation, have recommended the training of the shoots in a zigzag manner, advancing upwards, with the view of retarding the ascent of the sap through the inclined parts: this, however, I have found to have little or no effect, the general direction of the shoot being upwards, through all the bendings. But whatever may be the effect produced by the horizontality of the position, in equalising the luxuriance of the growth, I conceive that no doubt will be entertained, in regard to that of uniformity of temperature; and this is fully obtained by the method in question. I now come to the other object to be attained by the mode of treatment, which will be stated in a few words, as the effects produced in regard to it will be very evident.

3581. *In the usual mode of management*, each tree is under the influence, in its different parts, of all the degrees of temperature in the house; but under the mode now proposed, each tree has its own peculiar climate, to which alone all its parts are exposed. This affords us the command of a most convenient variety, in regard to earliness in the ripening of fruit. For example, if there be a wish to save fuel, and yet to have grapes of several varieties, which ripen at different seasons, of the late sorts there will, under the common method, be only a few brought to perfection at the tops of the trees, whilst those that are near the bottom will not ripen, and that part of those trees will accordingly be useless. But in the arrangement above described, the early and late sorts may be procured at the same time in equal abundance and perfection, by training the early sorts, let us suppose the sweetwater, at the bottom; the middling ones, such as the black Hamburg, next; and the late, such as the muscat of Alexandria, at the top. Again, if it be wished to have some very early, and others very late, the order may be reversed, by placing the early varieties at the top, and the late at the bottom; in which case more fuel will be required. This method, it will be perceived, may be varied in many ways, and will operate under all the degrees of forcing. (*Hort. Trans.*, vol. iii. p. 9. to 13.)

3582. *In Griffin's mode of training and pruning*, only a single shoot is led up under each rafter. The vine is planted outside, close to the parapet, and introduced through a hole immediately under the rafter up which it is trained. On planting, it is cut down to one eye; about Christmas, the shoot formed during the preceding summer is cut down to two or three feet; the second year one shoot only is trained from the extremity, and it is again headed down in winter, so that the joint length of the two years' wood is from ten to fifteen feet; and at the Christmas of the third year, the shoot is cut off at the end of the rafter. The fruit, it is obvious, is to be obtained from the side shoots, or spurs, proceeding from this main shoot. The spurs are cut down to single eyes every winter, till the main shoots get coarse and ragged, which will happen in about ten years; it is then cut away entirely, a young stem having been previously trained up the two preceding years from the bottom to substitute in its place. As soon as the plants become sufficiently strong to furnish wood, from the point where they enter the house, for a second and third branch, then a proper number must be fixed on as permanent plants, and their side branches brought successively forward and trained to the contiguous rafters, "one bearing branch being applied to each rafter, and the plants which originally belonged to these rafters taken away entirely." The weight of grapes produced by the vine under each rafter by this mode of pruning is generally about forty pounds, two bunches to each spur, or from fifty to a hundred bunches, averaging half a pound each. When the house is in forcing, the branches are suspended from the rafter by strings from two to three feet long, fastened to nails or hooks on each side the rafter; by this means they are let down from the glass when danger from frost is apprehended, in the manner effected by the hinged rafter-trellis. (p. 357.) "I also contrive," adds this very successful cultivator, "to spread the branches, when in bearing, on either side of the rafters, under the glass, but so as not to occupy the whole space under the glass with the foliage; for I consider that very great advantage arises to the fruit from giving free admission to the sun from the centre of each light." It will be asked by some gardeners, what is done with the leading shoot at the end of every main stem? This Griffin "stops during its growth in the summer, leaving three or four joints at the utmost; and these must be cut away, at the time of pruning, down to the old wood, or nearly so; sometimes, to prevent the top of the house being crowded, a little of the old wood at top may be cut off also, and replaced by the next year's shoot." (*Hort. Trans.*, vol. iv. p. 104.)

3592. *The long or succession mode of pruning vines* may be exemplified in the practice of Mearms, late of Shobden Court, Herefordshire. The vinery there, as at Wood Hall, is of the common form, with

wooden sashes and rafters; the vines are planted inside the house, at two feet and a half apart, nearly close to the front wall, and are headed down to within a foot of the soil (*fig. 796. a*). One shoot only was



allowed by Mearns to proceed from each plant, which at the end of the first season was cut down to the second or third eye (*b*). Next year, two leading shoots were encouraged, the strongest of which was stopped when it had grown three or four joints beyond the middle of the roof, and the weaker after having grown three or four feet, for the purpose of strengthening the eyes. At the fall of the leaf, the leading shoots were reduced, the main one to the length of the middle of the roof (*c*), and the lower one to the third eye (*d*). In the third season, one leading shoot was trained in from each shoot (*c* and *d*), and from the bearing shoot (*c*), fruit-bearing side shoots were produced, one bunch was left on each, and the shoot stopped at one or two joints above it: no side shoots were allowed to proceed from the spur (*d*), the leading shoot from which was to become the bearing wood for the next year. Thus in the autumn of the third season the lower part of the house was furnished with a crop of grapes from shoots proceeding from wood of the preceding year (*e*), and parallel to this bearing shoot on each vine was the young shoot for next year's crop. In winter, the shoot from the extremity of the bearing branch (*g*) was cut off at the top of the roof, or within twelve or fifteen inches of it (*g*), and the shoot (*f*) from the spur (*d*) was cut down to the middle of the roof, and all the spurs (on *e*) which had borne the grapes were cut out. Each vine was then furnished with two shoots of bearing wood (*g*, *f*), a part of old barren wood (*e*), and a spur for producing a young shoot the following year (*h*). In the fourth summer a full crop was produced both in the upper and lower half of the house; the longer shoot bearing on the upper half of its length, and the shorter on its whole length; a leading shoot was produced from the short shoot, and another from the spur. In the pruning season of the fourth year, the centre shoot was entirely removed and replaced by the side shoot (*h*), now the whole length of the roof, and this side shoot was in its turn supplanted by the shoot (*h*) from the spur, while a spur (*i*) was prepared to succeed it. This constitutes one rotation or period of the system of Mearns, which he always found attended by abundant crops of large-sized bunches; and which he considers may be continued for any length of time. (*Hort. Trans.*, vol. iv. p. 246.)

3593. Summer pruning. This depends generally on the necessity of admitting light and air to the fruit and young wood; and particularly on the sort of winter pruning to be adopted. "The gardener, therefore," as Nicol observes, "must have a predestinating eye to the following season." "Whatever methods of pruning are used," McPhail remarks, "the vine, through the whole course of the growing season, requires constant attendance, so as not to suffer the plant to be crowded in any part with superfluous shoots or leaves, and no more fruit ought to be suffered to swell on the plant than it is well able to bring to perfection. The berries also on each bunch should be thinned, so that they may have room to swell, without pressing too hard upon each other."

3594. Mearns in his summer pruning stopped the bearing branches at the bunch, instead of the next joint above it, which is the usual practice; "for I found," he says, "that the fruit did equally well, and it divested the branch of an incumbrance, while it allowed a much larger portion of light to come into the house, together with a more free circulation of air among the fruit and young wood. I blind all the eyes on each fruit-spur as soon as they push, except the uppermost, which I retain, to draw up the sap to nourish the fruit: I never suffer them to push above a joint or two before I pinch them back, always cautiously retaining an eye, and am particularly cautious that nothing should happen to injure the leaf that accompanies the bunch, for if that is lost, the fruit of course will come to nothing." (*Hort. Trans.*, vol. iv. p. 255.)

3595. Thinning the leaves and fruit. "Every one of penetration and discernment," Nicol observes, "will admit the utility of thinning the berries on bunches of grapes, in order that they may have room to swell fully; and, further, that of supporting the shoulders of such clusters of the large-growing kinds as hang loosely, and require to be suspended to the trellis or branches, in order to prevent the bad effects of damp or mouldiness in over-moist seasons. Of these, the Hamburgh, Lombardy, Royal Muscadine, Raisin, St. Peter's, Syrian, Tokay, and others, should have their shoulders suspended to the trellis, or to the branches, by strands of fresh matting, when the berries are about the size of garden peas. At the same time, the clusters should be regularly thinned out, with narrow-pointed scissors, to the extent of from a fourth to a third part of the berries. The other close-growing kinds, as the Frontignone, Muscat, &c., should likewise be moderately thinned; observing to thin out the small seedless berries only of the Muscadine, Sweetwater, and flame-coloured Tokay. In this manner, handsome bunches and full-swelled berries may be obtained; but more so, if the clusters on over-burdened plants be also moderately thinned away. Indeed, cutting off the clusters, to a certain extent, of plants overloaded and pushing weak wood, is the only means by which to cause them to produce shoots fit to bear fruit next year; and this should be duly attended to, so long as the future welfare of the plants is a matter of importance."

3596. Remedies for bleeding. "If the pruning has been timely, the vine is not liable to bleed. When the sap rises before the wound is healed, bleeding ensues, and is not easily stopped. This retards the plant; and, out of doors, the loss of a few days is, in some seasons, irreparable: but in other respects, the consequences of bleeding are not so disastrous as many seem to apprehend; and a gardener is sometimes surprised by a subsequent crop of uncommon goodness. Innumerable remedies for bleeding have been proposed: the following rank among the best. Seal the place, and cover it with melted wax, or with warm pitch spread upon a piece of bladder, or peel off the outside bark to some distance from the place; and then press into the pores of the wood a composition of pounded chalk and tar, mixed to the consistency of putty." (*Abercrombie*.) Knight's remedy consists of four parts of scraped cheese to be added to one part of calcined oyster-shells, or other pure calcareous earth, and this composition pressed strongly into the pores of the wood. "This done," he says, "the sap will instantly cease to flow." (*Hort. Trans.*, vol. i.) When the vine is in full leaf, it is not liable to bleed when cut; therefore the largest branches may be cut off during the growing season with perfect safety.

3597. Stirring the soil, and culture of the borders. "The borders," *Abercrombie* observes, "should be kept at all times clear from weeds. In winter and spring, the surface of an open border should be stirred with a three-pronged fork, but not so deeply as to injure the roots. The design is merely to revive the surface." A week or two previous to commencing to force, say about the middle of January (forcing to begin the 1st of February), Nicol directs the border to be pointed or forked over carefully; and to be watered all over with the drainings of the dunghill; this should be repeated at the end of four or five

days, and also again at a slight interval; giving as much as will sink down to the deepest-placed roots and fibres. The border on the outside should also be covered, or rather should already have been covered, to a good thickness, with stable-yard dung; not, however, mere litter, but good fresh dung, the juices of which may be washed down to the benefit of the roots. The intention of this covering is to answer as a manure; and also to keep severe frost from the roots, from the time the sap is put in motion, till the spring be so far advanced as that the plants shall sustain no injury. Vine borders ought never to be cropped.

3588. *Time of beginning to force.* "The growing season of our climate," Abercrombie remarks, "does not last long enough to bring out, swell to full size, and perfectly ripen, the fruit and summer shoots of the vine. Hence, when the artificial excitement, applied to this plant, begins just before the natural spring, and is continued till the leaves fall, the plant is beneficially assisted under a deficient climate rather than forced. The best time to begin to force is the 1st of March, if the object be simply to obtain grapes in perfection moderately early. In proportion as the start is accelerated before this, the habits of a deciduous plant, and the adverse state of the weather, leave a greater number of obstacles and discouraging contingencies to intercept final success. Managers, however, who work a number of houses, and who have to provide, as well as they can, against demands for grapes in early succession, begin to force about the 21st of December, and, successively, in other houses, the 1st of January, 1st of February, and so on. Attempts are even made, by bold operators, to lay forward for a crop in March, by beginning to force in August, and getting the fruit set before November; but such labour and expense is often lost. The period of ripening is not early in proportion to the time of beginning: when the course of forcing coincides nearly with the natural growing season, ripe grapes may be cut in five months or less; when short days compose a third part of the course, in about six months; when the course includes full half the winter, it will last nearly seven months."

3589. *Care of outside stems.* "At whatever season forcing commences, the stems of vines planted outside the house should be guarded from the stagnating effects of cold, by a bandage of hay, or moss and best matting, round the bole, and a mulching of dry litter over the root. The excluded stems must be protected in the same way at the commencement of the forcing season. While the vines are young, it will also be advisable to cover the outside border, in winter, with straw dung taken from the outside of old hotheds. (Abercrombie.) Griffin keeps the stems of his vines inside the house moist, from the time of beginning to force till the bunches show themselves, by daily watering them with a syringe. This, he says, contributes materially to the production of vigorous shoots. Some gardeners wrap the stems round with moss, which they keep moist for two or three months, for the same purpose. In hard forcing, practices of this sort are particularly necessary."

3590. *Temperature.* "Begin," Abercrombie says, "at 50° min. 55° max. In a week, raise the minimum to 55°, and the maximum to 60°. Till the time of budding, the temperature should not exceed 60° from artificial heat, and 64° from collected sun heat. After the buds are in full motion, it may be raised to 60° min. 64° max. from fire, and 68° from sun heat. By the time the bloom expands, the lowest effect from the fires should be 60°; the highest may be 75°; and when the sun's influence is strong, let it be accumulated, by confining the interchange of air to the ventilators, till the heat rise to 80°. After the fruit is set, the minimum should be 75°, and fresh air copiously admitted."

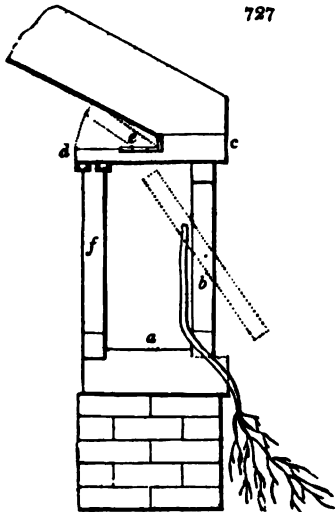
3591. *Air.* Abercrombie directs this to be given pretty freely by the sashes till the leaves unfold. "Before the foliage is fully out, begin to keep the house close, admitting air moderately; and particularly observe to have a sultry, moist climate while the blossom is coming out, and until it is off and the fruit set. While the fruit is swelling and ripening, the plants will want abundance of heat and air." (*Fr. Gard.*, p. 651.) M'Phail recommends a little air to be given during a part of the day while the thermometer is above 65°, and the sun shines in the winter months, and abundance in the summer season when the heat exceeds 75° or 80°.

3592. *Watering and steaming.* Vines require a plentiful supply of water from the time the fruit is well set till it begins to colour, particularly when the berries become transparent at the last swelling. Withhold water entirely when the grapes approach maturity.

3593. *Ripening the wood.* Abercrombie directs, "If the fruit be not off by the middle of August, the continuation of fine dry weather, or of the heat dependent on the natural climate, will hardly be sufficient to ripen the wood; and therefore, as soon as the external air declines to 80° assume gentle fires, morning and evening, so as to keep the minimum temperature of the house to 70°. The maximum need not exceed 75° in sunshine; for fresh air should circulate at every proper opportunity. Proceed thus until the shoots of the season have ceased to grow, and turn brownish at bottom, and the leaves begin to fall, indications that the wood is ripe, when the first and last are not caused by a deficiency of heat." He adds, "If the weather continues warm after the fruit is cut, take off the glass frames; as the shoots will ripen the better under full exposure to it. In October, however, it will be advisable again to put on the frames, as well by shelter to assist the ripening of the wood, if that is not complete, as to protect the house from injury, when rough wintry weather may be expected."

3594. *Exposure and resting of the wood.* "Some managers," Abercrombie observes, "leave the house quite exposed when the vines have done growing; and, whether it be covered or not, there should be constantly a circulation of air through it. Vines which have been exposed to the weather, or freely to the dry air, in a state of rest, when forced after a proper interval, generally break at almost every eye." The rest proper to a deciduous plant cannot be given to vines where the branches are kept subject to the influence of a permanent heat after the leaves are fallen, as in the case of vines grown in pine or other stoves. The top of its stem, with its branches, must therefore be withdrawn from the house immediately after the fall of the leaf, to remain on the outside till it be proper again to force the plant. Abercrombie says, "the branches will require no covering in this climate;" but many gardeners lay them down, or tie them to stakes, and cover them with litter or mats.

3595. S. Galton describes a plan of exposing the branches of vines growing in a stove to the external air, without the necessity of suspending the forcing or heat in the stove, or of drawing the stems back through apertures by which they are introduced into the house. This was put in practice at Derby, in the garden of Joseph Strutt, of that town, where it has been in successful use for above fifteen years. The foundation wall in front of the house is capped with a stone sill (fig. 797. a); the front upright lights (b) move on centre pins, and can be taken out from their places without disturbing the rafter-plate (c), or the uprights which support the plate: these lights, when taken out, can be



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fixed by the lower ends to the inner side of the stone sill, the spaces of the uprights being filled by other pieces, whilst the tops are held by a board (d) longitudinally fixed to the rafter by hinges (e), and capable of being raised and let down at pleasure. When the vines are to be exposed, they are unfixed from their places between the rafters, and laid down on the stone sill (a); the front upright lights (b) are then taken out and fixed on the inner side of the sill (f), thus leaving the whole of the vine on the outside of the house, and under cover, protected from rain, until it is desired to put it again into heat, when the situation of the upright lights is changed, and they are replaced in their former situation. (*Hort. Trans.*, vol. iv. p. 567.) This mode will be found reduced to its very simplest form in the *Gardener's Magazine*, vol. vii. p. 411.

SUBJECT. 2. Particular Modes of Cultivating the Grape, adapted to particular Situations.

3606. *The particular modes of cultivating the grape* which we shall now enumerate, refer to its culture in pineries, green-houses, and other plant structures, by dung heat in hot-bed frames, temporary frames and glass covers, hand-glasses, and cultivating for retarding maturation.

3607. *Forcing the vine in a pine or other stove.* Abercrombie, in a comparison between the hot-house or general stove and vinery, justly observes, that the former "has many circumstances of inferiority to the vinery; and, although its shades of inconvenience or imperfect accommodation are not weighty enough to forbid the dedication of any spare room to the vine, yet they are sufficient to confer very great credit on the manager who obtains a good crop of fine-flavoured grapes under them." (*Pr. Gard.*, p. 657.) Speechly considers, that the vine and pine may be advantageously grown together; but, subsequent experience having led to the culture of pines in pits, most gardeners prefer growing them separately.

3608. *Growing grapes in green-houses and other houses.* Vines are grown under the rafters in green-houses, conservatories, and in most kinds of forcing and other hot-houses; but, as the gardener who understands their culture in the vinery and pine stove, can be at no loss in any case of that sort, we do not consider it necessary to introduce here any thing farther on the subject. The excellence of the fruit, and the grateful nature of the plant, than which none is more certain of rewarding the gardener's care by abundant crops, will, we trust, justify our having brought together the practice of so many cultivators.

3609. *Forcing vines by dung heat.* Justice, Lawrence, and Switzer state instances of this being done on wooden walls in their time. Fletcher, a market-gardener near Edinburgh, has practised it with great success in a glass case, keeping constantly, till the fruit is about to ripen, a heap of dung, or dung and weeds, in a state of fermentation in the area of the house; and extensive forcing of this kind has been practised by a gentleman farmer of East Hornden, in Essex, an account of which will be found in the *Hort. Trans.*, vol. ii. The dung is laid in a ridge along the floor of the house, as shown in the section, fig. 729.

3610. *Temporary frames and glass cases* have been constructed by various gardeners, foreign as well as British, but more especially those of Holland and Flanders, against walls of vines. Sometimes a temporary furnace and flue is built, or hot-water or steam-pipes are laid on, and at other times a dung or tan bed is resorted to, and very excellent crops are obtained. The process is so simple, and so obvious to every gardener who can manage a common cucumber frame, that it is unnecessary to enter into details. (*See Gard. Mag.*, vol. i. p. 168; and vol. iii. p. 390.)

3611. *Ripening grapes under hand-glasses.* About twenty years ago, a market-gardener at Bath published a plan of ripening grapes under common hand-glasses. He planted the vines in a soil composed in great part of lime rubbish; placed a glass over each plant, taking out half a pane in its summit, through which the leading shoot of the vine protruded itself, and grew round the panes, and bunches of grapes remained within the hand-glass, and enjoyed the advantages of protection from cold winds, dews, and rains, during night, and of a high degree of confined solar heat during the day.

3612. *Forcing vines in pots.* This is not a very common practice, because the vine requires a greater extent of pasturage for the roots than any other fruit tree. It has, however, been occasionally attempted by gardeners in pits and stoves, and three or four bunches are sometimes thus obtained from one plant. The soil must be as rich as possible, and every attention paid to keeping the plants regularly supplied with water and liquid manure. Knight employed water impregnated with pigeon's dung to the colour of porter, and found, in consequence, the most vigorous growth. He states, that a pot containing two cubic feet of very rich mould, properly supplied with water and manure in a liquid state, is fully adequate to nourish a vine, which, after being pruned in autumn, occupies twenty square feet of the roof of a hot-house. Such vines he constantly found to produce more vigorous wood when forced very early, than others of the same varieties, whose roots were permitted to extend beyond the limits of the house. (*Hort. Trans.*, vol. ii: p. 573.) Mr. Stafford, gardener at Willersley, in Derbyshire, excels in this mode of producing grapes. He prefers the prolific varieties to those which bear large bunches, and uses pots thirteen inches wide, and fifteen inches deep, filled with light rich vegetable mould. He puts the plants deeper in the pot every succeeding year, thus allowing the wood which was above the pot the preceding year to make new roots; while, the next time of potting, he takes from the bottom about the same proportion of old roots. By this perpetual succession of young wood, and young roots in fresh soil, he is said to produce nearly as great a weight of fruit as the weight of soil in which the plant grows. The vines receive abundance of water up to the time of the ripening of the fruit. (*Hort. Reg.*, vol. i. pp. 9, 467.) It is evident that by this mode a succession of grapes may be had all the year, as is now the case at Willersley, and was formerly at Woodbank, near Stockport, as described in *Hort. Trans.*, vol. ii. But the method, as practised the same method, but in the winter season remove the pots containing his ripe fruit into a dry airy situation, which preserves the fruit in perfection much longer than if the pots had been kept in the vinery. (*Hort. Trans.*, vol. iv. p. 561.)

3613. *Cultivating for retarding maturation*, so as to obtain a supply in the winter season, is thus described in the *Transactions of the Horticultural Society*, as practised at Willersley. The sorts cultivated for this late crop are the White Muscat of Alexandria, the Black Damascus, the Black Terrefille, the St. Peter's, the Black Raisin, the Syrian, and the White Nice. They are grown in houses alternately used as pineries and vineries. About the second week in February, the pine plants are always removed into another vinery. The grapes which remain on the vines are all cut, and the house thrown open for the free admission of air at all times, till the end of April, when the vine buds begin to swell, when a gentle fire is applied in the night, and in dark and cold days; but air is admitted freely when the thermometer is up at 70°. At this period, a proportion of the pine plants is again brought into the house, where they remain till the succeeding February. The treatment from this time is quite in the common way; and by this late and slow process, the grapes do not begin to ripen till towards the end of October, and the very late sorts, such as the St. Peter's, are scarcely ripe at Christmas.

SUBJECT. 3. Gathering and Keeping forced Grapes.

3614. *With respect to the gathering of grapes*, Niccol observes, "they should be allowed to hang till fully matured and ripened; especially the thick-skinned and fleshy sorts

Even the thin-skinned and juicy kinds, as the white sweetwater, white Frontignac, and muscadine (that are often cut before nearly ripe), are much improved in flavour by being allowed to remain on the plant till the skin become transparent, and of a russet or yellowish colour." The grapery, when the fruit is ripe, ought to be kept dry and cool, in order to preserve the fruit as long as possible on the branches, and thus to prolong the grape season. Covering the border an inch or two with dry sand, ashes, gravel, decayed granite, or decayed trap, contributes to dry the air and dispel damps. The leaves round the bunches are to be picked off for the same end, and a fire to be made in the daytime in gloomy weather.

3615. *Thompson*, gardener to Earl Cowper, at Panashanger, preserves grapes in his vinery till February, by lighting fires in the daytime, and giving plenty of air; but putting them out in the afternoon, and shutting the house close up at night. "The fire in the day, aided by the circulation of the air, renders the whole interior of the houses perfectly dry, so that no damp exists in them when shut up; a night fire, on the contrary, with the houses closed, creates a vapour, which causes the fruit to become mouldy, and to decay. The sorts used were the Frontignac, Sweetwater, and Black Damascus." (*Hort. Trans.*, vol. iv. p. 132.) M^r Phail observes, "there are some sorts of grapes, such as the Black Muscat of Jerusalem, the Syrian, Tokay, and some others, which will keep on the tree a long time after they are ripe, provided the house be kept dry and cool." Braddick covers the floors of his vinery in autumn about three inches thick with coal-ashes, which, by preventing any damp from rising, to mildew or injure the fruit, enables him to preserve the grapes hanging on the tree in a very perfect state till the end of January, or later. (*Hort. Trans.*, vol. iv. p. 143.) Torbton, in a temporary vinery, or a glass case placed against a wall on which grapes are trained, has ripened a late crop, and kept the fruit on the trees in a state fit for use till February. (*Hort. Trans.*, vol. iv. p. 118.)

3616. *To preserve grapes by removal from the tree*, Forsyth directs, where there are several bunches in one branch, it may be cut off, and seal both ends with some common sealing-wax; then hang the branches across a line in a dry room, taking care to clip out any of the berries that begin to decay or become mouldy. "In this way," he adds, "I have kept grapes till the 6th of February; but, if they are cut before the bunches are too ripe, they may be kept much longer."

3617. *Grapes may be kept by packing them in jars*, every bunch being first wrapped up in soft paper, and covering every layer with bran, or with sand, which should be well dried before it is used. The mouth of the jar should be covered with a bladder tied firmly on to exclude the air. The jars should be kept in a room in which there should be a fire in wet or damp weather. (*Tr. on Fr. Tr.*)

SUBJECT. 4. *Insects and Diseases attendant on forced or Hot-house Grapes.*

3618. *The insects and diseases of the vine* are not numerous: of the latter there are few or none, unless bleeding may be excepted, the remedies for which we have already given. (3596.) The insects which infest the vine are chiefly the red spider and two species of coccus; the one called the brown (*C. hespéridum* L.), and the other the vine coccus (*C. vitis* L.) To remove these, Speeachy and Abercrombie recommend washing the stem and all the shoots with soap and water; the stem being previously divested of the loose bark. Abercrombie adds, give the border two or three soakings over the roots with soap-suds. If the plants get infested with the brown or turtle coccus, it can be extirpated by brushing the stems after removing the loose bark; and then, as an additional precaution, washing them either with lime, or strong tobacco water. This should be done, if the evil does not call for an immediate check, after the leaves have fallen; or before the buds of the following year are formed. Similar treatment is found the best preventive against the red spider, and the aphid, or green fly, as the eggs of both will be thus destroyed, and the next year's damage prevented.

3619. *Birds, wasps, flies, &c.* several gardeners direct to be excluded by gauze frames, calculated to fit the openings by which air is given. Some recommend putting bags of gauze over each bunch; others hang up bottles, boiled carrots, &c. Nets may do very well to prevent the entrance of birds into the greenhouse, but are perfectly useless in keeping off wasps and other insects, as they will alight on the outside and, folding their wings, pass through those of the smallest meshes.

SECT. III. *Culture of the Peach-house.*

3620. *Soil*. Abercrombie recommends three parts of mellow unexhausted loam, and one part of drift-sand moderately enriched with vegetable mould, or the cooler dunga. The border or bed to be thirty inches or three feet deep. The nectarine wants the warmer, richer, and deeper soil if any difference be made. (*Pr. Gard.* p. 292.)

3621. M^r Phail recommends the soil for peach trees, which are to be forced, to be "fine loamy well-prepared earth of a medium texture, neither very light, nor of a strong binding quality, well mixed with some good manure. The border to be four feet deep, and so broad that the roots cannot get into a bad soil." (*Gard. Rev.* p. 18.) Almost all gardeners agree, however, that three feet deep is quite sufficient: where the bottom is cold and moist, three feet is too much, and a depth of only two feet, or even eighteen inches, is far preferable.

3622. *Choice of sorts*. The following are recommended by Mr. Thompson as the most proper for forcing:—

PEACHES.

*Grasse Mignonne | *Royal George | Red Magdalen (of Miller) or *Méditerranée de Courson* | Royal Charlotte | *Bellegarde

These will form a sort of succession in the same house; should the supply be required to be still further prolonged, the Barrington and Late Admirable might be included.

NECTARINES.

Straw

Violet

Hative

All the above are free-stones; as for cling-stone peaches and nectarines, indeed, few persons will have them either for forcing or the open wall. The Catherine might be cultivated on walls for its beautiful appearance, late in the season, as well as its good quality; but for the purpose of forcing, no cling-stones should be recommended.

3683. *Choice of plants.* "Before a house for forcing peaches and nectarines be built," M'Phail observes, "trees to plant in it should be got in readiness; and, if they be growing on the premises, it will be an advantage. If it can be avoided, no tree should be planted in a forcing-house until the fruit of it has been seen and tasted. The trees should be well-trained ones, four or five feet high; indeed, it is of no consequence what their age be, provided they be healthy, well rooted, and in a bearing state; and if they have been transplanted several times since they were budded, they will be the fitter for transplanting again; and if the work of taking them up and of planting them in the peach-house be carefully and methodically done, the trees by their removal will be but little retarded in their growth. When every thing in a forcing-house is got in readiness for the reception of the trees, loosen them from the wall to which they were fastened with nails and shreds, and dig a wide semicircular trench four feet distant from the stem of each tree, and a little deeper than their spreading roots; then by little and little with a pointed stick work the earth out among their roots, taking care to break as few of them as possible; in this manner the roots of the plants are to be divested of earth in a careful manner, so as to undermine the stem, that the tree may be lifted out of its place without straining the roots of it. Having holes previously prepared about eight or ten inches deep, and four feet wide, set the trees into them one after another, training their roots out in a regular horizontal manner at full length, and after the ends of the roots are cut so as to take the raggedness off, cover them no deeper than about six inches at their extremities, and at the stem of the tree about four inches." "Settle the soil properly," says Mr. Thompson, "but tread it not, if the trees be meant to thrive as they ought, and not to be immovably fixed in their growth, or nearly so, for a year or two."

3684. *Situation of the plants in the house.* Permanent occupants, intended to be forced early, Abercrombie plants in a front border, training them on a trellis just under the roof. In late forcing-houses, he trains them to an upright trellis near the back wall. M'Phail plants so as to train under the glass; and Nicol's practice concurs with that recommended by Abercrombie.

3685. *For a late peach-house,* dwarfs should be planted in front, to be trained about half way up the roof; and dwarfs, with riders between them, against the back wall, to be trained at the top. In this case, the trees on the back trellis would not be shaded by those in front, provided they be not trained to more than half way up the sloping glass; and thus the greatest possible extent of unshaded surface, and the greatest quantity of unshaded fruit, may be obtained. A house planted in this manner, about forty or forty-five feet in length, may have four dwarfs in front, and four dwarfs and five riders at back; and, when in a full-bearing state, would produce a large quantity of nectarines and peaches. If only thirty or thirty-five feet in length, three dwarfs in front, and three dwarfs and four riders at back, would be trees enough to fill it. (*Pract. Gard.*)

3686. *For an early peach-house* many consider the plants as safer when trained against the back wall, or on a trellis not nearer the glass than three feet. This is the Dutch practice, and was that of Speechly, and Kyle of Morredun.

3687. *Season of planting.* Abercrombie recommends November and December as preferable; or otherwise February and March: M'Phail, "any time when the weather is open, between October and March;" which practice is also agreeable to that of Nicol.

3688. *Training.* All seem agreed in recommending fan-training for peaches and nectarines; which being the simplest and most natural of all training, we deem it unnecessary to quote opinions at length. Seymour's mode, which will be described hereafter, is perhaps better adapted for the open wall than for a forcing-house, because it requires more room.

3689. *Pruning.* This, according to Abercrombie, may be performed at the fall of the leaf; but should be completed before the blossom buds are considerably advanced. M'Phail says, the best season is the spring, when the blossom buds can be distinguished. Nicol, in the case of a newly planted house, heads down the maiden plants, or cuts in the trained trees, about the end of March or beginning of April. "With respect to the dwarfs, the shoots on the lower branches should be cut back to two or three buds, that the trellis may be furnished from the bottom with young wood. The shoots on the upper or farther extended branches may be shortened back to half or one third of their lengths, according to their strength, provided they have been well ripened, and are free from canker; but if the tree be anywise diseased, let them be cut so far back as to get rid of the cankered or mildewed part. I mention this as a matter of precaution, but would rather advise that no diseased tree be planted, unless of a particular kind, that cannot be easily obtained. The riders need not be headed so much in as the dwarfs; the object being rather to throw them into a bearing state, than to cause them to push very strong shoots, which would not be fruitful. If they make moderately strong shoots, and if these be well ripened in autumn, a good crop may be expected on them next year. Let the young shoots be laid in, as they advance, at the distance of about nine inches from each other; that is, of the dwarfs. Those of the riders may be laid in considerably closer, it not being intended they shall grow so vigorously as those of the dwarfs." "Unless peach trees be very strong," Mr. Thompson observes, "the shoots should be more or less shortened, according to the vigour of the tree. If this be not attended to, it will be impossible to prevent the bearing wood from becoming naked at the base. Who then could answer for the setting and stoning of blossoms situated at or near the extremity of a three years old branch, having, perhaps, only leaves on the part produced during the last season?"

3690. *The summer pruning* consists in pinching off all fire-right shoots as they appear, and all such as are ill placed, weakly, watery, deformed, or very luxuriant, leaving a leader to every shoot of last year, and retaining a plentiful supply of good lateral shoots in all parts of the tree. If any blank is to be filled up, some conveniently placed strong shoot is shortened in June to a few eyes, in order that it may throw out laterals.

3691. *The fruit is thinned before and after the stoning season.* Abercrombie says, "There should be a preparatory thinning before the time of stoning, and a final thinning afterwards, because most plants, especially such as have overborn themselves, drop many fruit at that crisis. Finish the thinning with great regularity, leaving those retained at proper distances, three, four, or five, on strong shoots; two or three on middling, and one or two on the weaker shoots; and never leaving more than one peach at the same eye. The fruit on weakly trees thin more in proportion."

3692. *Stirring the soil.* The borders are to be pointed and forked up after pruning, and a little well-rotted dung or compost added where deemed necessary. The part of the borders on the outside may, in addition, be covered with dung; and, after forcing is commenced, those in the inside may be occasionally watered with the drainings of the dunghill. (*Kal.*, pp. 324, 438.)

3693. *Time of beginning to force.* "From the rise of the sap," according to Abercrombie, "it occupies, in some sorts, about four months to make mature fruit; in the later varieties, five months; and, when much of winter is included in the course of forcing, the time is proportionally lengthened. To ripen moderately early kinds by the end of May, begin to force on the 21st of December. Little is gained by commencing sooner. But you may put on the glasses a week before, and make gentle fires, admitting a constant stream of fresh air, to get the house ready."

3694. *Temperature.* Abercrombie directs to "begin at 45° min. 45° max. from sun-heat; and rise in a fortnight to 45° min. 50° max. from sun-heat, giving plenty of air; in the progress of the second fortnight, augment the temperature from three to eight degrees, so as to have it at the close up to 50° min. 55° max. from sun-heat, admitting air in some degree daily. When the trees are in blossom, let the heat be 55° min. 60° max. Continue to aim at this till the fruit is set and swelling. When the fruit is set, raise the minimum to 60°, the artificial maximum to 65°, in order to give fresh air: when the sun shines, do not let the maximum, from collected heat, pass 70°, rather employing the opportunity to admit a free circulation of air."

3635. *Air.* A constant stream of fresh air is to be admitted before beginning to force, and plenty of air during sunshine throughout the whole progress of forcing. M'Phail says, when the fruit is set and swelling, "give the house air every day, whether the sun shine or not." Give plenty of air, and keep the house dry, when the fruit begins to ripen. When the intention is to begin to force on the 1st of February, Nicol advises the house to be shut up from the middle of January, admitting plenty of free air through the day. During the first month of forcing, he admits air freely "every day, even in frosty weather, by the ashes, till the flowers begin to expand; after which time by the ventilators, except in fresh weather, till the season become mild. Air should be admitted all this month, to such an extent as to keep down the temperature, in sunshine, to within five degrees of the fire-heat medium; and this in order to strengthen the buds as they break, and that the young shoots may spring in a vigorous manner." Admit large portions of air every day when the fruit is swelling off, except in damp weather, from seven or eight in the morning to five or six in the evening; opening the ashes to their fullest extent from ten till two or three o'clock, giving and reducing gradually, &c.

3636. *Watering and steaming.* "While the fruit is in blossom," Abercrombie observes, "steaming the floors must be substituted for watering over the herb; at the same time, you may water the roots now and then gently, avoiding such a copious supply as might risk the dropping of the fruit to be set. Let the water be warmed to the air of the house."

3637. Nicol says, "newly planted peach-trees should be freely supplied with water at the root throughout the season, in order to promote their growth; and the engine must be applied with force to the branches, for the suppression of the red spider, and refreshing the foliage, generally once in two or three days." In a fruit-bearing house, after the fruit is set, "water should be given pretty freely to the plants at root, once in two or three days; increasing the quantity as the fruit begins to swell, and as the shoots advance in growth. Also, continue the operations of the engine regularly; and do not be sparing, or be afraid to hurt the foliage, if the red spider appear on it. Hit hardest at or near to the top of the house; as it is there he preys most, being fostered by the extreme heat, in which he delights. In looking out for this enemy, therefore, keep your eye particularly on this part. Withhold water from the border, and cease to exercise the engine on the foliage when the fruit is swelling off." (*Kal.* 368. 401.)

3638. *Fumigation*, whilst the trees are in bloom, neither sprinkles nor steams the house, for he "considers that sufficient moisture arises from the earth in the house, at this stage of forcing." (*Hort. Trans.*, vol. v. p. 60.) When the fruit is set, he gives the trees a gentle syringing on a fine morning with clean water, and waters the borders within the house occasionally after the steaming, until the fruit is arrived at full size, and begins to change colour, then all watering should be left off both with the syringe and on the borders.

3639. *Insects and diseases.* The red spider is the grand enemy to peach trees; but they are also attacked by mildew, the aphid, thrips, chermes, and sometimes even by the coccus. "The blight," Abercrombie says, "is caused by small insects, very pernicious both to the trees and fruit in their growth; this is apparent by the leaves curling up, and often by the ends of the shoots becoming bunched and clammy, which retards their shooting. In this case, it is advisable to pick off the infected leaves, and cut away the distempered part of the shoots. Further to check the mischief, if the weather be hot and dry, give the trees a smart watering all over the branches. A garden-engine will perform the watering much more effectually than a common watering-pot, as it discharges the water in a full stream against the trees. Apply it two or three times a week; the best time of the day is the afternoon, when the power of the sun is declining. These waterings will clear the leaves, branches, and fruit, from any contracted foulness; refresh and revive the whole considerably; and conduce greatly to exterminate the vermin." On this passage Mr. Thompson observes, "by the blight, in this place, Abercrombie, no doubt, means the green fly: if so, before ever the leaves be curled up, or the ends of the shoots have become clammy, the remedy should be applied; viz. a slight syringing to damp the leaves, and then a good sprinkling with tobacco-dust." Mr. Swinson advises for the destruction of the aphid, "the application of warm water, sufficiently hot to destroy the aphid, without injuring the tree: more will be thus destroyed than either by repeated applications of the syringe, or by the use of tobacco water. Some recommend picking off the infected leaves, and cutting away the distempered part of the shoots. Two or three applications of warm water will destroy nearly all the insects, and if the plants be afterwards cleared of their dead bodies by a small cable-hair pencil, and then syringed with cold water, they will soon acquire a fresh and healthy appearance."

3640. *Ripening the fruit.* Knight finds that neither peaches nor nectarines acquire perfection, either in richness or in flavour, unless they be exposed to the full influence of the sun during their last swelling, without the intervention of the glass. In consequence, he says, some gardeners take off the lights early before the fruit begins to ripen; but he recommends taking them off only in bright sunshine, and putting them on during rain, and at night to protect the fruit from dews, &c. "When the fruit begins to ripen, which will be about the second week in July, I gradually expose the house to the open air on fine and dry days, by drawing down the lights as much as convenient in the day, and shutting them again in the evening. It is this which gives the fruit both flavour and colour." (*Hort. Trans.*, vol. v. p. 61.)

3641. *Gathering the fruit.* M'Phail advises laying moss or some soft material over the borders, to save those which drop off of themselves. Nicol recommends the peach-gatherer. (*Ag.* 410.) Sir Joseph Banks, quoting from a French author, states that, "peaches are never eaten in perfection, if suffered to ripen on the tree; they should be gathered just before they are quite soft, and kept at least twenty-four hours in the fruit-chamber." (*Hort. Trans.*, vol. I. App.) Williams, of Fitzmaston, says, "Should the season prove wet when the peaches are ripe, they should be gathered, and placed for about two days in a dry airy room before they are eaten." (*Hort. Trans.*, vol. II. p. 113.)

3642. *Ripening the wood.* Abercrombie says, "On account of the fruit of most sorts of peaches ripening somewhat earlier than grapes, and the growth of the shoots stopping sooner than the summer wood of vines, it is not so often necessary to assist the plant in September or October, by artificial heat; but in some of the late kinds, if, by the time the external air is down to 60°, the shoots have not taken a greenish brown tint as high as several eyes from the origin, and if the blossom-buds on these, round when full swelled, are not distinguishable from the oblong wood-buds, apply a little fire-heat, and continue it till the leaves fall."

3643. *Resting the wood.* The management of the peach-house, when at rest, Abercrombie says, "should be nearly the same as for the grape-house, except when there is but one set of frames to serve both an early peach-house and late grape-house; in which case, as soon as the young wood of the vines is perfectly ripened, the glasses should be brought back to the peach-house; for although the fruit of the grape is to be set and ripened in a higher heat, the peach tree, as a plant, is more tender than the vine; and, independently of forcing, comes into blossom about two months sooner."

3644. *Forcing peaches and nectarines by dung-heat.* The following mode is practised at Dagnam Park:—"The house is seventy feet long by eleven feet wide, the front wall being five feet and a half deep from the bottom of the lights, the depth from the roof (there being no upright lights in front) to the ground: about three feet and a half of the bottom of this wall in open brickwork, with a flue in the inside, the top of which is covered with plain tiles. The inside of the house is filled up with earth to within two feet of the bottom of the lights, and the trees planted as near as possible to the front wall, and trained under the lights or wires, in the same way as vines. The back wall of a pine-pit is built of the same height as the front of the peach-house, and three feet distant from it; this, of course, forms a space three feet wide for the hot dung. As soon as I wish to begin forcing, this space is filled with hot dung; the roots, being near the flue, soon begin to feel the warmth, and I sometimes take off a few tiles from the top of the flue, so as to admit the steam from the hot dung into the house; I find this of great advantage, and productive of no

ill effects, until the leaf-bud begins to expand, and if the stream is not then perfectly sweet and moderate, the places left to admit it must be secured. You will, of course, observe, that while this hot dung lining is forcing the peaches and nectarines, it is assisting to work the pines in the pine-pit at the same time, and without any additional expense, there being also a lining at the front of the pine-pit, as well as this one at the back; and when it has become cooled by frequent turnings, I either make cucumber-beds of it, or take it inside the peach-house or vinery. For these five years past, I have never failed in producing an abundant crop of peaches and nectarines by the above method." (*Breeze in Hort. Trans.*, vol. v. p. 219.)

3646. *Forcing the peach-tree in pots.* "All the varieties of the peach and nectarine," Abercrombie observes, "are extremely well suited for forcing in large pots or tubs. Small plants, intended to come in before or after those in the borders, may be excited, in the first stage, in a distinct house; so as the temperature of the pit in which they are brought to finish fruiting be suited to their progress. The compost for plants in cradles ought to be lighter and richer than the mould in the borders." The pots or tubs should be such as not to contain less than a cubic foot of earth; the soil should be lighter and richer than that recommended for the borders, and should be of such a nature as that frequent watering would not render it coagulated or retentive; liquid manure should be plentifully supplied, to make up, in some degree, for the confinement of the roots. They are best forced in a peach-house, but succeed in a vinery or succession-stove; best of all, however, in a pit or Dutch frame, where the temperature can be regulated at pleasure, and where they are near the glass. Great care must be taken to supply them regularly with water, for which purpose some place saucers under the pots; others cover their surface with moss, or, what is better, fresh cow or rotten horse dung. Casing the pots with ropes made of moss is also a very good method, as it not only preserves a uniform degree of moisture, but also of temperature. Of course, the moss must not be watered, especially where the sun could act upon it. This will be obvious, when it is considered how intense a degree of cold may be produced by a bandage of wet cloth on a bottle of wine or water, when exposed to the sun. Cover the bulb of a thermometer with calico, and pour ether upon it, and 30° of cold will soon be produced, on the hottest day in summer.

3646. *Peach trees* fully grown may be taken from the wall, and forced in pits heated by dung. The practice is common in Holland, and has been introduced into England by a Dutch gardener, Mr. Nieman, at Hylands, in Essex. It will be found described at length in the *Gardener's Magazine*, vol. iii. p. 380; but from the quantity of manure which it requires, and the much greater degree of care and labour, requisite for forcing in houses placed against walls, it cannot be recommended for general use.

3647. *Peach trees as standards.* The peach bears remarkably well in the standard form, planted in the middle of a house; and the flavour of the fruit is universally acknowledged to be preferable to that grown on the trellis, from the comparatively free circulation of air.

SECT. IV. Culture of the Cherry-house.

3648. *No fruit is more difficult to force than the cherry.* The blossoms of forced trees are apt to fall off before the fruit is set, and the fruit will keep falling off before and after they are as large as peas.

3649. *Soil.* M^rPhail says, "Take light, sandy, rich, mellow earth, and make a border of it the whole width of the house, and four feet deep." Nicol:—"The border should be from twenty-four to thirty inches deep; the bottom, if not naturally mild and dry, to be drained and paved. The soil should be a sandy loam, or light hale garden-earth, made moderately rich with stable-yard dung well reduced, or with other light compost. If a small portion of lime or a moderate quantity of marl were mixed with it, so much the better. The soil for cherries to be forced in pots or tubs should be considerably richer than the above." Torbrun uses fresh virgin soil and rotten dung. (*Hort. Trans.*, vol. iv. p. 116.)

3650. *Choice of sorts.* M^rPhail, Nicol, and all gardeners, agree in giving the preference to the May-Duke. Nicol says, "None of the other kinds set so well, except the Morello, which I do not hesitate to say well deserves a place: it is a good bearer, and the fruit, when forced, acquires a superior size and flavour." (*Kal.*, p. 295.)

3651. *Choice of plants.* M^rPhail takes standards of different heights in a bearing state; Nicol, clean, healthy, young plants, that have been one or two years in training against a wall; Torbrun, trees eight or ten years from the bud, and selected of such various heights as are best suited to the size of the house.

3652. *Situation of the plants in the house.* M^rPhail and Torbrun plant in rows, beginning with the tallest at the back of the house, reserving the shortest for the front, and letting them come to the south gradually, somewhat in the form in which plants are set in the green-house. (*G. Rem.*, 146; *Hort. Trans.*, vol. iv. p. 116.)

3653. *Time of planting.* According to Nicol and M^rPhail, January and February; to Torbrun, early in the autumn.

3654. *Pruning.* "Trees planted in January may be pruned about the middle or end of March. Dwarfs, planted against the trellis, should be well cut in; that is, each shoot of the last year should be shortened back to three or four buds, that the plants may throw out a sufficiency of young shoots to fill the rail from the bottom. The dwarfs, planted in the border as little standards, need not be headed in so much; as the intention is to have them fruitful, and that they may grow little to wood from the beginning. Their short stubby shoots need not be touched, unless bruised or hurt in transplanting; shortening back the longer and weaker ones only a few inches, according to their strengths. The riders, planted against the back trellis, may be treated very much in the same manner: the sole intention being to obtain a few crops of them while the dwarfs are making wood and filling their spaces. In November following, the trees may be pruned for the succeeding season. In order to produce wood to fill the trellis as soon as possible, the dwarfs should be pretty much headed in. The shoots may be pruned very much in the manner of the trees in the early house, shortening no shoots that are fully ripened, except a few of those at the extremities of the tree, in order to make them throw out others for its full extension upwards next year. November is also the proper time for pruning an established cherry-house, preparatory to forcing for next year." "The circumstance of forced cherry trees making very little wood," observes Mr. Thompson, "renders it expedient that pruning should be resorted to in order to produce a moderate quantity of young shoots and healthy leaves, to generate sap, and induce fresh vigour in the tree: this, and thinning superabundant fruit-spurs, would certainly be a great preventive in regard to the dropping of the blossoms, and failure in the spring of the fruit."

3655. *Summer pruning.* Very little of this is requisite: such water-shoots or breast-wood as arise among the spurs are to be pinched off as they appear; laying in such shoots only of this description, as may be wanted to fill an occasional vacancy. Train in the summer shoots of the dwarfs as they advance, at the distance of about eight or nine inches from each other; and otherwise observe the general rules for pruning cherries on walls and espaliers.

3656. *Stirring the soil.* After pruning, the borders are to be forked up, and a little well-rotted dung, mixed with sand, worked in, if thought necessary. In summer, they may be slightly stirred on the surface, and needed to keep them fresh, clean, and neat, and where a part of the border is outside the house, cover with horse-dung or litter in the early part of the season.

3657. *The time of beginning to force* is sometimes December, but more generally January or February. "Newly planted trees," Nicol observes, "will bear gentle forcing next spring, from the first or middle

of March; which ought to be considered merely as preparatory to forcing them fully, from about the first of February, the third year." Torbrön, if the trees have been removed with good balls, admits of gentle forcing the first spring, but prefers deferring it till the third year. He says, "I have had an abundant crop of fine cherries, from trees which had been planted only a few months before forcing, but would not recommend the risking a whole crop, unless the trees have been longer established." Where cherries are to be ripened early in the season, he "shuts in about the beginning of December, and lights the fires about the third or last week of that month." (*Hort. Trans.*, vol. iv. p. 116.)

3653. *Temperature.* Abercrombie begins at 40°, and throughout the first week, lets the minimum be 40°, and the maximum 45°, giving plenty of air. By gradual advances in the second, third, and fourth weeks, raises the course to 45° max. In strong sunshine, admit air freely, rather than have the temperature above 55°, by collecting the warm air. In the fifth and sixth week, the artificial minimum may be gradually elevated to 45°, but the maximum should be restrained to 45° from fire-heat, and to 55° from sun-heat, until the plants are in flower. After the blossoms are shown, and until the fruit is set, aim to have the heat from the fires at 45° min. 55° max. At this stage, maintain as free an interchange of air as the weather will permit; and when the sun-heat is strong, do not let the temperature within exceed 60°. As the fruit is to be swelled and ripened, the requisite heat is 60° min. 65° max.

3654. *Watering.* M'Phail waters occasionally at the root and over the top, till the trees are in blossom; but when the stones in the fruit are become hard, the trees may be washed all over occasionally with clean water, not too cold. "Let this be done in a fine sunny morning, and take care not to spatter the fruit with any kind of dirt. In April, when the cherries are grown large, give the border a good watering now and then, which will enable the trees to swell their fruit to a good size: by keeping them in a healthy growing state, the fruit will be fine-flavoured, and the trees will make strong flower-buds for the ensuing season. If the fruit are not ripening, wash the trees occasionally, in a fine sunshine morning, with sweet clean water." Torbrön says, "From the time the flower begins to open, till the fruit is completely stoned, the soil should be but sparingly watered; but when the stoning is effected, water may be applied to the roots freely, till the fruit is nearly ripe." (*Hort. Trans.*, vol. iv. p. 119.)

3655. *Air.* "In forcing the cherry, it is essential to continue a free renovation of air; always sustaining the minimum heat in the different stages. The blossoms will sometimes fall abortive, or the young fruit drop off after setting, from no other cause than a stagnant atmosphere." At first beginning to force, M'Phail gives plenty of air night and day. In February, when the trees are in blossom, "let air be at the house day and night; and as much as you can when the fruit are swelling off."

3656. *Birds and insect depredators.* The cherry is a favourite food for sparrows and other hard-billed birds, which are very likely to carry their attacks even into the cherry-house, as soon as the fruit there begins to ripen: to prevent their depredations, the trees should be covered with netting; the birds may be scared away by miniature windmills, &c. on the outside. The insect depredators both on the fruit, the blossoms, and the leaves, are many, and require various modes of treatment. The tender leaves of the cherry tree often become rolled up, and the interior inhabited by the caterpillars of two or three small moths; but whether these are produced from eggs deposited very early in the spring, or late in the preceding autumn, has not been ascertained; nor have the perfect insects been scientifically examined. The best remedy for checking this evil in its commencement consists in dressing the trees three or four times, at intervals of from ten to fifteen days each, with powdered lime, in the manner recommended for apples. The first dressing should be given as soon as the bud-leaves have expanded, and before the young larvae are sufficient sheltered within the folds to be screened from the effects of the lime. Where the trees are few and low these and other small caterpillars may be removed by hand-picking. Another larva commences its devastations later; and usually appears when the trees are in blossom. There are two or three kinds of early spring wasps, not much more than half the size of the common autumnal species, which, instead of producing injury, are of the greatest service to gardens. If attentively watched, these industrious little creatures will be seen, on a sunny day, flying about and searching among the leaves of fruit trees for small caterpillars and other insects, of which they devour vast numbers. The cherry-house, as the season advances, may be smoked every seven or ten days. Flies and other insects, which feed upon the fruit, may be enticed by honey water and other sweets, put into glass phials, and suspended near or upon the branches.

3657. *Nicot*, after every winter pruning, washes the trees over with the mixture of soap, sulphur, &c. already mentioned (3651.), and in spring and summer waters over the leaves, picks off grubs, and fumigates, like M'Phail. Torbrön fumigates for the black fly, and picks off the grub keep for some time on the trees, provided the birds can be kept from them. Keep the house, for this purpose, dry, cool, and well aired. (*Gard. Remem.*, 246.)

3658. *Exposing the wood.* This, according to all the authors quoted, may be done from the time the fruit is gathered, till within a week or ten days of the recommencement of forcing. The glass should be entirely taken off, unless the cherry-house is in part used for some other purpose, to which this practice would be injurious.

3659. *Forcing cherry trees in pots.* M'Phail and Nicol concur in approving the very general practice of planting cherry trees in pots; in which, or in tubs of a foot or fifteen inches diameter, they may be successfully forced. "Three or four dozen good plants well managed in this way, would give a deal of fruit; which might be had in succession for a considerable length of time, by dividing the plants into three or four classes or divisions, and shifting them from one compartment to another. In January, the first twelve trees may be placed (from the open air, of course) in the green-house or conservatory. If they be one, or in a peach-house now at work; placing them in the coolest part of the house, but in the full light, and where they may have plenty of air. They must be duly attended to with water at the root; and be frequently syringed at top, generally once in two days. The pots being occasionally watered with the drainings of the dunghill would add much to the vigour of the plants: there is no method of manuring more effectual, or so easily accomplished. The plants may remain here till the fruit be fairly set, the stoning over, and all danger of dropping be passed. They may then be placed in a vinery or stove to ripen off, where they would come in early, and be very high-flavoured, if placed near the light, and so as that they might have free air daily. In February, a second and third season should be taken in, and a fourth in the beginning of March, and each similarly treated." (*Kalend.*) "It is very common with early forced cherry trees to bear a second crop late in the same season." (*Hort. Trans.*, vol. iii. p. 367.)

3660. *Forcing by a temporary structure.* Torbrön observes, that, "where a portion of wall (especially with a southern aspect), already well furnished with May-dukes, perfectly established, and in a bearing state, can be spared for forcing, a temporary glass case may be put up against it; the sue may be built on the surface of the border, without digging, or sinking for a foundation; neither will any upright glass or front wall be requisite; the wooden plate on which the lower ends of the rafters are to rest may be supported by piles, sunk or driven into the soil of the border, one pile under every, or every alternate, rafter. The space between the plate and the surface of the soil should be filled by boards nailed against the piles, to exclude the external air, for the plate must be elevated above the level of the surface from eighteen to thirty inches, or whatever height may be sufficient to let the saabes slip down, in order to admit fresh air. I believe this to be an uncommon structure, and it may perhaps be objected to; but I am confident that it will suit well for cherries, for I have constructed such places even for forcing peaches with good success, as well for maturing and preserving a late crop of grapes." (*Hort. Trans.*, vol. iv. p. 117.)

SECT. V. *Culture of the Fig-house.*

3667. *A house for forcing the fig* is seldom built expressly for that purpose; partly from there being no great demand for the fruit in most families, and partly because figs are generally forced in pots or tubs placed in the peach or cherry-house, and managed as these trees. The fig tree, when forced, is very apt to cast its fruit before it is half swelled.

3668. *The soil for fig borders, or plants in pots, is in all respects the same as that for the cherry.*

3669. *Choices of sorts, &c.* Thompson recommends the following:—

Fragrans.

Figus blanche.

Brown Turkey.

Such plants as are two or three years trained, either as wall or dwarf standards, are to be preferred. Their situation in the house is generally against a back wall trellis.

3670. *Pruning.* Figs are to have a spring and summer pruning; both of which, Nicol observes, may be comprised in one, by rubbing or pinching off the infant shoots; thought necessary to be displaced, in order to give the tree air, and strengthen such as remain. The summer pruning, or rather thinning, consists chiefly in keeping them moderately thin of leaves, so as not to overshadow the fruit. Fig trees, intended to bear fruit abundantly, should never be allowed to produce suckers, or any shoots from the main stem, within eighteen inches of the ground; fan-training is in general the best method, and the points of the young shoots may be turned downwards, where it can be done without producing fracture, or inducing them to throw out shoots by the strain requisite for this purpose.

3671. *Stirring the soil, &c.* After the gathering of the fruit, the borders are to be forked up and manured, if necessary, as in the cherry-house, and in summer weeded and refreshed.

3672. *The time of beginning to force* is generally the same as that for the cherry or peach-house: December, January, or February.

3673. *Temperatures.* "From the leafing time," Abercrombie observes, "till the ripening of the fruit, the fig requires a temperature between that scale which is proper for the peach and that for the cherry." M'Phail says, "They require a greater degree of heat than the cherry." When bringing forward their fruit, they will bear a good strong heat, if care be taken to keep a free circulation of air moving out of and into the house. (*G. Rem.*, p. 167.)

3674. *Water.* Fig trees in a house, and especially those in pots, require abundance of water in the stages suitable for watering fruit trees. (*Abercrombie.*) M'Phail says, "The border in which fig trees grow, should be kept sufficiently watered, till May, when watering over the leaves may be commenced."

3675. *Air.* When the figs are planted under glass, Miller observes, "The heat should not be too great, nor the glasses or other covering kept too close, but at all times, when the weather is favourable, a good share of free air should be admitted." In this respect the fig does not greatly differ from the vine, though it will thrive with less air than any other fruit tree. (*Diet. in loco.*) In summer, as the fruit advances, water even in that part of the border which is without the house. Refrain from watering over the leaves and fruit, when the latter begin to ripen. (*G. Rem.*, p. 192.)

3676. *Insects.* Very much pains, Nicol observes, should be taken to suppress the red spider on the foliage of figs; whether by the engine, syringe, or by frequently brushing with a painter's sash tool, the under sides of the leaves, "in order to destroy his webs, which are there thickly woven." Few other insects annoy the fig, except sometimes the coccus or scaly insect; which is destroyed by washing with soap-suds and sulphur, or the liquor recommended for destroying that insect on pines. (*Kalendar*, 319.)

3677. *Gathering the fruits.* Figs begun to be forced in January, Nicol states, will be ripe about the end of June and July. "If fig trees in a forcing-house," Miller observes, "are properly managed, the first crop of fruit will be greater than upon those which are exposed to the open air, and will ripen six weeks or two months earlier, and a plentiful second crop may also be obtained, which will ripen early in September." To preserve the bloom, gather with the peach-gatherer. They may be preserved a short time on the trees, by covering with mats from the sun, and admitting abundance of air among the branches. This alludes to what is called the second crop, or that produced from the wood of the current year. Sometimes a few of the first crop ripen, but in general it is not to be relied on. Alton, Sir Joseph Banks informs us (*Hort. Trans.*, vol. 1. p. 253.), "has for several years practised the forcing of figs in the royal gardens of Kew, with great success, and his chief dependence is on the second crop."

3678. *Exposure of the wood.* After the fruit is gathered, the glasses may be removed, till winter sets in, when they must either be put on, or the trees covered with mats or straw, to protect them from the frost.

3679. *Forcing the fig in pots.* M'Phail says, figs may be ripened at an early season, by planting them in pots, and setting them into a hot-house or forcing-house. "The plants should be low and bushy, so that they may stand on the curb of the tan-bed, or they may be plunged in a gentle tan-bed, or in a bed of leaves of trees. The best way to propagate plants for this purpose is to take layers or slips which have good roots: plant them in pots in good earth, one plant in each pot, and plunge them in a bed of tan or of leaves of trees, in which is a very gentle heat: a brick bed will answer the purpose very well; or they will do in the forcing-house, if there be room for them. Let them be put into the house in the latter end of February or beginning of March, and keep them sufficiently watered. When they are two years old, they will be able to bear fruit; the pots in that time having become full of roots. In the month of November or December, turn the plants out of the pots, and with a sharp knife pare off the outside of the ball, by which the plant will be divested of its roots matting against the inside of the pot: then place them into larger pots, filling up the vacancy round the balls with strong loamy earth. During the winter, let them be kept in the green-house, or in a glazed pit of a like temperature, till the month of February; then set them into the forcing-house, where it is intended they shall ripen their fruit. In this manner let them be treated every year, which will be a means of preventing the fruit from falling off before it come to maturity." (*G. Rem.*) Nicol says, fig trees kept in pots or tubs may be treated very much as directed for cherries. Two dozen, or thirty plants, would be a good stock for that purpose. The first division might be placed in a cherry or peach house about the middle or latter end of January. (*Kalendar*, p. 319.)

SECT. VI. *Culture and Forcing of the Cucumber.*

3680. *To produce cucumbers at an early season*, is an object of emulation with every gardener; and there is scarcely any person, not even the humblest tradesman, as M'Phail observes, who has not his cucumber-bed in his garden. We shall follow our usual plan, and lay before the reader a systematic view of the practices of the most approved gardeners in the culture of this plant. Cucumbers are forced in hot-beds, pits, and hot-houses; and the heat of fire, hot water, steam, and dung has been applied to their culture; but dung, as the author last quoted observes, is the only thing yet found out, by the heat of which the cucumber may be advantageously cultivated.

3681. *Soil.* Cucumbers, like every other plant, will grow in any soil, though not with the same degree of vigour, provided they be supplied with a sufficiency of heat, light, water, and air. Abercrombie, for early forcing, recommends a mould or compost of the following materials:—"One third of rich top-spit earth, from an upland pasture, one half of vegetable mould, and one sixth of well decomposed horse-dung, with a small quantity of sand. M'Phail used vegetable mould, made from a mixture (accidental) of the leaves of "elm, lime, beech, sycamore, horse and sweet chestnut, spruce and Scotch fir, walnut, laurel, oak, evergreen oak, ash, &c." and among them withered grass, and weeds of various sorts. "This vegetable mould," he says, "without a mixture of any thing besides, is what I used for growing cucumbers in, and, by experience, I found it preferable to any other moulds, earths, or composts whatever, either in my new method of a brick bed, or in the old method of a bed made of hot dung. Alton gives the following as the compost used in the Kew garden:—"Of light loam, a few months from the common, one third part; the best rotten dung, one third part; leaf-mould and heath-earth, of equal parts, making together one third part: the whole well mixed for use." (*Hort. Trans.*, vol. ii. p. 282.) Mills (*Hort. Trans.*, vol. iii. p. 148.) states, that the soil he uses "is half bog or black mould, got from a dry heathy common, and half leaf-mould; after lying twelve months in a heap, the compost is fit for use."

3682. *Time of beginning to force.* Abercrombie says, "Managers who have to provide against demands for early cucumbers, must raise the seedlings from twelve to ten weeks before the fruit will be required, according to the length of the days in the interval. In proportion as the entire course embraces a greater part of midwinter, the liability of failure from obstacles in the weather will be greater. The last fortnight in January, or first week of February, is a good time for beginning to force the most early crop. In the subsequent months, both main and secondary crops may be started as required; and will come forward more freely. To have a constant succession, seedlings should be originated twice a month. As the course of forcing more coincides with the natural growing season, the length of it will be reduced to eight, seven, or six weeks."

3683. *Sorts.* The short prickly for very early fruit, and the long prickly kinds for the chief early and main summer crops, are generally recommended. M'Phail prefers "the green cucumber with black prickles, as best for forcing. When fit for table, it runs from six to nine inches long, and, when ripe, is about eighteen or twenty inches long." Other varieties, such as Walker's, attain the length of twenty, twenty-four, or even twenty-seven inches, in a green state, and fit for the table.

3684. *Choice of seed.* Seed from two to four years old is preferable to newer seed, which is more apt to run luxuriantly in vine, and the plants from which do not show fruit so soon or so abundantly as those from seed of a greater age. Seed which has been kept more than four years is sometimes found to be too much weakened.

3685. *Forming the seed-bed.* "A one-light frame," Abercrombie says, "will be large enough for ordinary purposes. Choose a spot sheltered part of the melon-ground, and form a bed for a one-light frame. When high winds are suffered to blow against a cucumber-bed, they have a very powerful effect on it; for, in that case, the heat in a short time will not only be greatly abated, but also forced and driven into the corners of the frames, and, consequently, some parts thereof are rendered too cold, whilst other parts are made too warm; and, of course, the plants are all equally endangered, retarded in their growth, and perhaps some, if not all of them, totally destroyed. Therefore, when a cucumber-bed is about to be built, the first object of consideration should be, to have it, as far as possible, sheltered from the high winds and boisterous stormy weather. Having put on the frame, and tailed till the bed is fit for moulding, lay in five or six inches depth of the proper earth or compost." M'Phail makes up a bed of good dung, four feet high, for a one-light box.

3686. *Sowing.* Abercrombie sows some seeds in the layer of the earth, which he spreads over the bed, putting them in half an inch deep. He also sows some seeds in two, three, or more small pots of the same kind of earth, which may be plunged a little into that of the bed. M'Phail sows in a pot filled with rich earth, covers about two inches thick, and sets the pots on the surface of the naked dung on the bed.

3687. *Raising plants from cuttings.* M'Phail says, "Instead of raising cucumber plants from seed, they may be raised from cuttings, and thus kept on from year to year in the following manner: the method of striking them is this; take a shoot which is just ready for stopping, cut it off just below the joint behind the joint before which the shoot should have been cut, but smooth the lower end of the shoot or cutting, and stick it into fine leaf or other rich mould about an inch deep, and give it plenty of heat, and shade it from the rays of the sun till it be fairly struck. By this method, as well as by that of laying, cucumber plants may readily be propagated." Mearns, when gardener at Shobden Court, near Leominster, propagated his cucumber plants for a winter crop in this way, and found, "that the plants raised from cuttings are less succulent, and therefore do not so readily damp off, or suffer from the low temperature to which they are liable to be exposed in severe weather; that they come into bearing immediately as they have formed roots of sufficient strength to support their fruit, and do not run so much to barren vine as seedlings are apt to do." He advises the cuttings to be taken from the tops of the bearing shoots, and planted in pots nine inches deep, half filled with mould. They should then be watered, and the tops of the pots being covered with flat pieces of glass, they should be plunged into a gentle bottom heat. "The sides of the pot act as a sufficient shade for the cuttings during the time they are striking, and the flat glass, in this and in similar operations, answers all the purposes of bell-glasses. The cuttings form roots, and are ready to pot off in less than a fortnight." (*Hort. Trans.*, vol. iv. p. 411.)

3688. *Temperature of the seed-bed.* Abercrombie says, "The minimum heat for the cucumber is 50° at the coldest time of night; in the day-time 60° is sufficient for the maximum; because air admitted when the sun has great influence will do more good than a higher heat." M'Phail says, "If it were possible to keep the heat in the frames always to 80°, with the concurrence of proper air and moisture, I am of opinion that that would be a sufficient heat for the production of the cucumber."

3689. *Treatment till removed to the fruiting-bed.* After sowing, Abercrombie continues the glasses on the frame; giving occasional vent above for the steam to evaporate, that the heat may not become too violent. "The plants will be up in a few days, when it will be proper to admit air daily; but more guardedly, at the upper ends of the lights, which may be raised from half an inch to an inch or two, according to the temperature of the weather, that the plants may not draw up weak, or be injured by the steam. In frosty weather, part of the mat should be hung over the aperture. "When the plants are a little advanced," says Abercrombie, "with the seed-leaves about half an inch broad, take them up, and prick some in small pots of light earth, previously warmed by the heat of the bed. Put three plants in each pot, and insert them a little slopingly, quite to the seed-leaves. Plunge the pots into the earth; and prick some plants also into the earth of the bed. Give a very little water just to the roots: the water should be previously warmed to the temperature of the bed. Draw on the glasses; but admit air daily, to promote the growth of the plants, as well as to give vent to the steam rising in the bed, by tilting the lights behind, from half an inch to an inch or two high, in proportion to the heat of the bed and temperature of the weather. Cover the glasses every night with garden-mats, and remove them timely in the morning. Give two or three water, once in two days, or daily, according to the season, a very light watering. Keep up a moderate lively heat in the bed, by requisite linings of hot dung to the sides."

3690. *Forming the fruiting-bed.* Abercrombie directs, "When the plants are advanced in some tolerable stocky growth, that is, when the first rough leaves are two or three inches broad, or when the plants have been raised about five weeks, transplant them to a larger hotbed, with a two-light or three-light frame, sometimes called the *ridging-out bed*." Form the bed on general principles, of superficial extent

according to the frame it is to support, leaving from four to six inches all round, and fixing the height according to the season. Thus, in January, Abercrombie directs the bed to be "three feet nine inches high in front; four feet six inches at the back; and six inches larger than the frame all round: in February, three feet three inches high at the front; four feet at the back; and four inches to spare round the frame: in March, three feet high in front; three feet six inches at back; and four inches beyond the frame every way. Put on the frame and glasses presently after the body of dung is built up, to defend it from the weather. At the same time raise the glasses a little at the upper end, in order both to draw up the heat sooner, and to give vent to the rising steams, until the bed is reduced to a regular temperature. In connection with the thermometer, the vivimeter may be assisted to form a judgment of this, by *tying sticks*, that is, two or more sharp-pointed smooth sticks, thrust down in different parts of the bed; which at intervals may be drawn up, and felt by a quick grasp of the hand. The smell of the vapour is also a criterion: it should not be strong and fetid, but mild and sweet. While taking care that the heat is not so intense as to burn the mould when applied, let it not be suffered to evaporate unnecessarily by delay. If the temperature appear not sufficiently high, take off the frame, and add another course of dung." M'Phail, when he fruits the cucumber on dung-beds, begins to make preparations for the fruiting-bed about three weeks before the plants are ready to be finally planted out. The dung collected, after being well worked, is "made up into a bed of about four or five feet high, and the frames and lights set upon it. It is afterwards suffered to stand for a few days to settle, and until its violent heat be somewhat abated; and when it is thought to be in a fit state for the plants to grow in, its surface is made level, and a hill of mould laid in just under the middle of each light, and when the mould gets warm, the plants are ridged out in it. After this, if the bed has become perfectly sweet, and there be heat enough in it, and the weather prove fine, the plants will grow finely."

3691. *Moulding.* "As soon," Abercrombie observes, "as you deem the bed to have a lively, safe, well-tempered heat, which may be in a week or ten days after building, proceed to mould it. Earth the middle of each light, laying the mould so as to form a little hill, from six to ten inches in height, according as seed is to be sown, or plants from the seed-bed inserted. Then earth over the intervals between the hills and the sides of the frame only, from two to four inches, as a temporary measure, until the heat is ascertained to be within safe limit. After the whole bed has been some time covered, examine the mould: if no traces of a burning effect appear, discoverable by the mould turning of a whitish colour and caking, it will be fit to receive the plants. But if the earth appears burnt, such part should be replaced by fresh, and vacuities made to give vent to the steam, by drawing away part of the hills from the centre. When the bed is in fit order, level the mould to six inches deep, if to receive seeds; but to receive plants in pots, the hills of earth should be kept ten inches deep or more. If there be any motive for haste while an excess of heat is to be suspected, the danger from burning may be obviated by leaving vacancies in the top mould; by placing patches of fresh cow-dung or decayed bark to receive the pots of seeds or plants; and by boring holes in the bed with a round pole sharpened at the end, which holes should be filled up with hay or dung when the heat is sufficiently reduced. Some persons place a layer of turf with the sward downwards between the dung and the mould: but this, if ever expedient, is only in late forcing; for in winter the full effect of a sweet well tempered heat is wanted, much of which, by being confined at top, may be forced out at the sides."

3692. *Planting out.* Abercrombie, when the temperature is ascertained to be right, brings the plants in their pots; turns over the hills of mould, forming them again properly, and then proceeds to planting. "Turn those in pots clean out, one pot at a time, with the ball of earth whole about the roots; and thus insert one patch of three plants which have grown together, with the ball of earth entire, into the middle of each hill, earthing them neatly round the stems. Also any not in pots, having been pricked into the earth of the bed, if required for planting, may be taken up with a small ball of earth, and planted similarly. With water warmed to the air of the bed, give a very light watering about the roots, and shut down the glasses for the present, or till next morning. Shade the plants a little from the mid-day sun a few days, till they have taken root in the hills, and cover the glasses every evening with large mats, which should be taken off in the morning."

3693. *Temperature for fruiting plants.* Abercrombie's minimum is 59°, and maximum in the daytime 65°, the same as for the seed-bed. M'Phail says, "It appears, that during the winter and spring months, the medium heat of the air in the frames should be 75°, and the medium heat of the mould 80°. But when the sun shines, the heat of the air in the frames is often raised to a much higher degree; so that reckoning this heat, the medium for that of the air of the frames may be 80°." (*Gard. Review*, p. 53.)

3694. *Linings.* The requisite degree of heat Abercrombie is careful to support in the bed, when declining, "by timely linings of hot fresh dung, which may be applied to the sides, fifteen or eighteen inches in width, and as high as the dung of the bed. Generally line the back part first, and the other in a week, or from ten days to a fortnight after, as may seem necessary by the degree of heat in the bed. Sometimes, if the heat is fallen abruptly below the minimum degree, it may be proper to line both sides moderately, at once, to recover the temperature sooner and with better effect; but be particularly careful never to over-line, which would cause a too violently renewed heat and steam in the bed. The dung for linings must be fermented, as in first building a bed."

3695. *Covering.* This must be nightly performed till June; proportioning the warmth of the cover to the heat of the air in the bed, and that of the external air. Mats are laid next the glass; on these a layer of hay, and over this mats, made fast by boards, but not hanging over the linings. M'Phail says, "My method of covering up was as follows: in the first place, I laid clean single mats on the lights, in length over the sashes on or above the linings, for that would be the means of drawing the steam into the frames another covering of single mats, upon which were laid two, and sometimes three or four, rows of boards, to prevent the covering from being blown off by the winds. The mats laid on next to the glass are merely plants. If the bed be high in covering up, steps or short ladders must be used by those whose office it is to cover and uncover the linings, and great care must be taken not to break or injure the glass."

3696. *Air.* Abercrombie directs to "admit air every day, when the weather is moderate, without much wind; and always more freely in sunny days than when cloudy and cold, or frosty. Open the lights raising it by degrees equal with the top of the hills, all in level order, from eight to ten inches thick. 3697. *Trussing.* To force the cucumber into early fruit, Abercrombie directs to "stop the runners as soon as the plants have made two rough leaves: as the bud that produces the runner has already started, it may be as the second rough leaf, it may be cut off or picked out, or, if the runner has already started, it may be pinched off close. This is called *stopping* at the first joint, and is necessary to promote a stronger stalky growth, and an emission of fruitful laterals; and from these, other prolific runners will be successively

3697. *Water.* Give necessary watering, with water warmed to the air of the bed, mostly in the forenoon of a mild day, in early forcing; and in a morning or afternoon, in the advanced season of hot sunny weather.

3698. *Earthing.* When the first heat of the bed is moderated, add more earth between the hills; raising it by degrees equal with the top of the hills, all in level order, from eight to ten inches thick.

3699. *Trussing.* To force the cucumber into early fruit, Abercrombie directs to "stop the runners as soon as the plants have made two rough leaves: as the bud that produces the runner has already started, it may be as the second rough leaf, it may be cut off or picked out, or, if the runner has already started, it may be pinched off close. This is called *stopping* at the first joint, and is necessary to promote a stronger stalky growth, and an emission of fruitful laterals; and from these, other prolific runners will be successively

produced. The vines, without the process of stopping, would generally be both weaker, and so deficient in fertile runners, that they would sometimes extend two or three feet, without showing fruit. When plants which have been once stopped have extended the first runners to three joints without showing fruit, they are to be again stopped, for the purpose of strengthening the plant, and disposing it for bearing. As fertile runners extend, train them out regularly along the surface, fastening them down neatly with pegs."

3700. *Upright training.* Cucumber-plants being climbers, by means of their tendrils, some branchy sticks being placed to any advancing runners, they will ascend and produce fruit, at a distance from the ground, of a clean growth, free from spots, and well flavoured.

3701. *Setting the fruit.* "The cucumber," Abercrombie observes, "bears male and female blossoms distinctly on the same plant. The latter only produce the fruit, which appears first in miniature, close under the base, even before the flower expands. There is never any in the males; but these are placed in the vicinity of the females, and are absolutely necessary, by the dispersion of their farina, to impregnate the female blossom; the fruit of which will not otherwise swell to its full size, and the seeds will be abortive. The early plants under glass, not having the full current of the natural air, nor the assistance of bees and other winged insects to convey the farina, the artificial aid of the cultivator is necessary to effect the impregnation. At the time of fructification, watch the plants daily; and as soon as a female flower and some male blossoms are fully expanded, proceed to set the fruit the same day, or next morning at farthest. Take off a male blossom; detaching it with part of the footstalk. Hold this between the finger and thumb; pull away the flower-leaf close to the stamens and anthers or central part, which apply close to the stigma or bosom of the female flower, twisting it a little about, to discharge thereon some particles of the fertilising powder. Proceed thus to set every fruit, as the flowers of both sorts open, while of a lively full expansion; and generally perform it in the early part of the day; using a fresh male, if possible, for each impregnation, as the males are usually more abundant than the female blossoms. In consequence, the young fruit will soon be observed to swell freely. Cucumbers attain the proper size for gathering in about fifteen, eighteen, or twenty days from the time of setting; and often in succession, for two or three months or more, in the same bed, by good culture. The above artificial operation will be found both necessary and effectual in forcing the cucumber, between the decline of autumn and May, while the plants are mostly shut under glass. In plants more freely exposed to the open air in the increasing warmth of spring, and having the full open air in summer, from June or July till September, the impregnation is effected mostly or wholly by nature. The male flowers, being by some ignorantly denominated false blossoms, are often plucked off as useless, under a notion of strengthening the plant; but this should not be generally done. Where crowded too thick in clusters, some may be thinned out moderately; but their agency being absolutely necessary in fertilising the females, they should only be displaced as they begin to decay, except where they are superabundant."

3702. *Gathering the crop.* Cucumbers are used green or unripe, and before they have attained their full size. They are cut and gathered when four, five, six, or eight inches long, according to the kinds. To this size they attain in ten days, or a fortnight, in the best part of the season.

3703. *To save seed.* Select some best summer fruit, from good productive plants; which permit to continue in full growth till they become yellow. Then cut them from the vine, and place them upright on end, in the full sun, for two or three weeks; when they may be cut open, and the seed being washed out from the pulp, spread it to dry and harden: then put it up in papers or bags for future sowing. It will remain good many years: and seed of three or four years' keeping is preferable for early frame crops.

3704. *Cultivation of the cucumber in a fixed pit.* Nicol says, "Those who would have cucumbers on the table at Christmas (a thing sometimes attempted) will find it more practicable, and less troublesome, if the plants be grown in a fixed pit, in the manner of late melons, than if they grow on a common hot-bed. In this case the cucumbers should take place of the melons planted in this compartment in July, and which will, by the middle or end of the month, have ripened off all their fruit of any consequence."

3705. *Cultivation of the cucumber in M'Phail's brick-bed or frame.* "When I used," observes M'Phail, "to cultivate cucumbers on a dung-bed, the fruit were sometimes watery and ill-tasted; but after I began to cultivate them on a brick-bed, the fruit were constantly firm and well-flavoured; which is certainly occasioned by the goodness and wholesomeness of the food with which the plants are fed or nourished."

3706. *The chief advantages of M'Phail's frame are stated to be:—*

That the coldest place in the bed is exactly in the centre of each pit, from which centre the heat increases on each side to the linings where the heat begins. The plants being inserted, he says, "in this centre, or coldest part of the bed, their roots can never be hurt by the heat increasing on each side gradually, being in every respect suitable for their increase and extension. The heat in the centre of each pit, just where the plants are first placed, seldom rises higher than to about 80° or 85°, nor does it ever rise higher in any part of the pits than about 96° or 97°; nor do I believe it ever can be raised higher than that, without scorching the plants by top heat or heated air: whereas, in a bed made of dung, the heat in the centre of the bed, under the mould in which the plants are planted, frequently arises to above 120°, when, at the same time, the air in the frames can scarcely be kept up to a proper degree of heat: this frequently happens in cold weather in winter. The scorching heat of a hotbed of horse-dung, when too hot for plants, is equal to 130° and more, and hereabout is probably the heat of blood in fever."

The dung requires no more working than what is necessary to bring it to and keep it in a proper degree of heat, and to let some of its more rancid qualities pass off by evaporation; and as soon as the heat rises in the linings, it circulates in the flues, and warms every part of the bed; whereas the dung for making a common cucumber-bed must be turned and worked, and lie till, by fermentation, its rank qualities be evaporated, and its violent heat be somewhat diminished. This, as already noticed, is a very great advantage.

The linings retain the heat longer than the linings of a dung-bed do, and that because the flues are constantly full of steam; but, a dung-bed having little or no vacuum for the retention of the steam, the steam of the linings of it is perhaps more immediately evaporated, and consequently the heat of the linings is sooner exhausted than the heat of the linings of the brick-bed.

In the course of the winter a dung-bed sinks so low, that it becomes difficult sometimes to get a proper heat raised in the linings; but the brick-bed being always of the same height, such difficulty can never happen.

A brick bed may be built and set to work immediately; the heat of the linings will dry the lime of the joints of the bricks. The evaporation in the frames, from the moist lime of the joints of the brickwork, has no bad effect on the plants; but when a bed is set to work before it be dry and steady, great care must be taken not to injure the brickwork in filling up the pits.

All the materials of the brick-bed are clean and sweet; and the flues being made perfectly close, no tainted or bad-smelling air can get through them into the bed, so that it is of little or no concern whether the dung of the linings be sweet or otherwise, or whether the linings be made of dung, or of any thing else, provided there be a sufficient heat kept in them, and no pernicious steam be drawn in among the plants by the current of air. The plan of M'Phail's frame has already been given and described. (3604, and fig. 545.)

3707. *Cultivation of the cucumber in stoves.* "Cucumber-plants," M'Phail observes, "will grow in a hot-house where the pine-apple is cultivated; but they will not be very long-lived there, for that is not a healthy climate for them." In August, sow the seeds in boxes filled with vegetable or other light earth,

and place them on shelves in the back side of the hot-house, where the sun may shine on them in the short days. They may, perhaps, produce a few fruit in the month of December or January. (*Gard. Rem.*, p. 301.)

3708. *Atton's method of raising cucumber plants in August, with a view to their being fruited in the stove through the winter, is as follows:—*

3708. *The plants being raised on a well-prepared one-light hot-bed; when the cotyledons or seed-leaves became nearly of full growth, the plants were potted out two into each pot, known to gardeners about London by the name of upright thirty-twoes. When these pots became filled with roots, the plants were again shifted into larger ones, called sixteens, and removed from the seed-bed into a three-light frame, with a sufficient bottom-heat to allow a considerable portion of air being given day and night, both in the front and back of the frame. About the middle of September, the plants having again filled their pots with roots, and become stocky, were taken from the frame to the stove, and after a few days received the last shifting into larger pots of the following dimensions:—at the top fourteen inches over; the bottom ten inches across, and twelve inches deep, all inside measure; each pot, at equal distances apart, having three side-drain-holes near the bottom, and a larger one in the centre of the bottom, and containing about three pecks of solid earth. The plants were fruited in a pinery. On the front edge of the back flue of this stove, a fascia-board, six inches deep, was affixed, the whole length of the building, forming all along a trough or enclosure for a reserve of compost after the exhaustion of the mould in the pots had taken place. The pots were now placed in regular order upon the mould-trough over the flue, at three feet apart, and remained in this station for good, for succession. A setting of the second sowing was placed upon the end flues of the house; underneath each pot was set an upright circular garden-pan, six inches deep, and fourteen inches diameter, which being filled with earth, the pots were plunged therein about two inches deep, and the drain-holes, being sufficiently covered with mould, served as outlets to the roots. The fire-heat of the stove was kept day and night at 60° to 65° Fahrenheit's thermometer, varying only a few degrees when the sudden influence of sun or steam produced an additional glow of climate. The plants being now established and vigorous, required stopping for laterals and fruit; and these second and third lateral shoots in their turn were stopped also, and the blossoms from time to time set, as usual, for succession of supply. Waterings were necessary only when the surface of the earth was evidently dry, and light sprinklings of soft water, tempered in the stove, were occasionally given over the leaves of the plants and path with good effect. Steam from a well-regulated flue was considered always favourable to the cultivation, but applied sparingly on account of its scalding effect upon the leaves when the vapour proved over-heated. For the mildew, flower of brimstone, coloured leaf-green by a little soot, has been applied with the best success in all stages of the disease, and copious fumigations of tobacco were used for the destruction of the several species of the aphid tribe. Under this simple practice, winter cucumbers have been produced abundantly in the months of October, November, December, and part of January, in all the royal gardens of His Majesty during a series of years.*

3710. *Growing the cucumber under hand-glasses. The following method is given by M^r Phail as that generally practised:—*"The seeds are sown some time about the middle of April in a cucumber or melon bed, and when they come up, they are potted out into small pots, two or three plants in each pot, and are kept properly watered, and stopped at the first or second joint. About the middle of May, a warm situation, where the mould is very rich, is pitched on, and a trench is dug out about two feet deep, three feet broad, and the length is proportioned according to the number of lights it is intended for. This trench is filled with good warm dung, and when the dung is come to its full heat, it is covered over with eight, ten, or twelve inches deep of rich mould. The glasses are then set upon it about three feet distant from each other, and when the mould gets warm under them, the plants are turned out of the pots with their balls whole, and plunged in the mould under the glasses, and a little water given them to settle the mould about their roots, the glasses set over them, and after they have made roots, and begin to grow, in five days they are raised a little on one side to let the plants have the free air; and as the weather gets warmer and warmer, air is given more plentifully, to harden the plants, so that they may be able to bear the open air, and run from under the glasses. When the plants begin to fill the glasses, they are trained out horizontally, and the glasses are set upon bricks or such like, to bear them from the plants. After this the plants require nothing more but to be supplied with water when the summer showers are not sufficient, and to stop them when they run too thin of branches, and thin them of leaves or branches when they are likely to become overcrowded. In warm summers and in warm situations, by this mode of management, the plants will bear plentifully for about two months, provided they be not attacked by insects or weakened by diseases."

3711. *Insects and diseases. The thrips sometimes attacks early cucumbers, and is to be destroyed by fumigation. The red spider rarely makes its appearance; when it does, water must have been imperially withheld. Some soils produce canker in the shoots, especially where they branch from the main stem. When this is the case, the only resource is to renew the soil and the plants.*

SECT. VII. Culture of the Melon.

3712. *The melon requires the aid of artificial heat the greater part of the year, and even in the warmest months it cannot be brought to perfection in Britain without the protection of glass. Its culture is an object of emulation among gardeners; and the fruit of the best sorts have a peculiarly rich flavour, thought by some to bear a resemblance to that of the pine. Ripe fruit, Abercrombie observes, "may be had by forcing at any season; but the main crops raised for the general demand, are seldom cut, at the earliest, before May, and the last succession mostly ceases to yield fruit after October." To ripen the best, largest, fine kinds, M^r Phail observes, "as great an atmospherical heat, and a bottom heat to its roots also, is required as is sufficient to ripen the pine-apple in this country; but as the melon is produced from an annual plant, the seeds of which must be sown every year, it requires a different mode of culture. Different methods of treatment and various kinds of earths and of manures have been recommended, and used successfully in rearing of melons. The great thing after planting is to give them plenty of atmospherical heat, and a sufficiency of external air and water. Those methods which are most simple and the least expensive, and best calculated to assist in making a suitable climate for the melon-plant to grow in and ripen its fruit well should be preferred."*

3713. *Soil. Abercrombie says, "The melon will succeed in any unexhausted loam, rich in vegetable rudiments, with a mixture of sand, but not too light. The following is a good compost: two thirds of top-split earth from a sheen common, adding sharp sand, if the earth contains little or none, till half is*

sand; one sixth of vegetable mould; and one sixth of well consumed horse-dung. Or, if the earth is not obtained from a pasture, rotted sheep-dung may be substituted for the last. The ingredients should have been incorporated and pulverised by long previous exposure and turning over. The compost should be dried under shelter before it is used, and warmed in the frame for potting."

3714. *McPhail* says, "Melons will grow and produce fruit of a good flavour, if they be planted in any kind of earth not of too light a texture, whether it be taken from a compartment of the kitchen-garden or from a corn-field mixed well with good rotten dung; but earth of a loamy nature is the best, because it retains moisture longer than light earth. Earth dug from the surface of a common, where sheep and cattle have long been pastured, is excellent for the melon. It should be broken well, and lie a few months before it be used; and if it be exposed to a winter's frost, it will do it good. This sort of earth, if it be taken from the surface of the common, will require no manure the first year of using. I would here mention, that unless the earth which I used for the melon-plants was very strong, I made it a practice, when the melon-beds were wholly earthed up, to tread the surface all over, which makes the earth retain its moisture longer than if it were left loose."

3715. *Nicol* says, "Soil for melons may be thus composed: one half strong brown loam from a pasture; a quarter light sandy earth; an eighth part vegetable mould of decayed tree-leaves; and an eighth part rotten stable-yard dung. The mould for melons should be well incorporated; should be exposed to the frost, and be frequently turned over to meliorate."

3716. *Soria*. The following list is recommended by an eminent practical gardener, Mr. Brown; and they correspond also with the lists of Abercrombie and Lindley.

Melons with red flesh and thick rind.

Rock, the Black and Dutch.	Cantaloupes, the early, netted, the orange, and Montagu.	Polignac.	Romana.
		Succinea.	Scarlet-fleshed.

Fruit with green flesh and moderately thick rind.

Green-fleshed.	Italian green-fleshed.	London green-fleshed.
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Fruit with green or white flesh and thin rind.

Dorea.	Geras.	Green House-lion.	Gurtnuck.	Kelting.	Impahan.
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Winter melons.

Danphala.	Valencia.	Hidra.
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We may here observe that the melon, being an annual plant, the varieties in cultivation are continually changing; and that many excellent sorts are in cultivation of which no general names by which they can be purchased at the seed-shops can be given.

3717. *Estimate of sorts.* The cantaloupes are in high estimation in general, for their superior flavour, although not uniformly such great bearers as some others in the list; they are besides admired for their handsome and curious shapes, some of them growing very large. The netted cantaloup is a good bearer; the fruit is above the middle size, round, heavy, full of juice, and high flavoured. The early small black rock cantaloup is also a good bearer: but there is a large black rock which holds an inferior rank, both for bearing and the flavour of the fruit. Of the carbuncled rock there are two sorts: the smaller is by far the best. The green cantaloup has a dark green rind, with a pale pulp, grows rather larger than the early black rock, and vies with it in flavour. The orange cantaloup is an excellent early variety, a great bearer; the fruit under the middle size, but juicy, and of the most generous flavour. The golden, and the prolific, set speedily, and soon ripen; the fruit is middle-sized, and the flavour not so elevated as might be expected from a cantaloup. The silver cantaloup bears freely; the fruit is middle-sized, and for flavour ranking with the finest. The small Romana is one of the most plentiful bearers, either for an early or main crop; the fruit is not abundantly juicy, but good-flavoured. The larger netted Romana bears more freely than large sorts in general; the fruit is substantial and heavy, a single melon sometimes weighing ten pounds, not so juicy as the best cantaloupes, but the flavour high and grateful. The Polignac is also a rich-flavoured fruit. The old oblong-ribbed is generally a good bearer, and the fruit is agreeably flavoured. The other kinds also will ripen in Britain in full perfection, except the water-melon, which does not always ripen freely with a good full flavour. For the principal culture, however, the cantaloupes, Romanas, and Polignac are indisputably preferable: any of the others may be adopted in secondary crops, or for variety.

3718. *Time of beginning to force.* From the time of sowing, ripe fruit may be cut in about fifteen weeks, as an average period: when many short and wintry days fall in the course, it may last eighteen weeks; but when the forcing is not commenced till the days are nearly twelve hours long, and continually lengthening, ripe fruit is sometimes cut in ten weeks. The period also depends upon the sort. Little time is gained by beginning to force in December. The early and main crops are commonly sown from the middle of January to the first week of February; the latter or succession crops, at the beginning of March; and late crops intended to fruit at the end of summer, in the middle of April.

3719. *Forming the seed-bed.* The plants may be raised in a cucumber-bed, and this is the general practice; but Abercrombie prefers a separate bed, built a slight degree higher than that for the cucumber, at the same season, and adapted to a one or two light frame, according to the quantity to be raised. Nicol raises the melon almost exactly in the same way as the cucumber, and there is very little difference in his subsequent culture of these plants.

3720. *Choice of seed.* Seed under the age of two years is apt to run too much to vine, and show only male flowers; but new seed may be mellowed by being carried in the pocket a fortnight or more, till the heat of the body has dried and hardened it. Seed, twenty years old, has been known to grow and make fruitful plants; but seed which has been kept three or four years is quite old enough, and less likely to fail than older.

3721. *Sowing.* Abercrombie says, "Having moulded the bed, and proved the heat, sow in pans three inches, or pots four inches, deep, rather than in the earth of the bed. Sow a second portion in five or seven days, to provide against failure. Do not at once plunge the pots to the rims." (*Pr. Gard.*, p. 108.)

3722. *Treatment till removed to the fruiting-pit.* "As soon as the plants appear, give air cautiously; guarding the aperture with matting at night, and on frosty or gloomy days. At favourable opportunities wipe the condensed steam from the glasses. When the seed-leaves are about half an inch broad, prick the plants into small pots five inches in diameter, three in each pot, giving a little aired water just to the roots; then plunge the pots into the earth of the hot-bed partially, or to the rims, according to the heat. Admit fresh air every day in moderate weather, at the upper end of the lights, raised an inch or two, according to the temperature of the external air; more freely when sunny than cloudy; shutting closer, or quite close, as the afternoon advances towards evening, or sooner, if the weather changes cuttishly cold; and cover the glasses every night with mats, and uncover in the morning, as soon as the sun is high enough to reach the frames. Give, occasionally, a very light watering, when the earth appears dry. As the plants advance into the first rough leaves, the first runner-bud in the centre should be stopped, by cutting or pinching the top off close to the first or second joint; an operation which strengthens the plants, and promotes the lateral issue of fruitful runners. Be careful to support a regular tenour of heat in the bed, by laying, first, an outward casing of straw litter round the sides, to defend it from the weather; afterwards, if the heat declines, remove the above casing; and apply a moderate lining of hot dung to one or more of the sides. In matting at night, be careful not to drive the rank steam of the linings into the beds, by letting the ends of the mats hang down."

3723. *Fruiting-bed.* Form it as directed for the cucumber-bed, but six inches deeper; M'Phail says, "four feet high, and after it has stood about a week, tread it down and make it level, and set the frames upon it."

3724. *Moulding the bed.* Abercrombie directs to "mould it by degrees to eight, ten, or twelve inches depth; first laying the compost in little hills of that thickness, one under each light, with the intervals earthed only two or three inches, for the present, till the general heat is moderated." M'Phail lays in under each light a small hill of earth about one foot high.

3725. *Planting.* When the earth of the hills is warmed by the heat of the bed, and the plants have leaves two or three inches broad, or have begun to push lateral runners, turn them out of the pots, "with the ball of earth entire: set a ball containing one plant, in the middle of each hill, inserted clean over the ball; or set at most two plants under the centre of a large light. After planting, give a gentle watering over the hills and round the roots, taking care not to wet the shanks of the plants: shut down the glasses close, till the heat and steam arise; then give air moderately. Extend a slight shade over the glasses in the middle part of warm summer days, if the plants shrink or flag their leaves before fully rooted in the hills, which they will be in two, three, or four days after planting."

3726. *Temperature.* The melon requires a minimum heat of about 65° from the time of germination till that of fructification, and a heat of about 75° to fruit in. (*Abercrombie.*)

3727. *Air.* As long as weak steam is perceived to rise from the bed, leave an aperture, even at night, for it to escape; guarding against the influx of cold air by a curtain of matting. Admit fresh air to the plants by tilting the glasses more or less at the most favourable hours in a mild dry day. After the bed has come to a sweet heat, shut down close at night. As the fruit enlarges, it becomes more necessary to seize every proper opportunity of admitting air; raising the lights from one to four inches, according to the season, the heat of the bed, and temperature of the external air; shutting close, if that should turn cold, and always timely towards evening. As confirmed summer approaches, admit air still more freely.

3728. *Water.* After the plants are placed on the hills, give opportunely, gentle waterings, increasing them as the season and the growth of the plants advance. Water circumspectly and scantily while the fruit is setting or young in growth, as too much moisture would make it decay. Take a warm morning for watering, before the middle of May; in summer, the afternoon, or evening. Use soft water warmed to the air of the frame; and let as little as possible fall on the setting or newly-set young fruit; or near the main head of the plants, for fear of rotting that part. Shut down the lights after watering, for a short time; and if in the morning, and there is a strong sun, spread a mat over, to prevent the sun from injuring the plants by acting on the water lodged on the spray and leaves. As a strong steam will now arise, remove the mats, in an hour or two, and raise the glasses at the top, to give vent to the steam and admit air to the plants. As the fruit becomes nearly ripe, lessen the quantity of water given, barely keeping the plant from flagging; and withhold water entirely when the fruit begins to turn colour.

3729. *Earthing.* Perform this operation as directed for the cucumber, after the heat of the dung has become moderate, earthing up by degrees the intervals between the hills, till the depth of the earth becomes equal. Eight or ten inches' depth of earth, M'Phail states to be enough for the roots of the plants to run in, provided the bed, or fermenting mass beneath, be made of leaves of trees, or of dung well prepared; for if the bed under the earth be in a good state, the roots will grow into it, and draw thence considerable nourishment to the plants. The roots of the melon do not naturally run deep; they extend horizontally, not far from the surface, especially in forcing-frames, where the moist warm air is more confined than in the open atmosphere. In early forcing, leave unfilled up with earth a space of about seven or eight inches wide against the inside of the frames, immediately adjoining the hot linings. "By this method the heat of the linings does more powerfully warm the air in the frames than if the earth was made level home to the sides of the boards of the frames to which the linings adjoin. But if melons be not planted earlier than the month of May, this precaution need not be attended to, unless the weather prove uncommonly cold, and but little sunshine." (*G. Rev.*, p. 63.)

3730. *Training.* As the plants advance into the first runners, three or four joints in length, if no fruit be shown, stop them at the third joint, in order that they may produce fruitful laterals; and as the runners extend, train them over the surface of the bed with neat pegs. Many of these runners, as the plant proceeds, will show embryo fruit at the joints; but a great many barren ones are occasionally produced, and hence it becomes necessary to regulate them. Abercrombie says, "Cut out the superfluous, unfruitful, or evidently useless shoots, especially the very weak and the most luxuriant; for the middle-sized are the most fertile."

3731. *Setting.* As the fruit-bearers come into blossom, you may assist the setting of the fruit, by impregnating some of the female blossoms with the male flowers, as described for the cucumber. The melon, however, will also set naturally, and produce fertile seeds, if the time of fructification fall at a season when the glasses can be left almost constantly open. (*Aber.*) Nicol says, he has proved experimentally, that melons not impregnated will not swell off so fair and handsome as impregnated ones, and therefore considers it more necessary to attend to this operation in melons than in cucumbers.

3732. *Care of the fruit.* As the fruit increases to the size of a walnut, place a flat tile or slate under each, to protect it from the damp of the earth; the slab thus interposed will also assist the fruit to ripen, by reflecting the rays of the sun. (*Abercrombie.*)

3733. *Time of maturation.* The interval between the setting of the fruit and perfect maturity is generally from thirty to forty days; but the plants in the same bed, and the vines on the same plant, often show some difference in the time of reaching maturity.

3734. *Cutting the fruit.* Ripe melons are distinguished by their full size; sometimes by turning yellowish, more constantly by imparting an agreeable odour; often by the base of the foot-stalk, close to the fruit, cracking in a little circle. On these indications of maturity, the fruit should be cut, before too mellow or dead ripe, that it may eat with a lively sharp flavour. The morning is the time for cutting.

3735. *Sowing seed.* The ordinary mode is to request the seeds, or particularly fine fruits, of approved sorts, to be returned from table. The best way, however, is to pick some best ripe fruit, take out the seed, clean it from the pulp, and let it be well dried and hardened; and then put it up in papers. (*Abercrombie.*) Nicol says, wash it very clean, skimming off the light seeds, as those only that sink in water will grow. (*Kal.*, p. 396.) Great care must be taken that the sorts, from which seeds are saved, are genuine and distinct. When different sorts are planted in the same frame, this cannot be the case.

3736. *Second crop from the same plants.* When the fruit of the first crop is off, a second crop may be obtained from the stools; which often proves more productive than the first. If the first crop is taken before the middle of June, the second will come in at a very good time. For this purpose, as soon as the fruit is cut, prune the plant. Shorten the vigorous healthy runners at a promising joint, to force out new laterals; cutting about two inches above the joint. At the same time take off all decayed or sickly vines, and all dead leaves. Stir the surface of the mould; and renew it partially, by three inches' depth of fresh compost. Water the plant copiously; shutting down the glasses for the night. Shade in the middle of hot days; and give but little air until the plant has made new radicles and shoots. Afterwards repeat the course of culture above described, from the stage when the first runners are sent out till fruit is cut.

3737. *Late crop on old hotbeds.* To ripen melons, not earlier than the month of August, M'Phail "generally made beds of dung which had first been used for linings to the early cucumber and melon beds. For this purpose, this kind of dung is better than new dung, because it does not heat violently, and keeps its heat for a considerable time. Leaves of trees make very good melon-beds, but they do not produce heat enough alone for linings; of whatever materials melon-beds be made, the air in the frames

among the plants should be kept sweet and strong, otherwise the plants will not grow freely. It may be known whether the air be sweet or not, by putting the head in under the lights, and smelling it. It is frequently very difficult to bring dung-beds into a requisite state of kindliness for these delicate plants; for if the dung by any means get and retain too much water before its noxious vapours pass off by evaporation, it will stagnate and become sour, and, until these pernicious qualities be removed, which requires time and patience, the plants will not grow kindly; besides this, although corrupted stinking air hinders the growth of plants of the melon kind, it greatly promotes the health and forwards the breeding of different kinds of insects, which feed upon and otherwise hurt fruits, and plants, and esculent vegetables of various kinds."

3738. *Culture of melons in a dung-pit.* "A glazed pit to receive either stable-dung, leaves, or tanners' bark, is calculated to ripen extremely fine fruit. The well of the pit may be formed either by a nine-inch wall, or by strong planking; a yard in depth, from six to eight feet wide, and in length from ten to twenty feet, or more, as required. A low glass case is to be fitted to it, adapted to the growth of the melon. Having raised the plants in a small seed-bed as for the frame crop, ridge them out into the pit in the usual manner. Give the proper subsequent culture; and when the strength of the fermenting mass begins to decline, add linings outside the pit, if enclosed by boards; but if enclosed by a nine-inch wall, cut away as much of the dung and earth within, and throw it out, as will admit a lining of well-tempered dung." (*Abercrombie*.)

3739. *Culture of melons in a glazed pit.* One such as that proper for the nursing-pinery is here understood; and the plants being raised in the usual way, and the bed, whether filled with dung, tan, or leaves, or a mixture of these, being moulded, plant about the end of July. Nicol prefers for such late crops "the early golden cantaloup, the orange cantaloup, and the netted cantaloup, planting a part of the pit with each. A very mild bottom heat is sufficient for the purpose here in view; and if the pit have been occupied in the forcing of asparagus, French beans, or strawberries, on a bark, or bark and dung, or on a bark and leaf heat, it will require no other preparation than to be stirred up, and have a little fresh materials added; keeping the fresh bark, dung, or leaves well down, and finishing the bed with some of the smallest and best reduced. When it has settled a few days, let it be moulded all over to the thickness of twelve or fifteen inches; previously laying on a little more of the above small materials, in order to keep the plants well up to the glass, as the bed will fall considerably in the settling. It should be formed, and the mould should be laid on, in a sloping manner, from back to front, so as in some measure to correspond with the glasses. All being ready for the plants, they may either be planted in a row in the middle of the pit, at two feet apart, or may be planted in two rows at four feet apart; or, if they have been planted, in nursing, three in a pot, plant in the centre of each light, as directed for the common hotbed in March. Let them have a little water, and be shaded from the sun for a few days; exposing them to his rays by degrees. The future management of the plants is like that of melons in a hotbed, till September, when it will be proper to apply fire-heat, in order to further the progress of the late fruit, and to dry off damps. Let the fires be made very moderate at first, however, and increase their strength, as the season becomes more cold and wet. Keep the mercury up to about 70° in the night; and in the day, by the admission of air, keep it down to about 80° or 75°. Very little water will now suffice for the plants, as their roots will be fully established, and be spread over the whole bed; the heat of which will also now have subsided. They should only, therefore, have a little water once in eight or ten days; and, as the fruit begin to ripen off, entirely withhold it. Keep the plants moderately thin of vines and foliage; be careful to pick off all damped leaves as they appear; and fully expose the fruit to the sun as it ripens, in the manner directed for melons in the hotbed. In this manner, I have often had melons in October and November, fully swelled, and in good but not, of course, in high perfection, for want of sun to give them flavour. Any who have a pit of this kind, however, for the forcing of early vegetables, strawberries, flowers, &c. cannot, perhaps, occupy it to a better purpose in the latter part of the season; as the trouble is but little, and the expense not worth mentioning." (*Kal*.) Pits for this purpose may be heated by steam or hot-water pipes, instead of fires, according to any of the various plans for so doing which have been given in a former part of this work.

3740. *Culture of melons in Mr Phail's brick-bed.* The inventor of this pit says, "For the purpose of raising melons early, for many years I cultivated them on a brick bed, on the same construction as that which I invented for rearing early cucumbers, except only that through the pit of each three-light box I carried no cross flues. In each three-light division I made the pit three feet six inches wide, and ten feet long, and three feet deep below the surface of the flues. When this bed was first set to work, I had the pits filled level with the surface of the flues with well fermented dung, or with the dung and linings from the cucumber-beds. On the surface of the dung in the pits, I had laid about ten inches thick of good earth, in a ridge of about twenty inches wide, from one end of the pit to the other. When this was done, I made a lining round the bed, and, as soon as the earth became warm, I set the plants into the ridge of earth, and gave them a little water, and kept a strong heat in the frames, filling up the pit gradually as the roots and plants extended themselves. The dung or leaves of trees in the pit require not to be changed every year, neither need the earth for the plants be removed entirely every season, for by experience I found it to do very well by digging and mixing with it some fresh earth and manure in winter, and exposing it to the rains, frost, and snow. In forcing melons early, the surface of the cross flues, as well as of the surrounding or outside ones, should be kept bare of mould till the days in spring get long, which will let the heat of the linings arise freely through the covers of the flues to warm the air among the plants. After the cross flues are covered with earth, those which surround each frame may be left uncovered till the month of May or June." (*G. Rem.*, p. 64.) The culture in the brick-bed is in other respects the same as that already given for melons in frames, and cucumbers in brick-beds. (3705, 3713.)

3741. *Culture under hand-glasses.* A succession, or late crop, to fruit in August and September, may be raised on hot-bed ridges under hand-glasses.

3742. *Sow in a hot-bed, from the middle of March to the middle of April.* When the plants have been up a few days, while in the seed leaves, prick some into small pots, two plants in each: water, and plunge them into the hotbed; managing, as directed for the young frame plants, till the rough leaves are from two to four inches long, and ready to shoot into runners. From the middle of March to the third week of May, when the plants are a month or five weeks old, they will be fit to ridge out under hand-glasses.

3743. *Forming the bed.* With well prepared stable-dung, or with a mixture of fermented tree-leaves, build the hot-bed four feet wide, and two feet and a half thick, the height according to the number of glasses intended, allotting the space of four feet to each. In a week or ten days, or when the dung, or dung and leaves, is brought to a sweet well-tempered heat, mould the bed ten or twelve inches thick; then place the glasses along the middle, and keep them close till the bed has warmed the earth.

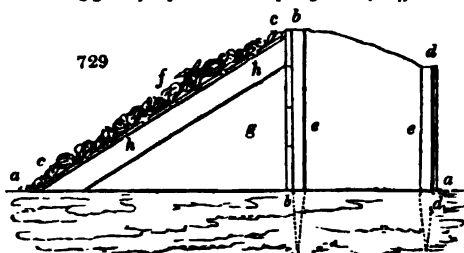
3744. *Planting.* The same, or next day, insert the plants: turn them out from the pots with the ball of earth entire; and, allotting plants for each glass, insert the ball into the earth clean down over the top, closing the mould about the stems. Give a little water, and place the glasses over close. The rest is mere routine.

3745. *Crop.* Some will be ready to cut in July, others in August, the more general time, and in September; they being generally, after setting, from thirty to forty days in ripening. The crop coming in at the decline of summer will not ripen well, unless guarded from cold at nights, and assisted by linings. The fruit that does not ripen may be used as a substitute for mangoes.

3746. *Culture on wide ridges.* The fruiting-bed may be made six, seven, or eight feet wide, for the plants to have an ample surface for their extending runners; defended either by a regular frame and

glassed of proportionate dimensions, or by a case formed of inch-and-half boarding, ranged connectedly along both sides of the bed, without any internal cross divisions other than top cross bars, to stay the sides, and support the glasses. (*Abercrombie*.)

3747. *Culture on sloping banks.* Williams, of Pitmaston, has for several years been trying to give increased hardness to the melon by growing it in the open air. He does not state what varieties he grows, but his bed (*fig. 729*) is placed in the open ground (*a a*), and is formed of a row of wooden posts, three



feet six inches high, to the south face of which boards are nailed (*b*). The surface of the bed is an inclined plane, fronting the south: covered with slates laid upon the mould, and not overlapping. There is another row of posts (*d e*), two feet six inches high, to which boards are nailed on the north face, forming a space (*c e*) three feet wide, extending the whole length of the bed on its north side, and this is filled with mowings of grass, weeds, fallen leaves, haum, and other refuse of the garden. The melon-plants (*f*) grow on the inclined plane, beneath which is old spent tanners' bark trodden hard (*g*), and over it nine inches of melon peated soil. The shoots, as they advance, are

soil. The plants are placed on this bed in May, under hand-glasses; and from that time till the plants are killed by frost in October. (*Hort. Trans.*, vol. v. p. 346.)

3748. *Insects and diseases.* To prevent melon-plants from being infested with insects, or injured by disease of any kind, no better method can be adopted than to keep the plants constantly in a healthy, vigorous, growing state; for this purpose, M'Phail observes, "they must be constantly attended to, giving them plenty of heat and water. In warm weather, in the spring and in summer, they should be watered occasionally all over their fruit and leaves, till the earth in which they grow be thoroughly moistened, and a stronger heat than usual kept in the frames about the plants for a few hours; also the lights should be shut down every afternoon, with a good strong heat among the plants. If there be sufficient moisture in the earth, the greatest sun-heat in the afternoon will not hurt the plants, but it might scorch the sides of large fruit exposed to the sunbeams operating upon the glass, which should be guarded against. The frames and lights should be kept clean, and painted over once every other year."

3749. *Mildew and canker.* Melon-plants are subject to be infected and hurt by the mildew and by the canker. These diseases come upon them because they are not in a good climate, they have not a sufficiency of heat, or the dung and earth of the bed is in a stagnated state. Melon-plants are also liable to be greatly injured by the red spider, which increases surprisingly in hot dry weather. Nothing will preserve melon-plants from the inroads of disease and insects but heat, fresh air, and a sufficiency of water, which sweetens the atmosphere, and makes it healthy for vegetables as well as for animals; and nothing will effect a cure but good management, strong heat, and plenty of water given all over the plants. Diseased plants, or plants much infested with insects, cannot produce good healthy fruit. The mildew is a most pernicious disease to all sorts of plants. On melons it generally makes its first appearance on the oldest leaves, and on the extremities of the young shoots. The cause of it is unhealthy nourishment, taken in by the roots of the plants.

3750. *Red spider.* When melon-plants have become diseased, or much infested with the red spider, they should either be destroyed, or effectual means used to cure them. To destroy the plants is easy; to cure them, the following method may be put in practice:—"Procure fresh linings, and as soon as they have cast a strong heat into the beds, scatter some flour of sulphur all over the plants, and keep as strong a heat in the frame as the plants can bear; a heat of 120° will not destroy them, if the steam of the linings be prevented from getting in among the plants. Water the plants all over their leaves about once a week with clean water 100° warm, and if the sun shine, keep the lights close shut down all day, and cover them up in the evening, leaving a little air all night at each light, to prevent a stagnation of air among the plants. Continue this process till the mildew and the insects disappear, and the plants appear to grow freely, and afterwards manage them in the usual way, taking care to keep up a good strong heat in the linings. This method sets the old stagnated bed in a fermentation, which makes the moisture run out of it, and dries it so, that water given to the plants has free liberty to pass off. If the linings do not heat the air in the frames sufficiently, let some of the earth in the inside all round the sides of the boards be removed, to let the heat from the linings rise freely in the frame." (*Abercrombie*.)

SECT. VIII. Forcing the Strawberry in Hot-houses, Pits, and Hotbeds.

3751. *The strawberry is forced* in every description of forcing-house, and also in the pinery, though the heat of the latter often prevents the setting of the blossoms. Where they are forced in large quantities, it is a good method to apply a pit to their sole cultivation. M'Phail says, "They will occasionally do well in a hot-house for growing the pine; but a heat sufficient to force peaches and nectarines is more natural, and more likely to secure the obtaining of good crops of fine fruit. A good way of forcing the strawberry," he adds, "is to bring them forward in a gentle heat in melon-frames, till the fruit be nearly about half swelled, and then to give them a stronger heat to ripen them." (*Gard. Rem.*, p. 29.) Nicol thinks "the climate of the cherry-house most suitable to the nature of strawberries; they will do well in a hot-bed; but the best method is to force them in flued pits, or pits heated by steam or hot water, such as those used for nursing pines."

3752. *Soil.* All agree that strawberries to be forced in pots require a strong and a very rich loamy earth.

3753. *Choice of sorts.* Abercrombie and Nicol recommend the alpine and scarlet Virginia, or old scarlet; to which Mr. Thompson adds Keen's seedling, the Grove-end scarlet, and the Roeberry. Morgan (*Hort. Trans.*, vol. ii. p. 376.) begins with the alpine; next he takes the Bath scarlets and common scarlets; and after these the pine.

3754. *Potting and preparation of the plants.* Abercrombie says, the plants selected should be two years old, having attained a full bearing state. It conduces to the perfection of the fruit, to put as many plants as are intended to be forced into pots, that they may be previously nursed for a longer or shorter time, according to the age of the stool.

3755. *New runners* of the present summer may be potted in July and August and nursed in pots for two seasons, having the blossoms pinched off in the second. This course of preparation is attended with most trouble: but the crop repays it. Three offsets may be planted in one large pot.

3756. *Runners made last year* may be potted in April, and then plunged in the earth, to be nursed throughout the growing season with a view to forcing, having such blossoms as appear pinched off, while the roots are carefully watered.

3757. *Stools of two years' standing*, which have borne one crop, may be put into pots in August, September, or October. They may also be put into pots during any mild interval from the beginning of November till the end of the year; but they will not be so strong and well rooted. The method of potting established bearers is this. The pots should be twenty-four or thirty-two; provide at the same time some fresh and good rich loam. Put some of the earth, well broken with the spade, and free from grubs or hurtful worms, into each pot, to the depth of three or four inches. Then take up the plants, with a ball of earth to the root of each; pare the ball with a knife till it be pretty round; and having cleared the stem of the plant from any withered or rotten leaves, place it in the pot, which fill up to the surface of the ball with the prepared earth. Water the plants as they are potted, and remove them to a warm situation. On the approach of winter, all the potted plants, whether established bearers or runners, should be placed under a frame, or other sufficient shelter, till the hotbed or forcing-house is ready to receive them.

3758. M^r Phail says, "Strawberry plants intended for forcing should be planted in pots eight or ten months before they be set into the forcing-house; or strong plants may be taken up with balls of earth about their roots, and be potted and set into the forcing-house immediately."

3759. Nicol says, "Some force old roots or stools, and others the runners only. Those who force the old roots generally take them up and pot them about October or November; raising a bulk from the bed or row, nearly sufficient to fill a nine or ten inch pot, of plants three or more years old. Others plant runners of the former year in April, three or four in a large pot, or two in a middle-sized one, and plunge them in the earth all summer, giving them occasional waterings, and taking proper care of them. These succeed better than old roots, treated as above. When I was in the practice of forcing strawberries, I used to prepare my plants in the following manner:—In July or August, I planted runners of that season, three in a nine or ten inch pot, watered them, and placed them in the shade for a few days; then plunged them to the brim, in a freely exposed situation. In October, their leaves were dressed off, and the plants trimmed; and before winter, they were covered with a little dry litter, in order to preserve the pots from the effects of frost. The following spring, any flowers that made their appearance were pinched off; and throughout the summer, the plants were occasionally refreshed with water, and kept clear from weeds. In autumn, the leaves were again dressed off as before; and when taken up for forcing, the pots were dressed, and fresh earthed at top, previous to being placed in the forcing-house. This method of preparing the plants is no doubt more troublesome than either of the above-mentioned; but the plants, by being completely established, and of a proper age, produce better crops. I have tried all the three ways repeatedly, and prefer the last."

3760. Morgan raises his alpine from seed, sowing in January in frames or boxes to be placed in a gentle heat; he hardens them after they come up by removal to a cooler situation; pots in May in pots six inches diameter and six inches deep. In October they are in flower, when he puts them under shelter, and in the latter end of November he places them in the forcing-house or pinery, where they bear fruit through the winter. The scarlets he pots, three plants in a pot, of the same size as those used for the alpine in May, or early in June, taking the runners of the previous year; he picks off the blossoms as they appear, and keeps them in a shady place till January, when he places them in the forcing-house on shelves eighteen inches from the glass, each pot in a pan. The pine-strawberries he pots in the same manner, and takes them into the forcing-house in February or March.

3761. *Time of beginning to force.* If the fruit be wanted very early, the plants are put in hotbeds, or pits, in October; but the crops from strawberries so forced, Nicol thinks hardly worth the trouble. Abercrombie says, "Begin to force strawberries about nine weeks before you want to gather fruit. Plants excited before the 1st of January seldom repay the trouble; and in proportion as the time of beginning to force approaches the vernal equinox, the returns are more abundant. To have a succession, reserve sets of potted plants for removal into a house, or frame, every three weeks, till the middle of March." He adds, "Strawberries taken into the house in March, fruit in higher perfection than those forced earlier." M^r Phail and Nicol begin in January. The latter observes, "Those who force strawberries to a considerable extent, perhaps a thousand pots, bring them in, in different successions, perhaps a hundred or two at a time; this is, in places where there are several forcing-houses." (*Kal.* p. 330.) M^r Phail says, "When the weather begins to get cold in September, strawberries of the alpine kind in pots may be set in a forcing-house or brick frame; and if they be in good health, they will produce fruit for a considerable time. They require only a gentle heat of from 50° to 60°; give them water occasionally, but as there is constantly blossom and fruit on them, they need not be watered all over broad cast. Give them great plenty of air: they only require protection from heavy rains and cold weather."

3762. *Temperature.* Abercrombie says, begin at 40°, and raise the heat as in the cherry-house. When a pit is employed, Nicol directs the pots to be plunged in a mild bark-heat; and the temperature, by the aid of the flues, to be kept at 50°, and 55° or 60° in sunshine. Such treatment will make the plants thrive, and the fruit set freely. Morgan prefers beginning with the heat of a frame on dung, or a pit, and then moves to the peach-house; and, after the fruit is set, removes his plants to ripen in the vinery or stove. Scarlets, he finds, bear more heat than the other sorts.

3763. *Air and water.* The former is to be freely admitted in good weather; and the latter plentifully supplied at all times, until the fruit begins to ripen off. Then it is to be withheld, lest the flavour become insipid. Morgan prefers supplying it from pans, in order not to rot the hearts of the plants. He gives as little water as possible when the plants are nearly ripe, this being essential in order to have good-flavoured fruit.

3764. *Treatment after gathering the fruit.* The strawberry, it is generally considered, will not force the year after like fruit trees; but must be roused by plunging in the open ground for one or two years, pinching off all blossoms as they appear. Williams, however, states that "the scarlet strawberry, after affording a crop of fruit in the hot-house early in the spring, if carefully removed out of the pots or boxes, and placed in the open ground, will yield another crop of fruit in September. These second crops are very abundant, the warm rains of July and August proving highly favourable to the growth of the fruit; and, as there is no other strawberry to be had at this season of the year, except the alpine, the addition of the scarlet makes a pleasing variety in the dessert." (*Hort. Tr.* vol. ii. p. 93.) Morgan observes, without limiting his observation to any one sort, that "after the fruit has been gathered from the plants, the pots should be plunged into a shady border, giving them a good watering, and at the same time cutting off the leaves: when thus treated, they will, in the year following, produce as good crops in forcing as fresh-potted plants; if not wanted for this purpose, they may be turned out into the natural ground, and will then bear a crop in the autumn of the same year, as described by Williams above."

SECT. IX. Forcing Asparagus in Pits and Hotbeds.

3765. *Asparagus* is forced with equal or with greater success, and with less trouble, in flued pits, or in pits heated by steam or hot water, than in dung hotbeds. M^r Phail recommends his brick-bed for this purpose. The roots, Nicol states, may either be

forced on bark, or on dung, or on dung and bark; but old half-rotten bark, in which there is not much heat, is to be preferred. Next to this he uses well fermented dung underneath, and old bark to the thickness of a foot or fifteen inches at top. "If dung alone, or a mixture of dung and leaves, be used, it should be carefully fermented, and should be in a state past heating violently before it is put into the pit. In this case, observe to finish the bed with the smallest and driest part of the materials." Ross (*Hort. Trans.*, vol. ii. p. 361.), instead of a warm stratum of dung or tan, places his roots on a cold bed of the latter, on which nursing-pines or melons have been grown, but which has ceased to ferment. He then applies warm linings to the sides, and thus produces the requisite degree of heat.

3766. *Choice of plants.* M'Phail says, take roots of any age that bear fine grass. Nicol says they should not be under four years old, nor above eight. Abercrombie takes plants of two or three years' standing.

3767. *Planting.* M'Phail says, "Lay on the surface of the bark-bed from six to eight inches of vegetable mould, or any other sort of light earth, that the heat may easily ascend through, and of such a texture as does not retain water. Take up plants, no matter what age they are, which produce fine asparagus, trim their roots, and place them in rows on the beds; when one row is laid, strew a little fine mould among the roots, then proceed in the same way with one row after another, keeping them on a level, as the surface of the bed at first lay, till you have finished planting them; then lay among the buds and roots some fine vegetable, or other light rich mould, working it in among them with your fingers, and cover the buds over about one inch thick, and above that lay three inches in depth of vegetable mould not very rotten, but such as the water will run quickly through. If you have not got vegetable mould of this description, old tan, not very fine, will answer the purpose equally well. If there is a strong heat in the bed, let the glasses remain off till it begin to decline." Nicol directs, that the roots in the beds in the open air, which are to be taken up and forced, should be kept covered with litter, so as to be easy to come at in time of frost.

3768. *Time of beginning to force.* Abercrombie says, if in mid-winter, begin six weeks before you propose to have a crop; when the days are longer, five weeks, or but a calendar month before. Nicol says, those who wish to have the asparagus on the table at Christmas, should prepare for forcing it in November, to have a continual succession.

3769. *Temperature.* The temperature at night should never be under 50°. In the day-time keep the maximum heat down to 65°. "If by the heat of the bark or dung, and the use of mats or canvass covers at night, the thermometer stand as high as 50°, fire-heat will be unnecessary; but otherwise recourse must be had to the flues. A very moderate degree of fire-heat, however, will be sufficient; and a small fire made in the evening will generally answer the purpose. Sometimes, in dull hazy weather, a fire may be necessary in the morning, in order to enable you to admit air more freely, and to dry off damp." (*Abercrombie and Nicol*.)

3770. *Air* must be freely admitted every day, in some cases, to allow any steam to pass off; and for the sake of the colour and flavour of the plants. As the buds begin to appear, as large portions of air must be daily admitted as the weather will permit.

3771. *Water.* When the asparagus-bed has, after planting, stood two or three days, and when the heat has begun to warm the root, give the plants a sufficient watering. Pour it out of a pot with a rose on it, to imitate a shower of rain; let the bed have enough to moisten the mould well, and to wash it in among the roots. Repeat such waterings now and then. Nicol says, the roots must have moderate supplies of water: once in three or four days, if the heat be not violent; and if otherwise, oftener.

3772. *Gathering.* By the time the buds have come up three inches above the surface, they are fit to gather for use, as they will then be six or seven inches in length. In gathering them, draw aside a little of the mould, slip down the finger and thumb, and twist them off from the crown. This is a better method than to cut them; at least it is less dangerous to the rising buds, which come up in thick succession, and might be wounded by the knife, if cutting were practised.

3773. *Forced roots.* The roots, after they have furnished a crop, are considered useless for future culture, because no leaves having been allowed to develop themselves, of course no buds could be formed for the succeeding year.

3774. *Successional supplies.* If the pit in which asparagus is forced be twenty-five to thirty feet long, it will be enough, for the supply of an ordinary family, to fill one half at a time. If the second half be planted, when the grass in the first half is fit for use, and so on, a constant succession may be kept up in the same pit for any length of time required. In order, however, to forward or protract the growth of the one part or of the other, the pit may be divided in a temporary way, by sitting a board neatly under the middle rafter. By this means, one half may be kept cooler or hotter than the other, by matting or not matting, or by the admission of more or less air, &c. "In filling the first end of the pit a second time, if bark be used, it will not be necessary to add fresh materials; as trenching over the bed will be found to answer the purpose, even a third time. And in using dung, the stirring up of the old, and adding as much new as will raise the bed to a proper height, finishing with the smallest and best fermented part, will generally be sufficient for a second filling. For a third filling, one half new dung may be necessary, which, however, should be moderately fermented, and be kept well down."

3775. *Forcing asparagus in hotbeds.* Asparagus may be brought to perfection in hotbeds at any time from November till it comes in the natural ground. When it is intended to have a constant supply from hotbeds, M'Phail recommends one to be made every fortnight, and Abercrombie once a month, from November till April. This must, of course, be arranged according to the size of the hotbeds and number of the family.

3776. *Forcing the hotbed.* M'Phail says, "Get a quantity of good dung well prepared, by putting it together in a heap to ferment, that the rancidity of it may be evaporated, by turning and mixing it several times when there is a strong heat in it; make it up into a bed about three feet high and four or five inches larger all round than the size of the frames which are to be set upon it. When it is made, set the boxes and glasses on, and let it heat and stand till it is sweet, which may be known by the smell of it; then tread it level, and loosen up the surface again, that the heat may have free liberty to arise." In this stage, Nicol covers the whole with "rolls or squares of turf, cut so as again to join exactly; which lay green side down, and beat them well with the back of the spade, that the whole may be close and compact, in order as much as possible to exclude steam." To this practice M'Phail objects, as preventing the water from sinking freely into the bed; and if there be a sufficient heat in it for winter forcing, unless it receive water, it must become dry and husky. The method, he says, is an old one practised fifty years ago, and now exploded by every good gardener. Instead of turf, therefore, M'Phail and Abercrombie, after setting on the frame, direct, with the bed from five to eight inches thick, to use any sort of light earth. Nicol says, "I have often used old bark reduced to a fine mould, without any mixture of earth, and have sometimes mixed it with fine sandy earth, with little difference in the success; only I have observed, that when the roots were placed in bark entirely, buds would come a few days earlier."

3777. *Planting.* Proceed as directed for planting on a bark-bed. Abercrombie says, "Provide from five to nine hundred (he elsewhere says six hundred) roots for a hotbed under a three-light garden-frame.

Having prepared the roots, mark out on the surface of the mould the width of the frame; then, beginning at one end, raise a small ridge of earth crosswise, and proceed to planting; placing the first course of roots nearly upright, close against the said ridge, and with the crowns in contact, either upon the surface of the level earth, or with only the lower ends of the roots a little inserted; place more against these in the same manner, as close together as possible, and extending to the width of the frame; add successive ranges, as close as they can be set, with the crowns of an equal height." Where the bed is completely planted, the crowns are to be earthed over regularly. Some, as Abercrombie, cover with two inches of light earth, adding, when the buds appear, three or four inches of additional earthing; others, as Nicol and M^cPhail, cover at once with four or five inches, adding no more afterwards. The planting completed, the next thing is to put on the lights, which are to be kept close shut down till the heat begin to rise in the frame; which will generally happen the second or third day, when air is to be admitted, in order to pass off the steam, and dry the surface of the mould. Air must be given every good day till the buds begin to appear above ground; and then more freely admitted to give colour and flavour.

5778. *Produce in hotbeds.* Nicol says, "An ordinary-sized three-light frame, completely filled with roots, and properly managed, will only yield a dish every day for about three weeks."

5779. *Successional supplies from hotbeds.* On the above estimate, if a constant succession of asparagus be required, it will be necessary to make up a bed every eighteen or twenty days till the middle or end of March. Each successive bed may be made a little lighter; and less trouble will be required as the season advances. (*Kal.*, p. 347.)

5780. *Forcing in ainery.* Melrose finds that "asparagus may be forced in a vinery, by planting the roots in the border, behind the flue, where no vine roots are." (*Caled. Hort. Mem.*, vol. iii. p. 164.)

5781. *Forcing the roots as they stand in open ground.* Stir the surface of any bed or beds in full bearing in the general plantation; then, having raked it fine as in the usual spring dressing, cover three inches with the siftings of old tan, and on that lay a layer of fermenting dung, as in forcing rhubarb or sea kale. This mode has been but seldom practised; but we consider it likely to succeed to a certain extent. A very general mode of forcing asparagus in first-rate gardens, is to have the beds, in the open air, cased with pigeon-hole brickwork, to the depth of three feet, with trenches between them of two feet in width. In these trenches, dung or fermenting vegetable matter of any kind is introduced, and over the beds are placed frames covered with boards. In this manner the asparagus beds may be forced every year; whereas, by taking up the plants, and placing them on dung or tan, they can only be forced once.

5782. *Sea kale and rhubarb* may be, and sometimes are, forced in the same manner as asparagus; but the most general mode is to excite them where they stand in the open garden, by the application of warm dung, with or without earth in pots, or other covers.

SECT. X. Forcing Kidneybeans.

5783. *The kidneybean may be successfully forced in pits, hot-houses, or forcing-houses, and hotbeds.* The more general mode is to force in the pine stoves; the same heat which suits the pine-apple suiting the kidneybean, which is a native of India. Nicol prefers a flued pit, such as that used for nursing pines: and Abercrombie says, "Where there are no hot-houses, or where kidneybeans are to be raised in quantities for the market, the most economical and successful mode will be found a flued pit, prepared as directed for asparagus, but with a stronger bottom heat." Pits heated by steam or hot water are, of course, equally efficacious.

5784. *Soil.* All agree in recommending light vegetable earth.

5785. *Sorts.* Abercrombie recommends the early speckled, early negro, and dun-coloured dwarf. Nicol says the speckled dwarf is the best sort.

5786. *Sowing.* Sow in flat boxes or pans of fine light earth thickly, and cover to the depth of an inch. Let them be placed in a stove or hotbed, and have moderate supplies of water, and they will be fit to plant when about three inches in height. Plant them in rows across the bed of the pit fifteen inches apart, and three inches distant in the line.

5787. *Cultures.* Water after planting, and afterwards, as required, give abundance of air every fine day, and earth up the plants as they advance in growth in order to give them strength.

5788. *Time of beginning to force.* M^cPhail says, "If you wish to endeavour to have kidneybeans green all the year, you should plant the seeds, and begin to force in August." Abercrombie observes, "Some farmers, quite in opposition to the season, raise kidneybeans in August, and thence till the 31st December, which day may be regarded as the boundary between late and early forcing."

5789. *Temperature.* The heat by fire in the night need not exceed 50°, according to Nicol; but Abercrombie recommends 60° for a minimum, and 75° for a maximum.

5790. *Successional supplies* are to be obtained by sowing every month or six weeks, for which purpose the pits may be divided by temporary partitions, as recommended under *Forcing Asparagus*.

5791. *Forcing in hot-houses.* "The most early fruit in perfection," says Abercrombie, "is obtained by culture in a stove, sowing from midwinter till the end of March." Sow in pots, or oblong boxes, containing a mixture of light fresh earth and vegetable mould, depositing the seeds either in a triangular or quincunx order, and fill an inch deep. If the plants are to fruit where sown, the pot or boxes should be ten inches deep; but, if they are to be transplanted, which admits a greater number in the same space, the seed-pots or boxes may be shallow. Do not fill them with mould at first, to allow of gradually earthing up. When the beans have germinated, sprinkle the earth with water; after the plants have risen, give moderate waterings every other day—the last crops may want water every day. Sprinkle also the leaves with water warmed by standing in the house. Those raised in shallow pans should be transplanted for fruiting when two or three inches high. It is sometimes proper to stop luxuriant runners. These incidental crops may stand in rows, on the flues, or on shelves; but take care they do not shade the pines and other principal plants. For succession, sow every fortnight or three weeks."

5792. *Forcing in a peach or cherry house.* Nicol observes, "French beans may be successfully planted out in the borders of an early cherry-house, or peach-house, so as that they may not be overmuch shaded by the trees; but they seldom do much good in a vinery, where they are shaded by the whole foliage of the vines."

5793. *Forcing in a common hotbed.* Under the deficiency of a house, you may have recourse to a hot-bed and frame; but the culture will be attended with more trouble, the course will be longer, and the fruit is rarely so fine and plentiful; nor without fire-heat can the difficulties of late or very early forcing be so well contended with.

5794. *Crop raised under glass to fruit in the open garden.* "At the end of March, you may sow a small portion under glass, for transplanting into the open garden in the first or second week of May. It is not so well to sow in patches on the surface of the ground, as in small pots, because the plants can be turned out from the latter with less check to their growth when transplanted. Sow three beans in each pot. When the seedlings are two or three inches high, harden them by degrees to the full air; and plant them on a good open border as soon in May as the season will suit. They will yield fruit about a fortnight sooner than the earliest raised under exposure to the weather."

5795. *Crop raised on slight heat.* "A crop to fruit early in the open garden may be accelerated with more certainty by plunging the pots containing the seed-beans into a gentle hotbed; or some sown in

shallow pans or boxes may be set on the shelves of a stove. Just at the opening of April will be early enough to begin, as the plants will otherwise get too forward for the weather, to proceed well without a continuance of artificial heat. Having nursed them to the proper stage, plant out under a south fence, either three inches apart, if in a single line, and eighteen inches by three, if in two lines; or it may be better to set the plants in patches of nine or seven, to receive the temporary shelter of a hand-glass, lest the transition from a hotbed all at once, to the fluctuating air of spring be too violent." (*Abercrombie*.)

3798. *Insects*. The aphid and chermes often attack French beans in the hot-house; in which case, the plants should be fumigated with tobacco.

SECT. XI. Forcing Potatoes.

3797. *The potato is forced in a great variety of ways*; but "for a fair crop of tubers, which shall be somewhat dry and flowery, and of the size of hens' eggs, plant sets of the ash-leaved variety in single pots, filled one third part with light earth, in January. Place them in a hot-house or hot-bed, earth them up as they appear, and about the middle or end of February transplant them with their balls entire into a pit prepared as for asparagus. Distance from plant to plant one foot each way. Give water occasionally, and admit as much air as possible at all times. Potatoes so managed will produce a crop the end of March or beginning of April." (*Abercrombie*.)

3798. *Hogg*, a market-gardener, describes "a method of growing early forced potatoes," by using an old cucumber or melon bed, in which the dung has long lost all its heat. The sets of a very early sort, a variety of Foxe's yellow seedling, known by the name of this grower, are cut a fortnight before they are planted, to prevent their damping, or being injured by worms. The bed is prepared by removing all the earth from the top of the dung, and covering it about one inch deep with fresh mould, on which the sets are planted in rows six inches apart, and the same distance from each other in the rows; they are then covered four inches deep with mould, and the frames and glasses are placed upon the bed, which must be carefully protected from frost. The covering best adapted for this purpose, is the second crop of short hay, called *rowen* in the neighbourhood of London. At the end of the fifth day the outside of the old dung should be cut away, from near the edge of the frame to the bottom of the bed, in a slanting direction inwards, of about fifteen inches from the perpendicular; strong linings of hot dung must be applied to the space so made, and renewed, if necessary, at the end of three weeks. Air must be given to the plants, by sliding down the lights at noon every day that the weather will permit, and water in the mornings, leaving about one inch of the light open for the admission of the air after watering. The potatoes will be fit for use in about seven weeks from the first planting of the sets, and the average crop to each light, if well managed, is usually about five pounds." (*Hort. Trans.*, vol. ii. p. 144.)

3799. *Forcing potatoes in pots or boxes*. This is sometimes attempted in stoves. One set is placed near the bottom of a large pot, and gradually earthed up. When nearly full grown, it is taken to the cherry or peach house, for the sake of more air. Another mode of planting in pans or boxes is thus described by *Abercrombie*:—"Plant potatoes of the growth of the season before the last; that is, the produce of 1832 to be planted in December, 1833, or January, 1834. Potatoes so kept will appear surrounded by a brood of new potatoes in contact with the seed or parent potato. The leaf-buds are retained, and the potatoes planted in a circle and in layers, in earthen pans or wooden boxes with alternations of fine loose earth. Such pans or boxes may be put into sheds, or on shelves in the kitchen, &c. By this treatment, no leaves will emerge above the soil, and young potatoes may be reared at any required period." A similar mode is described by A. Sherbrook, Esq. (*Hort. Trans.*, vol. i. p. 225.) The boxes, containing alternate layers of light earth and potatoes of the preceding year, are placed in a dry covered place, free from frost; they receive no water, and produce "good, fine, young potatoes in December." For a succession the process is to be repeated.

3800. *Incidental forcing of potatoes*. Small, young, spring potatoes are likewise obtained from some of the winter store of old potatoes, as they lie in the house; especially where these have been mixed with sand, and permitted to shoot as they lie, when they produce a few small button potatoes in spring; some of which are occasionally brought to market, but are only proper for immediate use.

3801. *Ashworth* adopts the following method:—"In the beginning of April, a quantity of large potatoes are selected, and set up in a dry, airy room; they are turned over four or five times during the summer, and all the shoots which they make are taken off as they appear. These are sown for the seed, and are planted in succession from the beginning of September to the end of December, in boxes in the following manner. In the bottom of each box, a layer of light vegetable mould, four inches deep, is placed, on which the potatoes are laid, two inches apart, and these are covered with another layer of the same mould, and of the same depth. On the surface of this second layer, potatoes are again laid, and then covered as before; this is repeated until the box is full. The boxes may be kept in any of the fire-houses, or in a warm back shed, and in three months from the time of planting, young potatoes fit for use will be formed. It is to be observed, that the young potatoes thus obtained are much inferior in quality to those produced by vegetating plants; but as it is scarcely possible to bring forward potatoes in beds so soon, this plan is useful, when considered as a means of obtaining a luxury at so early a season." (*Hort. Tr.*, vol. iii. p. 152.)

3802. *Forcing to raise a crop in the open garden*. For this purpose some spread a layer of sets, on hot dung, or in holes, in any warm situation, whether in the light or the dark. After they have sprung three or four inches, they are to be transplanted in the open ground, which should not be sooner than May, unless they have some protection at nights, such as fronds of fern, spruce fir branches, &c.

3803. *Substitutes for forcing potatoes*. Dr. Noehden describes the following method of preserving young potatoes as such for winter use:—"By young potatoes, I take for granted, are generally understood those tubers which have not attained their full age and growth. In this stage the substance is generally finer-grained, and more cohesive, than when they are farther advanced; they are what is called waxy, and differ in taste from those which are full grown. If they could be preserved in this state, through the winter, for the use of the table, it would doubtless be an acquisition: and something of this kind I have seen attempted. When the general crop of potatoes was gathered, at the usual period of their harvest, in autumn, the small tubers, which are frequently disregarded and left to their chance, were picked out and collected: they were deposited in a box, between layers of sand, and thus kept till the month of December. At this time, the box being opened, they were found in perfect preservation, and fit to be dressed for the table. To give them all the appearance of young potatoes, in a side dish, the tender skin on them was to be preserved, for peeling them would have destroyed that effect. It would not, indeed, for that purpose, when they were to be used, previously to soak them for a certain number of hours, in water, and then to toss or shake them in a piece of rough flannel or balse, between two persons, backwards and forwards, and rub them between the hands; by which operation, the coarse outer covering is loosened, and the skin remains clean and delicate, so as to exhibit all the exterior of young growing potatoes. Upon trying them on the table, I found that some had really the fine waxy taste of young potatoes; but that others, and perhaps the greater part, though resembling the former in size and looks, had entirely the grain and flavour of the old potatoes. That difference is undoubtedly to be ascribed to the different state of maturity at which the one and the other had arrived. The mealy ones, though

equally diminutive with the others, had, in fact, reached their full age, and possessed, accordingly, the qualities which that age would give. Those of a waxy texture were, unquestionably, much younger, and had not come to maturity when they were taken from the ground. They were in that condition which, by the taste, determines the nature of young potatoes. If this be so (and every probability seems to attend the reasoning), it may be concluded, that it is possible to preserve young potatoes, in the manner described, if they are young; but to distinguish those that are so, in the common harvest, in autumn, from those which only appear so, would be difficult. The idea, therefore, presents itself, of planting potatoes expressly for that use; which must be done at a later period than the vegetable is usually planted; let us say two months later, in June, instead of April. When the general crop is matured and gathered in, in October, those will be still in their young state; their grain will be still fine, and their texture close: and if thus taken up, and preserved, according to the method suggested, it can hardly be presumed that, when brought to table in winter, they will be different in quality from what they were when they were reaped: they will, in every respect, be young potatoes, probably not much inferior, if at all, to those raised on a hotbed. For it does not appear that this mode of keeping them has any effect in promoting their maturity, at least, not to any perceptible degree. The sand employed should be of as barren a nature as may be, and, if possible, contain little or nothing of the vegetative stimulus. When the tubers are taken out of the ground, previous to their maturity, they will not readily sprout, or emit roots, which circumstance is a security for the success of the method in question." (*Hort. Trans.*, vol. lii. p. 43.) Various modes of accelerating or retarding potatoes will be found under the article *Solanum tuberosum*, in our Horticultural Catalogue.

Sect. XII. *Forcing Peas.*

3804. *The best sort of pea to force* is the genuine early frame. The temperature may be progressive, "beginning at 40° or 50°, and rising to 52° or 66°, from the origin of the plant to the state of flowering, and after flowering increased from 55° to 70°; or in a regular heat between the latter limits. For hot-beds, the standard temperature may be from 50° to 55° for the nursery-bed, and from 55° to 65° for fruiting."

3805. *For forcing peas in a pit, sow as directed for French beans in pots or boxes; and transplant them when an inch and a half or two inches high, into the pit, at nearly the same distances as those recommended for the kidneybean.*

3506a. *Forcing for the honeycucum.* For the earliest crop, some of the true earl frame sort may be sown in the borders of a cherry-house, peach-house, or vinery, intended to be forced from the beginning of the year. By the time the forcing commences, they will be fit for transplanting, which is to be done in the same border, either in a single row, or in more rows, according to the room. The distance between the rows may be fifteen or eighteen inches; and two inches in the line. "In forcing peas," Nicol observes, "they should always be transplanted. They become more prolific, and run less to straw by that management, than when they are sown where they are to remain. Indeed, it would be very well worth while to transplant the earliest crops in the open ground." (*Kal.* p. 59.)

3807. *Beans* may be forced in a similar manner, though this is seldom attempted.

SECT. XIII. Forcing Salads, Pot-herbs, &c.

3808. *Salads, pot-herbs, and various other culinary plants, are, or may be, forced; but the practice in Britain seldom extends beyond pot-herbs and salads; though some have forwarded cabbages, cauliflowers, turnips, carrots, &c., in this way, as is occasionally done in Russia and the north of Germany.*

3809. *Cauliflower, lettuce, radish, carrot, and onion*, McPhail observes, may be planted or sown in February, "on gentle hotbeds of dung or sawdust, to bring them in before those in the open ground. They should have glass frames set over them in cold, frosty, or rainy nights; which may be taken off in fine days, or a great deal of air given to them." Nicol says, "the early horn carrot may be sown in January, on a slight hotbed, or on a border, close by the parapet in front of a pinery, early grape-house, or peach-house. The seeds should be sown in fine light earth, in either case, and should not be covered more than to the depth of a quarter of an inch. If sown on a hotbed, the seeds may be defended by a frame and lights, or by hoops and mats, from bad weather, and should be covered always at night. If sown on a border in front of a forcing-house of any kind, they may be covered with hand-glases. When the plants come up in either situation, they should have plenty of free air, as they do no good if they be drawn; they also should have moderate supplies of water. A thin sprinkling of radish or lettuce may be thrown in along with the carrot."

3810. *Pot and sweet-herbs*, such as parsley, mint, marjoram, chervil, tarragon, &c., are planted or sown in pots or boxes, and placed in any house, pit, or frame, in a state of forcing, near the glass, and where they will receive abundance of air in fine weather. They require little or no farther attention, but occasional watering. They may also be planted in rows in hotheds or pits.

3811. *Small saladings*, such as cresses, mustard, rape, succory, &c., to be cropped when young, may be treated as pot-herbs; the first three will thrive at a greater distance from the light, and may be sown as practised by the market gardeners on the floors or borders of cherry and peach houses.

3812. Radishes. Agrecoffsky says, "To obtain the earliest spring radishes, sow on a hotbed of dung or horse manure short-cut in December, January, or the beginning of February. Having made a hotbed two feet, or two feet and a half high, in dung, place on the frame. Earth the bed at top six inches deep; sow on the surface, covering the seed with fine mould, about half an inch thick; and put on the glasses. When the plants have come up, admit air every day, in mild or tolerably good weather, by tilting the upper end of the lights, or sometimes the front, one, two, or three inches, that the radishes may not draw up weak and long-shanked. If they have risen very thick, thin them in young growth, moderately at first, to about one or two inches apart. Be careful to cover the glasses at night with garden-mats or straw-litter. Give gentle waterings about noon on sunny days. If the heat of the bed declines much, apply a moderate lining of warm dung or stable-litter to the sides, which, by gently renewing the heat, will forward the radishes for drawing in February and March. After the first sowing, as the advance in growth, to give more copious admissions of air daily, by raising the lights, so that the plants are several inches, or, in fine mild days, by drawing the glass mostly off; but be careful to draw them on again in proper time. Small turnip-radishes of the white and red kinds may be forced in the same manner. For raising early radishes on ground not accommodated with frames, a hotbed, made in February, may be arched over with straw, and covered with mats, which should be covered with mats constantly all night; and during the day, in very cold weather. In moderate days, turn up the mats at the warmest side, and in fine mild day, take them wholly off." Any sort of radish seed may be sown occasionally for salad-herbs, to be taken while in the seed-leaves, to mix with cresses and mustard. Sow about once a week in spring, summer, or any season when radish-salad is required, managing it as other small salad-herbs.

shallow pans or boxes may be set on the shelves of a stove. Just at the opening of April will be early enough to begin, as the plants will otherwise get too forward for the weather, to proceed well without a continuance of artificial heat. Having nursed them to the proper stage, plant out under a south fence, either three inches apart, if in a single line, and eighteen inches by three, if in two lines; or it may be better to set the plants in patches of nine or seven, to receive the temporary shelter of a hand-glass, lest the transition from a hotbed all at once, to the fluctuating air of spring be too violent." (*Abercrombie*.)

3798. *Jasects*. The aphids and worms often attack French beans in the hot-house; in which case, the plants should be fumigated with tobacco.

SECT. XI. Forcing Potatoes.

3797. *The potato is forced in a great variety of ways*; but "for a fair crop of tubers, which shall be somewhat dry and flowery, and of the size of hens' eggs, plant sets of the ash-leaved variety in single pots, filled one third part with light earth, in January. Place them in a hot-house or hot-bed, earth them up as they appear, and about the middle or end of February transplant them with their balls entire into a pit prepared as for asparagus. Distance from plant to plant one foot each way. Give water occasionally, and admit as much air as possible at all times. Potatoes so managed will produce a crop the end of March or beginning of April." (*Abercrombie*.)

3798. *Hogg*, a market-gardener, describes "a method of growing early forced potatoes," by using an old cucumber or melon bed, in which the dung has long lost all its heat. "The sets of a very early sort, a variety of Foxe's yellow seedling, known by the name of this grower, are cut a fortnight before they are planted, to prevent their damping, or being injured by worms. The bed is prepared by removing all the earth from the top of the dung, and covering it about one inch deep with fresh mould, on which the sets are planted in rows six inches apart, and the same distance from each other in the rows; they are then covered four inches deep with mould, and the frames and glasses are placed upon the bed, which must be carefully protected from frost. The covering best adapted for this purpose, is the second crop of short hay, called rowen in the neighbourhood of London. At the end of the fifth day the outside of the old dung should be cut away, from near the edge of the frame to the bottom of the bed, in a slanting direction inwards, of about fifteen inches from the perpendicular; strong linings of hot dung must be added to the space so made, and renewed, if necessary, at the end of three weeks. Air must be given to the plants, by sliding down the lights at noon every day that the weather will permit, and water in the mornings, leaving about one inch of the light open for the admission of the air after watering. The potatoes will be fit for use in about seven weeks from the first planting of the sets, and the average crop to each light, if well managed, is usually about five pounds." (*Hort. Trans.*, vol. II. p. 144.)

3799. *Forcing potatoes in pots or boxes*. This is sometimes attempted in stoves. One set is placed near the bottom of a large pot, and gradually earthed up. When nearly full grown, it is taken to the cherry or peach house, for the sake of more air. Another mode of planting in pans or boxes is thus described by *Abercrombie*:—"Plant potatoes of the growth of the season before the last; that is, the produce of 1832 to be planted in December, 1833, or January, 1834. Potatoes so kept will appear surrounded by a brood of new potatoes in contact with the seed or parent potato. The leaf-buds are removed, and the potatoes planted in a circle and in layers, in earthen pans or wooden boxes with alternations of fine loose earth. Such pans or boxes may be put into sheds, or on shelves in the kitchen, &c. By this treatment, no leaves will emerge above the soil, and young potatoes may be reared at any required period." A similar mode is described by A. Sherbrook, Esq. (*Hort. Trans.*, vol. I. p. 325.) The boxes, containing alternate layers of light earth and potatoes of the preceding year, are placed in a dry covered place, free from frost; they receive no water, and produce "good, fine, young potatoes in December." For a succession the process is to be repeated.

3800. *Incidental forcing of potatoes*. Small, young, spring potatoes are likewise obtained from some of the winter store of old potatoes, as they lie in the house; especially where these have been mixed with sand, and permitted to shoot as they lie, when they produce a few small button potatoes in spring; some of which are occasionally brought to market, but are only proper for immediate use.

3801. *Ashworth* adopts the following method:—"In the beginning of April, a quantity of large potatoes are selected, and laid up in a dry, airy room; they are turned over four or five times during the summer, and all the shoots which they make are taken off as they appear. These are used for the seed, and are planted in succession from the beginning of September to the end of December, in boxes in the following manner. In the bottom of each box, a layer of light vegetable mould, four inches deep, is placed, on which the potatoes are laid, two inches apart, and these are covered with another layer of the same mould, and of the same depth. On the surface of this second layer, potatoes are again laid, and then covered as before; this is repeated until the box is full. The boxes may be kept in any of the fire-houses, or in a warm back shed, and in three months from the time of planting, young potatoes fit for use will be formed. It is to be observed, that the young potatoes thus obtained are much inferior in quality to those produced by vegetating plants; but as it is scarcely possible to bring forward potatoes in beds so soon, this plan is useful, when considered as a means of obtaining a luxury at so early a season." (*Hort. Tr.*, vol. III. p. 122.)

3802. *Forwarding to raise a crop in the open garden*. For this purpose some spread a layer of sets, on hot dung, or in boxes placed in any warm situation, whether in the light or the dark. After they have sprung three or four inches, they are to be transplanted in the open ground, which should not be sooner than May, unless they have some protection at night, such as fronds of fern, spruce fir branches, &c.

3803. *Substitutes for forcing potatoes*. Dr. Noë describes the following method of preserving young potatoes as such for winter use:—"By young potatoes, I take for granted, are generally understood the tubers which have not attained their full age and growth. In this stage the substance is generally finer-grained, and more cohesive, than when they are farther advanced; they are what is called waxy, and differ in taste from those which are full grown. If they could be preserved in this state, through the winter, for the use of the table, it would doubtless be an acquisition; and something of this kind I have seen attempted. When the general crop of potatoes was gathered, at the usual period of their harvest, in autumn, the small tubers, which are frequently disregarded and left to their chance, were picked out and collected: they were deposited in a box, between layers of sand, and thus kept till the month of December. At this time, the box being opened, they were found in perfect preservation, and fit to be dressed for the table. To give them all the appearance of young potatoes, in a side dish, the tender skin on them was to be preserved: for peeling them would have destroyed that effect. It was recommended, for that purpose, when they were to be used, previously to soak them for a certain number of hours, in water, and then to toss or shake them in a piece of rough flannel or baize, between two persons, backwards and forwards, and rub them between the hands; by which operation, the coarse outer covering is loosened, and the skin remains clean and delicate, so as to exhibit all the exterior of young growing potatoes. Upon trying them on the table, I found that some had really the fine waxy taste of young potatoes; but that others, and perhaps the greater part, though resembling the former in size and look, had entirely the grain and flavour of the old potatoes. That difference is undoubtedly to be ascribed to the different state of maturity at which the one and the other had arrived. The mealy ones, though

equally diminutive with the others, had, in fact, reached their full age, and possessed, accordingly, the qualities which that age would give. Those of a waxy texture were, unquestionably, much younger, and had not come to maturity when they were taken from the ground. They were in that condition which, by the taste, determines the name of young potatoes. If this be so (and every probability seems to attend the reasoning), it may be concluded that it is feasible to preserve young potatoes, in the manner described, if they be gathered young: but to distinguish those that are so, in the common harvest, in autumn, from those which only appear so, would be difficult. The idea, therefore, presents itself, of planting potatoes expressly for that use; which must be done at a later period than this vegetable is usually planted; let us say two months later, in June, instead of April. When the general crop is matured and gathered in October, those will be still in their young state; their grain will be still fine, and their texture close: and if thus taken up, and preserved, according to the method suggested, it can hardly be presumed that, when brought to table in winter, they will be different in quality from what they were when they were reaped: they will, in every respect, be young potatoes, probably not much inferior, if at all, to those raised on a hotbed. For it does not appear that this mode of keeping them has any effect in promoting their maturity, at least, not to any perceptible degree. The sand employed should be of as barren a nature as may be, and, if possible, contain little or nothing of the vegetative stimulus. When the tubers are taken out of the ground, previous to their maturity, they will not readily sprout, or emit roots, which circumstance is a security for the success of the method in question." (*Hort. Trans.*, vol. iii. p. 48.) Various modes of accelerating or retarding potatoes will be found under the article *Solanum tuberosum*, in our Horticultural Catalogue.

Sect. XII. Forcing Peas.

3804. *The best sort of pea to force is the genuine early frame. The temperature may be progressive, "beginning at 40° or 50°, and rising to 52° or 66°, from the origin of the plant to the state of flowering, and after flowering increased from 55° to 70°; or in a regular heat between the latter limits. For hot-beds, the standard temperature may be from 50° to 55° for the nursery-bed, and from 55° to 65° for fruiting."*

3805. *For forcing peas in a pit, sow as directed for French beans in pots or boxes; and transplant them when an inch and a half or two inches high, into the pit, at nearly the same distances as those recommended for the kidneybean.*

3806. *Forcing in a peach or cherry house. For the earliest crop, some of the true early frame sort may be sown in October in the borders of a cherry-house, peach-house, or vinery, intended to be forced from the beginning of the year. By the time the forcing commences, they will be fit for transplanting, which is to be done in the same borders, either in a single row, or in more rows, according to the room. The distance between the rows may be fifteen or eighteen inches; and two inches in the line. "In forcing peas," Nicol observes, "they should always be transplanted. They become more prolific, and run less to straw by that management, than when they are sown where they are to remain. Indeed, it would be very well worth while to transplant the earliest crops in the open ground." (*Kal.*, p. 23.)*

3807. *Beans may be forced in a similar manner, though this is seldom attempted.*

Sect. XIII. Forcing Salads, Pot-herbs, &c.

3808. *Salads, pot-herbs, and various other culinary plants, are, or may be, forced; but the practice in Britain seldom extends beyond pot-herbs and salads; though some have forwarded cabbages, cauliflowers, turnips, carrots, &c., in this way, as is occasionally done in Russia and the north of Germany.*

3809. *Cauliflower, lettuce, radish, carrot, and onion. M'Phail observes, may be planted or sown in February, "on gentle hotbeds of dung or leaves, to bring them in before those in the open ground. They should have glass frames set over them in cold, frosty, or rainy nights; which may be taken off in fine days, or a great deal of air given to them." Nicol says, "the early herb carrot may be sown in January, on a slight hotbed, or on a border, close by the parapet in front of a pinery, early grape-house, or peach-house. The seeds should be sown in fine light earth, in either case, and should not be covered more than to the depth of a quarter of an inch. If sown on a hotbed, the seeds may be defended by a frame and lights, or by hoops and mats, from bad weather, and should be covered always at night. If sown on a border in front of a forcing-house of any kind, they may be covered with hand-glasses. When the plants come up in either situation, they should have plenty of free air, as they do no good if they be drawn; they also should have moderate supplies of water. A thin sprinkling of radish or lettuce may be thrown in along with the carrot."*

3810. *Pot and sweet-herbs, such as parsley, mint, marjoram, chervil, tarragon, &c., are planted or sown in pots or boxes, and placed in any house, pit, or frame, in a state of forcing, near the glass, and where they will receive abundance of air in fine weather. They require little or no farther attention, but occasional watering. They may also be planted in rows in hotbeds or pits.*

3811. *Small saladings, such as cresses, mustard, rape, succory, &c., to be cropped when young, may be treated as pot-herbs: the first three will thrive at a greater distance from the light, and may be sown as practised by the market-gardeners on the floors or borders of cherry and peach houses.*

3812. *Radish. Abercrombie says, "To obtain the earliest spring radishes, sow on a hotbed of dung or leaves some early dwarf short-tops in December, January, or the beginning of February. Having made a hotbed two feet, or two feet and a half high, in dung, place on the frame. Earth the bed at top six inches deep; sow on the surface, covering the seed with fine mould, about half an inch thick; and put on the glasses. When the plants have come up, admit air every day, in mild or tolerably good weather, by tilting the upper end of the lights, or sometimes the front, one, two, or three inches, that the radishes may not draw up weak and long-shanked. If they have risen very thick, thin them in young growth, moderately at first, to about one or two inches apart. Be careful to cover the glasses at night with garden-mats or straw-litter. Give gentle waterings about noon on sunny days. If the heat of the bed declines much, apply a moderate lining of warm dung or stable-litter to the sides; which, by gently renewing the heat, will forward the radishes for drawing in February and March. Remember, as they advance in growth, to give more copious admissions of air daily, either by tilting the lights in front several inches, or, in fine mild days, by drawing the glasses mostly off; but be careful to draw them on again in proper time. Small turnip-radishes of the white and red kinds may be forced in the same manner. For raising early radishes on ground not accommodated with frames, a hotbed, made in February, may be arched over with hoop-bends, or plant rods, which should be covered with mats constantly at night; and during the day in very cold weather. In moderate days, turn up the mats at the warmest side; and on a fine mild day, take them wholly off." Any sort of radish seed may be sown occasionally for salad-herbs, to be taken, while in the seed-leaves, to mix with cresses and mustard. Sow about once a week in spring, summer, or any season when radish-salad is required, managing it as other small salad-herbs.*

SECT. XIV. *Culture of the Mushroom.*

3813. *The edible mushroom (Agaricus campestris L.)* has long been held in esteem in this country. Its peculiar habits, and the method of propagating it, are so unlike those of any other culinary vegetable, that gardeners, till lately, seem not to have generalised on its culture. For a long period back, it seems never to have been produced in any other way than on ridges of warm dung; no one appearing to advert to the circumstance of its being indigenous, and that it may be grown in the open ground in the warmer months.

3814. *The cultivation of mushrooms.* Nicol observes, "is a process in gardening, perhaps the most singular and curious of any. In the culture of any other vegetable, we either sow or plant something material, — a seed, slip, or root, which we both see and handle; but in the culture of the mushroom, we neither sow nor plant any thing visible, at least to the naked eye. Yet it is certain that mushrooms are produced by seeds, which naturally vegetate in the fields at certain seasons, and which may be made to vegetate artificially at any season, by a certain process, and by a composition, in which the dung of certain animals form the chief ingredient. The droppings of horses are found to produce mushrooms more plentifully, and with greater certainty, than the dung of other animals. Hence it would appear, that their stomachs have less power to hurt, or to destroy the vegetative quality of these seeds, which, being collected along with their food, must pass through their intestines, than the stomachs of other animals; or, that the dung of horses is a better nidus for the seeds than other dung. The food of horses, consisting mostly of corn and hay, may, no doubt, be more replete with the seeds of mushrooms than that of cows and other stock, which consists chiefly of green vegetables; but even the droppings of horses while at grass, or on tares, produce few or no mushrooms, as more particularly noticed below. This fact would seem to prove, either that the seeds are collected in great numbers, and are better preserved by hay or the straw and chaff of oats, than by green food; or, that green food may have the effect of destroying them by its moistness in the stomach, or after having passed through it. It may be further observed, that animal matter seems necessary to the vegetation of these seeds, or the spawn of mushrooms. Hence we find them produced plentifully in old pastures, and in cattle-sheds, whether these be frequented by horses, cows, or sheep, or by all of them; but the cattle kinds are never found in woods or fields from which cattle are completely excluded, though the herbage be ever so old. From the stubs of cut or decayed trees, and about such as have fallen and are rotten, many species of fungi spring; most of which are noxious, poisonous, or unwholesome. The seeds, too, may lie concealed and dormant in various other matter, till put into a state of active vegetation by a proper temperature, and a proper degree of moisture."

3815. *What spawn is.* Spawn is a white fibrous substance, running like broken threads, in such dry reduced dung, or other nidus, as is fitted to nourish it. These threads produce, when planted, tubercles in the manner of potatoes. The true sort has exactly the smell of a mushroom. Spawn, when once procured, may be extended or propagated as spawn, without producing mushrooms. (Neill; *Abercrombie*.)

3816. *Producing spawn.* This vegetable may be produced by first making lumps, or what are sometimes called cakes of spawn, and afterwards placing them on a slight dung bedded, where the spawn vegetates into complete mushrooms; in which process of making the spawn (as it is termed) different ingredients are used, but chiefly the dung of horses, as said above. This has so far become a branch of trade, as the mushroom-spawn may be had of most of the nurserymen and seedsmen about all the great towns in the kingdom.

3817. *Originating mushrooms without planting spawn.* Nicol says, "I have formerly been in the practice of producing mushrooms, however, most successfully, without using spawn, and by a very simple process: I might rather say, without transplanting spawn in the common way, but by making the bed a whole mass of spawn at once, and never disturbing it till done bearing. Beds that are built in the common way, and spawned, seldom produce long; perhaps only a few weeks or months. I have had them continue to yield large crops the year round, and sometimes for two years. But mushroom-beds, in whatever way made, are subject to many misfortunes; and the spawn is of a nature so delicate, that it is quickly destroyed either by too much wet or drought. By making up a bed in the ordinary way, that is, of stable-dung, moderately fermented, to the thickness of about a yard; spawning it over when the strong heat has subsided, and then covering it with light earth, mushrooms may be obtained sooner than by the process I shall recommend. But if this process be more slow, it has the advantage of being more sure; and the time of reaping may be reckoned upon with equal certainty. The difference of time, from first proceeding to make the beds to gathering mushrooms, will generally be three or four weeks. By the first method, you may reap in six or eight weeks; and by the latter, in ten or twelve."

3818. *Proceed thus:* — "After having laid a floor, as hinted at above, of ashes, stone chips, gravel, or brick-bats, so as to keep the bed quite dry, and free from under-damp, lay a course of horse-droppings six inches thick. These should be new from the stable, and must not be broken; and the drier the better. They may be collected every day, until the whole floor or sole be covered to the above thickness; but they must not be allowed to ferment or heat. In the whole process of making up, the bed should be as much exposed to the air as possible; and it should be carefully defended from wet, if out of doors. When this course is quite dry, and judged to be past a state of fermentation, cover it to the thickness of two inches with light dry earth; if sandy, so much the better. It is immaterial whether it be rich or not; the only use of earth here being for the spawn to run and mass in. Now lay another course of droppings, and earth them over as above, when past a state of fermentation; then a third course, which in like manner earth over. This finishes the bed, which will be a very strong and productive one, if properly managed afterwards. Observe, that in forming the bed it should be a little rounded, in order that the centre may not be more wet or moist than the sides. This may be done in forming the sole or floor at first, and the bed would then be of equal strength in all parts. If it be made up against a wall in a cellar, stable, or shed, it may have a slope of a few inches from the back to the front, less or more, according to its breadth. I have sometimes been contented with two courses, as above, instead of three; and often, when materials are scarce, have made them up altogether, thus: three four-inch courses of droppings, with one inch of earth between each, and a two-inch covering at top. Such a bed as this I have had produce for ten or twelve months together; but very much depends on the state of the material, and on the care taken in making it up; also on the after-management. The droppings of hard-fed horses only are useful. Those of horses on green food will, of themselves, produce few or no mushrooms. This I have proved in more than one instance, much to my disappointment; and I have, moreover, found, that the richer the keep of the horses, the more productive are their droppings. I have made up beds from farm-horses, fed partly on hard and partly on green food; and from carriage or saddle horses, fed entirely on corn and hay; treated them in the same way in every respect; and have found, not once, but always, those made from the latter most productive. Droppings from corn-fed horses may be procured at the public stables in towns, or at inns in the country, any time in the year; and if the supply be plentiful, a bed of considerable dimensions may be made and finished within five or six weeks. In as many more weeks, if in a stable, or dry cellar, or a fued shed, it will begin to produce, and often sooner; but if the situation of the bed be cold, it will sometimes be two or three months of producing mushrooms."

3819. *Where indigenous spawn may be collected.* September is the month in which the mushroom comes to perfection in the open air; and this is the time to look for it in its native habitats. Down and upland pastures are the primitive situations, whence the seeds seem to be carried by horses and cattle, to what are called secondary situations. Thus "it is found in strength and purity, in the path of a bark-

mill worked by a horse, in any other horse-mill track under shelter, in covered rides for horses, in dry half-rotted dunghoops, and in hotbeds. It is found in a less degree in various other situations." (*Abercrombie*.)

3820. *M'Phail* says, "The best of mushroom-spawn is frequently to be found in dunghills which have lain a long time without turning, and which had been formed of horse-dung, scrapings of roads, and turf cut up about the sides of roads and commons. The heat of the summer months having dried the dunghill, when rain comes about the latter end of August or in September, mushrooms of a good quality may often be seen beginning to form themselves on the surface, like large peas. When these are observed, it is time to take out the spawn, which is generally in hard dry lumps of dung, the spawn having the appearance of whitish coarse pieces of thread."

3821. *To preserve indigenous spawn.* "Having found cakes of dung which contain the desired spawn, take them up as entire as possible, with the earth adhering, and lay them carefully in a basket or any other conveyance. These are to be stored till used, as below, in a dry covered place; and, if they were found in a damp state, should be dried in hollow piles, before they are laid together in a mass. The dry spawn may be preserved three or four years. To preserve alike from perishing, and from running before it is planted, a dry shed furnished with a current of air, is indispensable."

3822. *Procuring spawn artificially.* Wales thus procures spawn:—"For this purpose, the month of March is the fittest time, the cattle not being then upon grass, but chiefly upon dry food of one sort or other. Take two barrow loads of cow-dung, one load of sheep and one of horse dung; dry them well; then break them quite small, so as they may go easily through a coarse garden sieve. When well mixed together, lay them up in a round heap, finishing at top in a point. It is to be understood, that the operation is to be conducted in a dry shed. Observe to tread the heap as it is put up, which will greatly save it from heating too much. If a stick were thrust into the heap as a proof, and when taken out, if it feels very slightly warm in the hand, the heat is doing well; for, in the whole mode of raising mushrooms, it should be particularly observed to take great care of the heat, as the mushrooms are impatient of either too much heat or cold: the best adapted and most productive heat I have ever found, was from 65° to 60° of Fahrenheit, and the nearer the beds are kept to this heat, the greater will be the success. The heap is to be covered with horse-litter, in a state of fermentation, to the thickness of four inches all over. If the shed be warm when the heap is put up, I would recommend old bast-mats rather than dung, as the least over-heat would spoil the heap. In this state let it lie for one month; then throw the litter a little aside, thrust the hand into the heart of the heap, and take out a handful. If the spawn has begun to run, you will observe numerous small white fibres or threads through the dung. If not begun to run, let another covering be put on above the old one of the same thickness as the first; and after a month more, you will undoubtedly find the heap to abound with spawn. I have had it running in three weeks, and sometimes it has required ten weeks, much depending on the state of the dung. The spawn thus procured is of the very best quality, far exceeding what is got in fields or in old hotbeds. I write from experience, and have not borrowed this mode of procuring spawn from any one. The spawn in this state is not fit for keeping long; and I shall next give directions how to form spawn bricks, when as many can be made at one time, as will serve for the season, or even for a number of years if required, provided the spawn be kept dry." (*Mem. Calcd. Hort. Soc.*)

3823. *Preserving artificial spawn by forming spawn bricks.* The author last quoted says, "Take of horse-dung without litter, three barrow loads; two barrow loads of the mould of rotten tree-leaves; two barrow loads of cow-dung; one barrow load of old tan bark, such as is thrown out of the pine-pit; with one barrow load of sheep's dung; mix all these well together, till the mixture seem to be one compost, and to be as fine and soft as common mortar, or as the clay used in grafting, as otherwise it would not come easily out of the mould. Then take a small frame, such as brickmakers use for moulding their bricks; the sides six inches long, four broad, and three deep. A portion of the mixture should then be forced into the mould or frame, and the sides of the mould being a little wetted beforehand, the spawn-brick will easily come out without breaking. After the bricks have stood two hours or so, take a blunt or rounded dibble, and make three holes in the middle of each brick, an inch from each other, and about half through the brick; these holes are for receiving the spawn. I find it is the best way to lay the bricks, as they are made, upon boards, that they may be carried out of doors in a good day to dry. The bricks should be rendered perfectly dry, as the least damp would spoil the spawn. They will often seem dry on the outside, while they continue wet in the inside. The best way to prove them, is to break a brick, and observe how dry it is in the inside. It is to be observed, that great care must be taken in the turning them upon the boards, for fear of breaking, they being very apt to go to pieces, till nearly fit for receiving spawn. When fit, they are firm, and quite dry on the outside; this happens in the course of three weeks, if the weather be dry and the bricks be rightly attended to. Now, take fresh horse-litter, which has been laid up in a heap to sweeten as if for hotbeds; spread a bottom course of this six inches thick, whereto lay the bricks. The horse-litter which is to be prepared for covering the spawn-bricks ought not to be rank, because the drier and sweeter the heat, the freer the spawn will work; and, as I stated before, if the weather be warm, the less covering will serve: if there be any heat in the old covering at the expiration of three weeks, add no more new covering, as the old will perfectly serve the end. Every hole in the bricks must next be filled quite close up with the spawn; and as the bricks are laid one upon another, the upper side of the brick, when laid, must also be covered with spawn: at the same time observing, as the bricks are laid, to keep them as open between one another as possible, so as to let the heat and steam of the dung go through all parts of the heap. The heap is to be terminated at top by a single brick. When all are thus laid, place round the sides and top six inches of the hot dung, which will soon raise a fine moderate heat; observing, that all this must be done in a shed, or where rain cannot enter to cool the dung. After two weeks, add three inches thick of additional fresh dung upon the old; this will renew the heat, and make it work forcibly for the space of two weeks more, when the litter may be taken off, and cleared all out from the spawn-bricks. Before the cover is taken off, it will be proper to lay a little of it aside, and take out a few of the bricks, to see whether the spawn has run all through each brick or not; if not, replace the bricks again, and the cover, and let them remain for ten days longer, when they will be found to be every one, as it were, a solid mass of spawn. They may be allowed to stand and dry for a few days in the heap: they are then to be laid up, till wanted for use, in some dry place, where they will keep good for many years."

3824. *Propagation of mushroom spawn.* *M'Phail* offers two modes, as follows:—"About the beginning of the month of May, collect a heap of nearly equal quantities of cow, horse, and sheep dung, add to it some rotten fern leaves, or rotten dry dung, somewhat resembling spawn, from the linings of hotbeds; mix the whole well together, in the way a bricklayer's labourer makes mortar; spread it on a floor in a cool dry shed, where it cannot dry too hastily, making it about five or six inches thick; beat or tread it firm; and as soon as it is in a fit condition, cut it with a sharp spade into pieces in the form of bricks; set the pieces to dry till they can be conveniently handled; then with a knife make a hole in the middle of each, and put a little piece of good mushroom-spawn into each hole, closing it up with a bit of that which was taken out; then pile the impregnated pieces up in a heap in a hollow manner, so that the air may pass through the heap freely among the pieces, to dry them gradually; and if the shed be light, cover the heap with mats, or any other light covering, to keep it dark. When the spawn has extended itself through every part of the prepared pieces of the mixture, lay them out separately, that they may be perfectly dried, which will prevent mushrooms from growing out of them; which, if suffered, would exhaust the spawn so, that it would be much weakened. In a dry state, the spawn, thus propagated, may lie till it be wanted in the autumn or following spring. If such pieces of spawn be continued in a dry state, the spawn will remain good for a long time."

3895. *Another way*, similar to the preceding, to make mushroom-spawn, is as follows:—"Some time in the month of May or June, collect about two cart-loads of dung from the fields, or take it from the stables; separate it entirely from the straw; add to it six barrows of fresh loam, two barrows of soil scraped from the road, and one barrow of coal-ashes sifted fine; mix these well together; then spread the mixture on the floor of a dry shed, give it a gentle watering, and spread over it a quantity of spawn from an old mushroom-bed; after this, tread it as firm as possible, and continue to do so two or three times a week. In this situation let it remain till it is turned into a solid mass of spawn, which generally is about the end of August; then cut it into lumps, and lay them up edgewise to dry."

3896. *Abercrombie* says, "Pieces of it may be laid along the ridge of a cucumber-bed raised in spring. Plant them about a foot apart. In about two months, the surface of the spawn will assume a mouldy appearance; it is then to be taken up with the earth adhering thereto, broken into pieces, and laid upon the shelf of a dry shed."

3897. *Oldacre's mode of propagation* is as follows:—"Take any quantity of fresh horse-droppings mixed with short litter (as recommended for the beds), add one third of cows' dung, and a small portion of earth to cement it together; mash the whole into a thin compost, and then spread it on the floor of an open shed, and let it remain till it becomes firm enough to be formed into flat, square bricks, which being done, set them on edge, and frequently turn them until half dry; then, with a dibble make one or two holes in each brick, and insert in each hole a piece of good old spawn, the size of a common walnut; the bricks should then remain until they are dry. This being completed, level the surface of a piece of ground three feet wide, and of length sufficient to receive the bricks, on which lay a bottom of dry horse-dung six inches high; then form a pile, by placing the bricks in rows one upon another (the spawn side uppermost) till the pile is three feet high; next cover it with a small portion of warm horse-dung, sufficient in quantity to diffuse a gentle glow through the whole. When the spawn has spread itself through every part of the bricks, the process is ended, and they must be laid up in any dry place for use. Mushroom-spawn, made according to this receipt, will preserve its vegetative power many years, if well dried before it is laid up; if moist, it will grow and soon exhaust itself."

3898. *Nella* mentions an original method of propagating spawn, practised by Hay, in Scotland. "A quantity of cow-droppings is to be gathered from the pastures; some rotten wood, or spray from the bottom of a hedge, is to be collected, with a little strong loam. These are mixed, and formed into a moist ductile sort of mortar or paste, of such consistence that it can be cut into pieces like bricks. When these are so far dried that they can conveniently be lifted, a row is laid in some dry place under cover, perhaps in a shed at the back of a hot-house; a little spawn is placed upon the layer; then another layer of the spawn-bricks, and so on. In a few weeks the whole mass is penetrated by the spawn. The spawn-bricks may then be laid aside for use; they will keep many months; and the drier they are kept the more certainly do they afford a crop of mushrooms when placed in favourable circumstances for doing so."

3899. *Roger's mode of preparing spawn* is as follows:—"I collect pure cow-dung, not fresh, but such as I happen to find in the park, the fields, or the farm-yard; with this I mix the scrapings of roads, in the proportion of one half to one, adding to it about one third or a fourth of vegetable mould, obtained from leaves or decayed stacks. These ingredients being well worked up together, the compost is formed into bricks about nine inches long, three and a half broad, and two thick. The bricks are exposed to the air and sun, and suffered to attain such a degree of solidity, as to bear a considerable pressure, but not to dry hard. They are then removed to a shed, for the purpose of being laid up in strata. Three or four rows are first placed on the ground with interstices of about one inch in width between the rows and the bricks; into these interstices, or spaces, loose spawn, such as is found in the litter of old mushroom beds, is scattered; and over the whole surface of the layer such spawny litter is likewise spread. Should there be no old mushroom-beds at hand to furnish the scatterings, some spawn-bricks must be broken to pieces in order to supply them. The first layer having been thus treated, another is put upon it, and likewise interspersed and covered with spawn and litter from old beds. A third and fourth stratum may be laid on, or more, and regulated in the same manner. The whole pile being completed according to the quantity that is required, it is covered over with hot stable dung and litter; and in two, three, or more weeks, according to the state of the weather, the bricks are filled with spawn, and may be laid by for use. I will not hazard an opinion, whether the cow-dung itself contains the elements of spawn, or only acts the part of a matrix, or receptacle; but this I can state, that mushroom-spawn is generated in other dung besides horse-dung; for I once found it plentifully in pigeons' dung. As I have used this preparation of spawn for a length of time, the essence of cow-dung must entirely preponderate in my composition; though the origin of the spawn should at first have been derived from horse-dung. I may add, that, when managed in the manner I have described, it yields spawn as productive as any that can be obtained. I was formerly taught to believe that it was essential to mix a portion of horse-dung in the bricks, but my experience has since convinced me, that cow-dung alone answers the purpose. The spawn is generated in it plentifully, and of good quality."

3900. *Care of the bricks.* It is of importance that the bricks alluded to should not be left in a situation which would cause the spawn to work, an effect which would be produced by moisture, combined with warmth. Therefore, when the spawn is bred, the bricks must be laid in a dry place, to prevent the process of germination. The spawn must not be suffered to advance towards the rudiments of the mushroom, which consist in little threads or fibres, for in this state it ceases to be useful in spawning a bed. As soon as those rudiments are formed, they must be left undisturbed, or they perish. They will grow into a mushroom on the spot where they are developed; but when removed or torn up, they are destroyed. A piece of spawn which appears in filaments or fibres is no longer applicable to a mushroom bed; it may produce a mushroom in itself, but can serve no other purpose. The spawn that is to be inserted in a bed, and to receive its development there, must not be gone so far, but should only have the appearance of indistinct white mould. (*Hort. Trans.*, vol. iv. p. 472.)

3901. *The importance of keeping spawn dry* is attested by Miller, who found, that spawn which had lain for four months near the furnace of a stove, yielded a crop in less time, and in greater profusion, than any other.

3902. *The methods of rearing mushrooms* are still more various than those of propagating the spawn. They are most commonly grown in ridges in the open air, covered with litter and mats; and next in frequency in ridges of the same sort under cover, as in the open sheds of hot-houses. They are also grown in close sheds behind hot-houses; in flued sheds built on purpose, or mushroom-houses; on shelves in flued mushroom-houses; in pots, boxes, hampers, baskets placed in any warm situation; in cucumber or melon beds; in old hotbeds of any sort; in pits with glass frames; and in dark frames or pits.

3903. *Ridges in the open air.* M^r Phall says, "Some think that mushrooms do better in the open air than in covered sheds, which I have frequently experienced to be the case. In sheds, mushroom-beds are apt to become too dry; in the open ground, the humidity of the air, and a little wet sinking through the covering, keeps them in a damp state." (*Gard. Rem.* p. 110.)

3904. *Preparing the dung.* Provide good horse-dung, purged of its fiery heat by the usual preparation; with which some old linings from a melon-bed may be mixed, if it is not winter. (*Abercrombie.*) M^r Phall says, "Take two cart-loads of fresh stable-dung, to which add an equal quantity of old dry linings from melon or cucumber beds, mixing them well together in a heap; and after letting it lie about a fortnight, it will be in a fit state to make into beds. To make a mushroom-bed of new dung, let the same be well prepared, by laying it together in a heap to ferment, and by turning and mixing it well, shaking the outside of the heap, which is cold, and the inside, which is hot, together, so that every part of it may be equally fermented, and deprived of its noxious quality."

3905. *Forming the bed.* Abercrombie says, "Mark out the ground-line of a bed four feet wide at

bottom, the length to be governed by the quantity to be raised; from this, work with an inward slope, so as to terminate with a narrow roof-shaped ridge along the centre, three feet or more in height. In building the bed, shake and mix the dung well together: beat it down with the fork, but do not tread it: leave it to settle, and to expend the first heat in vapour. When the dung is in a fit state to make into a bed, which it will be in about three weeks or a month after it has been put together to ferment, let the bottom for it be marked out about seven feet wide, and as long as you choose to make it: let the foundation on which it is made be dry, and let it be worked up in a sloping manner, so as to terminate with a narrow roof-shaped ridge along the centre, about four feet or more in height. In making the bed, shake and mix the dung well together; beat it down well with the fork; and if the dung be long and dryish, tread it down as you proceed." (*M^cPhail*.)

3836. *Moulding the bed.* "Having proved, by trial-sticks left some days in the bed, that the heat is become moderate, you may cover two thirds of the sloping bank with mould two inches thick, leaving the top of the ridge open for the steam to evaporate as it gradually rises. When the exhalation is finished, the top may also be earthed over;" or, earth round the bed four inches high, forming a ledge of mould two inches thick.

3837. *Planting the spawn.* "Divide the large cakes of spawn into small lumps. These may be planted in rows six or eight inches asunder. Place the lumps of spawn about six inches apart in the same row, inserting them through the mould close down to the surface of the dung; or, the dry spawn may be broken or scattered over the bed; being covered with earth to the depth specified above." (*Abcrrombie*.)

3838. *M^cPhail* directs, "When the bed has been some time made, and the heat sufficiently declined, the spawn may be put into it; but, for fear of the heat being too great in the upper part of it, it had best be at first spawned only half way up all round. Take the spawn in small pieces, and stick it into the sides of the bed, in rows about three or four inches, piece from piece, so that the spawn and earth about to be laid on, may meet. When the bed is spawned as high up as it is thought the heat of the bed will not injure it, take good, strong, rich earth, of a loamy quality, and cover the spawned part of the bed with it, about two inches thick, beginning to lay it at the bottom of the bed, beating it firm with the spade. The earth should be in a pliable state; not wet, nor over dry."

3839. *Covering the ridges.* "The inconvenience of a bed exposed to the weather is, that it is sometimes necessary to cover it from wet, where there is danger of thus exciting a fermentation. When the bed is even under a shed, it is necessary to apply a covering from three to twelve inches thick, as the strength of the dung declines, or the beds may be exposed, at the sides, to rain, snow, or frost. The covering may be either clean straw and long dry stable-litter, or sweet hay and matting; the latter is to be preferred. Lay it thin at first, and increase it as circumstances demand."

3840. *Ridges in open sheds* are formed and planted exactly in the same manner.

3841. *In rearing in close sheds behind hot-houses*, where the temperature approaches to 50° or 55° in the winter months, from the heat arising from the hot-house furnaces, the ridge mode above may be adopted, or a flat bed similarly composed and planted.

3842. *In flued sheds, or mushroom-houses* on the common plan, the method of forming the dung-bed, earthing, and planting is the same as in the last three modes: sometimes, however, the beds are formed in a walled pit, and flat, or sloping, on the surface, like a cucumber-bed.

3843. *German method of cultivating the mushroom.* The culture of mushrooms on shelves, in flued sheds or houses, is a German practice, introduced to this country by Oldacre. The plan of Oldacre's house has been already given (*Jag.* 608. to 611). *M^cPhail* describes a similar one, as "a good method of propagation." (*Gard. Rel.*). To either house the following directions will apply:—

3844. *Compost for the beds.* Collect a quantity of fresh horse-dung, that has neither been exposed to wet nor fermentation, clearing it of the long straw, so as to leave one fourth, in quantity, of the shortest litter, when incorporated with the horse-droppings; then add a fourth part of tolerably dry turf-mould, or rather maiden earth, and mix it well with the dung before mentioned: the advantage derived from the mould or maiden earth is the union of the whole into one compact solid substance, so congenial to the growth of mushrooms. If dung from the exercise ground of a large stable, or the round of a horse-mill, can be procured, and mixed with a fourth part of short litter, and added to as many fresh horse-droppings as will cause a gentle warmth, when made into beds, it will be found superior, for the production of mushrooms, to horse-dung that is gathered from the stables.

3845. *The method of making the beds.* Form the beds on the shelves and ground-floor by placing a layer about three inches thick of the prepared mixture. Then, with a flat mallet, beat it as close together as possible, next add another layer of the compost, repeating the same process as before, and so on until the beds are formed into a solid body seven inches thick, making the surface of the beds as smooth and as even as possible. The reducing the beds into a very solid body is a most essential point; for without it you cannot expect success: and the thickness of them must also be particularly attended to; for, where there is a much greater body, the beds will be subjected to a strong fermentation, and will be prevented, by evaporation, from retaining that consistency in the dung, which is absolutely necessary for the production of a good and plentiful crop. On the contrary, if a much less quantity be laid together, the heat and fermentation will be insufficient to prepare the beds for the nourishment of the spawn; but the assistance of both, to the extent prescribed, cements the materials together, which, in addition to beating, increases greatly their solidity. The proper vegetation of the spawn, and the consequent crop of mushrooms, depend entirely upon a moderate genial heat and fermentation, neither too strong nor too slight. As soon as the degree of heat in the beds is a little more than that of milk from the cow (say from 80° to 90° of Fahrenheit's thermometer), beat the beds a second time, to render them more solid, if possible; then make holes with a dibble, three inches in diameter, and nine inches asunder, through the compost in every part of the beds: these holes will be a means of cooling the beds, and preventing that excess of heat from taking place, which would produce rotteness, and render them unproductive. If the beds do not attain the heat required, in four or five days after they are put together (which you will know by plunging a thermometer into one of the holes), add another layer of the compost, two inches thick, which will probably increase the heat sufficiently: if not, a part of the bed should be taken away, and the remainder mixed with fresh horse-droppings, and wrought together in the same way as before, in order to produce the proper degree of heat. Beds made after this manner readily generate natural spawn in summer, and frequently in the winter months.

3846. *Of spawning the beds.* In three or four days after the holes have been made, by observing the thermometer, it will be found that you have the desired degree of heat, and the inside of the holes will also have become dry; the beds are then in a good state for spawning, which should be done while the heat is on the decline. If this operation be deferred until the heat is quite exhausted, the crop will be late, and less plentiful. Fill every hole full of spawn, which must be well beaten into them, and then make the surface of the beds solid and level; it is of no consequence whether the spawn put into the holes be in one lump or in several small pieces, it is only necessary that the holes should be well filled. About a fortnight after the spawn has been introduced, examine the holes, and if the spawn has suffered any damage from over-heat, or too much moisture, in the beds, introduce fresh spawn in the same way as before. On the contrary, if the spawn be found good, and vegetating freely into the compost, such beds (if required for immediate production) may be covered with mould, agreeably to the rules hereafter laid down; and the beds intended for succession should remain unearthed, in the summer, three weeks or a month before you wish them to produce, and in the winter a month or five weeks. If the spawn be introduced in hot weather, air must be admitted as freely as possible into the shed, till the spawn has spread itself through the beds; for if the place be kept too close, the beds will become soft and spongy, and then the crop will neither be abundant, nor of good quality.

3847. *Of earthing the beds.* Such beds as are intended to be put into work, must be covered with a coat of rich maiden earth, wherein its turf is well reduced. Then spread it regularly over the surface of each bed, two inches thick; and beat it as solid and level as possible. The earth used should be neither too dry, nor yet wet, but so as to become compact together, and take, when beaten, a smooth face. If too moist, it will chill the beds, and injure the spawn. On the contrary, if too dry, it will remain loose, and in a state by no means favourable to the growth of the mushrooms: but when solid, it produces not only finer mushrooms, but in greater quantities, as the earth from soils of lighter texture invariably grows them weaker, and of inferior quality, and such beds cease bearing much earlier.

3848. *Of the subsequent treatment.* From the time of covering with earth, the room or shed should be kept at 50° to 55° of Fahrenheit's thermometer, and the light must be excluded. If the heat be suffered to exceed, to any considerable degree, it will cause the beds to ferment a second time, and weaken, if not totally destroy, the spawn; but should a much lower degree of temperature than the one prescribed be permitted to prevail, the mushrooms will advance slowly in their growth; and if watered in that state, numbers of the small ones will be prevented from attaining perfection. In watering them, extreme caution is necessary, as well in the mode of application, as in the temperature of the water, which should be nearly as warm as new milk, and very lightly sprinkled with a syringe, or a small watering-pot; otherwise the mushrooms are sure to sustain damage. If cold water be used, and given plentifully at one time, it will not only destroy the existing crop, but the spawn also, and render the beds so treated of no further utility. If the beds have been suffered to become very dry, it is better to give them several light waterings than one heavy supply. In gathering the mushrooms great care should be taken not to disturb the small ones that invariably, with good management, surround the stems of those which are more early matured. The best method is to twist them up, very gently, in all instances where you can. But where you are obliged to cut them, great care should be taken to divest the beds of the stems of those that are cut, as they would rot, to the great injury of those that surround them. If the preceding directions are properly attended to, in the management of the beds, they will continue to bear several months, and a constant supply may be kept by earthing one bed or more, every two or three months, according to the quantity of mushrooms required at one season. When the beds are in full bearing, if the mushrooms become long in their stems, and weak, it is certain the temperature of the building is too high; consequently, air must be admitted in proportion to the heat.

3849. *Of renovating the old beds.* As your beds begin to decline in bearing, and produce but few mushrooms, take off the earth clean from the dung, and if you find the latter decayed, destroy the beds and replace them by new ones, being careful to select any good spawn that may present itself; but if, on taking away the earth, you find the beds dry, solid, and full of good spawn, add a layer of fresh compost, as before recommended, three or four inches thick, mixing it a little with the old, and beat it as before. By adhering to this mode of renovating the old beds, a continual supply may be kept up. (*Oldacre, in Hort. Trsaa.*, vol. ii.)

3850. *Estimate of the merits of the German mode of cultivating mushrooms.* Neill observes, "In what particulars the advantage of Oldacre's plan over former modes chiefly consists, does not very clearly appear. Beds made up in the usual way are much less compact, and are more damp; compactness and dryness may therefore be considered as important." (*Ed. Encyc. art. Hort.*) Rogers remarks that the quantity of mushrooms depends upon the manner in which they are nourished: if they are meagrely fed, their flavour and substance will be poor in proportion. Hence, it is alleged by some, that artificial mushrooms are, generally, richer and higher flavoured than those which grow naturally; and again, among the artificial produce, those are best which are reared on large and deep beds. It is a fact that in Covent Garden market, mushrooms grown on ridges are greatly preferred to those grown on shelves, or in boxes, in the German manner: they are considered heavier and more juicy. (*Hort. Trsaa.*, vol. iv. p. 475.) Another German mode of cultivating the mushroom will be found described and illustrated by a figure in § 689.

3851. *The French mode of cultivating the mushroom, as practised in the neighbourhood of Paris, in the subterranean stone quarries, and also in the gardens, will be found in detail in § 445.*

3852. *Growing mushrooms, in pots, boxes, &c. with dung, by Wales.* "Having given an account how to procure the spawn, which is the principal point, I shall next proceed to state how mushrooms are to be raised from the spawn with dung. I raise the mushrooms in boxes, hampers, or, in short, in any thing which will hold the dung and the soil together. These boxes or vessels are placed in the back sheds of the hot-houses, or in any house whatever, where no damp nor frost can enter. There should be several boxes, a part only being filled at a time, so as to keep a rotation of them, and have mushrooms at all times ready for the table. I shall suppose three boxes to be filled at one time. Each box may be three feet long, one and a half broad, and seven inches in depth. Let each box be half filled with horse-dung from the stables (the fresher the better, and if wet, to be dried for three or four days before it be put in the boxes); the dung is to be well beat down in the boxes. After the second or third day, if any heat has arisen amongst the dung, it is then a fit time to spawn: break each spawn-brick into three parts as equally as possible; then lay the pieces, about four inches apart, upon the surface of the dung in the box; here they are to lie for six days, when it will probably be found that the side of the spawn next to the dung has begun to run in the dung below; then add an inch and a half of more fresh dung upon the top of the spawn in the box, and beat it down as formerly. In the course of a fortnight, the box will be ready to receive the mould on the top; this mould must be two inches and a half deep, well beaten down with the back of a spade, and the surface made quite even. But before the box be earthed over, it will be proper to take up a little of the dung, as far down as near the bottom of the box, to see if the spawn has run through the dung; if not, let the box stand unearthened for some days longer, for, were it to be earthed before the spawn had run through the dung, there would be but a poor crop. In the space of five or six weeks the mushrooms will begin to come up; if then the mould seem dry, give a gentle watering, the water being slightly heated in any warm place before applied. This watering will make the mushrooms start freely, and of a large size. I cut three myself, which weighed 1½ oz. from a box treated as above. The boxes will continue to produce for six weeks, and I have had them productive sometimes for two months, if duly attended to, by giving a little water when dry, for they need neither light nor free air. I have had thirty-two pretty well-sized mushrooms in one cluster. If cut as button-mushrooms, each box will yield from six to twelve Scots pints (¾ to 48 Eng. pints), according to the season and other circumstances. The plan now described, I prefer for yielding numbers of mushrooms, and where a great many are required; but when reared without dung, they are best flavoured. They are not then to be distinguished from those which grow naturally in the fields, but comparatively few are in this way produced. I have lately found it very useful to add to every three barrow-loads of horse-dung, one of perfectly dry cow-dung, beat down to powder as it were, and well mixed among the horse-dung, after the horse-dung has lain under cover for four or five days to dry. The reason I tried the cow-dung dry was, that I still found the horse-dung to have a strong damp, after having lain in the boxes for some time; but the cow-dung, when beat down to powder, has the effect to dry up this damp, and also to make the horse-dung lie in the box more compactly; and the more it is pressed down, the finer the spawn will run amongst it." (*Wales, in Calad. Hort. Mém.*)

3853. *Growing mushrooms, in pots, boxes, &c. without dung.* "Take a little straw, and lay it carefully in the bottom of the mushroom-box, about an inch thick, or rather more. Then take some of the spawn-bricks, and break them down, each brick into about ten pieces, and lay the fragments upon the straw, as close to each other as they will lie. Cover them up with mould, three inches and a half deep, and well pressed down. When the surface appears dry, give a little tepid water, as directed for the last way of raising them; but this method needs about double the quantity of water that the former does, owing to

having no moisture in the bottom, while the other has the dung. The mushrooms will begin to start in a month or five weeks, sometimes sooner, sometimes later, according to the heat of the place where the boxes are situated. They do not rise so thick nor of so large a size, nor do they continue to be produced so long, as in the other plan with dung." (*Wales*.)

3854. *Compost or mould for growing mushrooms in boxes.* "Take a quantity of horse-dung from the stable-yard fresh, and for every layer of dung, six inches in depth, lay three inches of fine earth from any light soil: these alternate layers may be repeated till there be as much as will probably be wanted for the course of a year. After this mixture has lain about six months or so, the dung will be sufficiently rotten: it should then be well broken with a spade, and passed through a garden-sieve. Two inches of this compost laid upon the top of the box, and well pressed down with the back of a spade, will be found to answer. It is to be understood, that the same compost, made of the dung and earth, is used for going on the top of the beds formed with dung, as well as on those without it, observing to have it sifted fine, and well dried, for if it be damp, the spawn would not run freely amongst it." (*Oldacre in Horticultural Transactions.*)

3855. *Culture of the mushroom in melon-beds.* The following mode has been practised by the Rev. W. Williamson, for several years, with great success. He considers it more economical and generally practicable than the plan of Oldacre. "Having made my melon-bed in the usual manner, when the burning heat is over, and the bed is ready to be earthed to a sufficient thickness, I place spawn on the sides of the hills, and also on the surface of the bed, and then cover the whole with mould, as usual managing the melons exactly in the same manner as if the spawn were not there, not omitting even to tread it, as I find that a compact loam is more congenial to the growth of the mushroom than the light rich compost of the cucumber-bed. The heat will soon cause the spawn to run, and extend itself through the dung, to the surface of the ground. In September or October following, when the melon-bine is decaying, the bed is carefully cleaned, the glasses are put on, and kept close; and when the mould becomes dry, it must be frequently watered, but not immoderately, as too much wet would destroy the spawn; advantage should also be taken of every gentle shower, for the same purpose. The moisture coming up on the dry earth produces a moderate heat, which soon causes the mushrooms to appear in every part of the bed, in such abundance as even to prevent each other's growth. I have frequently, at one time, gathered two bushels from a frame ten feet by six, and have produced individual mushrooms of nearly two pounds' weight. The mould being kept warm by the glasses, and properly watered, the mushrooms will continue to spring till the frost of winter prevents their further growth. I then leave the bed, frame, &c. just as they are, and early in spring, as soon as the frost may be supposed to be over, I take off the frame and glasses, and cover the bed lightly with straw; when the warm enlivening showers of spring cause the mushrooms to be again produced in every part, till the drought of summer renders it difficult to keep the bed sufficiently moist for their growth. Sometimes I suffer the bed to remain in order to produce a crop in the second autumn, but more generally take the bed to pieces, for the sake of the dung, and also for the purpose of procuring and drying the spawn, against the return of spring. When I first thought of raising mushrooms in the manner above described, I was apprehensive lest the spawn, by running among the roots of the melons, might injure their growth. I therefore planted it in one light only, but the result convinced me that it did no injury, as, on the only plant in that light I grew a melon, of the black rock kind, weighing eight and three quarters pounds, for the first crop, and another six and a half pounds for the second crop; both of which ripened well. Since that time I have always placed the spawn over the whole of the bed, and have never failed to produce a good crop of both melons and mushrooms. Should it be thought advisable to have a supply of mushrooms during the depth of winter, I am confident (though I have not tried the experiment), that they might be obtained, at a trifling expense, by lining the bed with hot dung, and using other precautions to keep out the cold air." (*Hort. Trans.* v. 11.)

3856. *Oldacre*, at the end of his paper on growing mushrooms on shelves, &c. says, "They may be grown also plentifully, in hothed frames, by the same process as is recommended for the sheds. In this latter practice, as soon as the beds are earthed, they should be covered with hay or litter under the lights, until they are in full bearing, then remove the covering to the outside of the lights, to exclude the sun and air as much as possible. In cold weather, if they advance slowly in their growth, the frames may be covered with hot dung, which will greatly encourage them. It must be recollected, that when these beds are made in hot weather, air must be admitted as freely as possible into the frames, during the time of spawning, as directed for the management of this part of the process, in cellars or sheds."

3857. *In old hotbeds.* A good crop of mushrooms is sometimes obtained without making a bed on purpose, by introducing lumps of spawn along the margin of late cucumber ridges, just into the top of the mould. This may be done from March to May. (*Abercrombie*.)

3858. *In pits.* *Reeves* has adopted this practice, and thus describes it. "To make my bed, the dung was placed in the bottom of the pit, and rammed tightly down, to about the thickness of eighteen inches; the dung itself producing sufficient heat to set the spawn running, after it had been introduced in the usual manner. The bed was made up last September, and came into bearing in six weeks; it has continued to produce regularly to the present time, and requires no more heat than is collected by the effect of the sun on the air within the house, except on frosty nights, when a little fire is put into the due. The mushrooms come up uniformly over every part of the bed, which is covered very slightly with straw (not sufficient to exclude the light), for the purpose of preserving moisture on the surface."

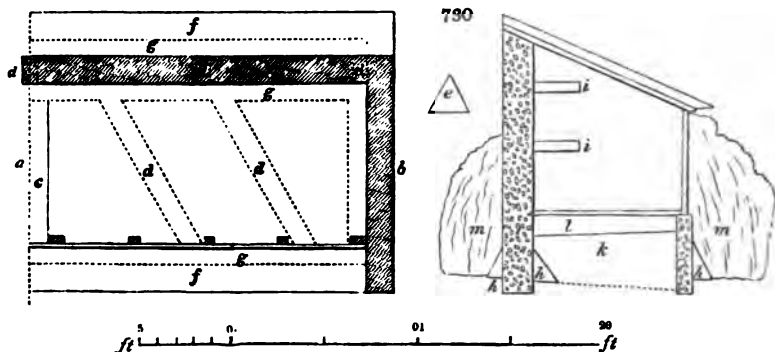
3859. *In dark frames.* *Nicol* says, "If you have no mushroom-house, and yet are anxious to have mushrooms in winter, a cover or frame, capable of defending the bed from rain, snow, or frost, may be made at a small expense, thus: first, make a frame of inch-and-half deal, nine or ten inches deep, six feet wide, and of any convenient length, from ten to twenty feet. Then fit a roof to the frame, three feet in the pitch, made of thin weather boarding, which should be covered with two or three coats of pitch or paint. The roof part should be fixed down to the wooden frame by hooks and eyes, or by bolts, so that it may be removed at pleasure, and it should have two movable boards on each side, of about a foot square, to slip aside for the admission of air. This sort of frame being placed in a dry warm situation, and being insulated by a drain or trench, would completely defend the bed from wet; and, if covered with straw or mats, from frost. If the ground be not perfectly dry, a sole or floor must be formed of ashes, gravel, or stone-chips, for the bed; a thing necessary in any situation which is the least damp, either within or out of doors."

3860. *In a cellar.* "Mushrooms may likewise be produced in a cellar, or any other vaulted place, with equal success, and not unfrequently to greater advantage as to crop, than in a shed, or other building, that is level with the surface of the earth. The same rules of management are to be observed as directed for the shed. The peculiar advantage of a cellar is, that no fire is necessary, and less water, the application of which so frequently proves injurious, is wanted."

3861. *On hollow ridges.* *Hogan* says he has devised an easy mode of growing mushrooms under shelter, and tried it one season with great success. "The exterior form of my bed resembles the old ones as built against a wall; but instead of building it solid, it is hollow; strong stakes are inclined against the wall, at an angle of about 65°, on which are placed hurdles to support the bed. By this means a cavity is formed under the stakes, between them and the wall and floor, for the purpose of receiving dung, which being readily changed, an opportunity is thus afforded of keeping up a permanent moist heat in the bed, the absence of which, together with an insufficient depth of mould for the spawn to run in, is the great defect of all other modes of raising mushrooms with which I am acquainted. On this structure fourteen inches of rotten dung and four inches of loamy earth were laid, and best firm, and the spawning and other processes and results were the same as usual." (*Hort. Trans.*, vol. v. p. 305.) We fear two things

from this mode, occasional overheating and overdrying; either of which is as ruinous to the mushroom as they are to Cape heaths in pots.

3862. *Callow's mode of cultivating the mushrooms* differs from all the others which have been mentioned, in the employment of the steam from dung for heating the air of the mushroom-house. The state of moisture in which the air of a mushroom-house is kept, Mr. Callow observes, though it has hitherto almost escaped the notice of gardeners, is nevertheless of the first importance. Every countryman knows that mushrooms are most abundant in close, foggy, or what, in some parts of the country, is called "mushroom" weather. The dimensions of Mr. Callow's mushroom-house may be twenty or thirty feet in length, and ten or twelve feet in width, on a dry foundation. When a large supply is wanted, there should be two houses; one for summer use, sloping to the N. or N.E., and the other for winter use, sloping towards S. or S.W. The back and end walls may be built of stone or brick; but the front wall Mr. Callow prefers having made of boards on the outside, and plastered on the inside, as being cheaper than open brickwork; and affording less shelter to wood-lice or other small vermin. The roof should be thickly covered with thatch; and there should be apertures at each end, such as windows, and air holes, with boarded shutters. When the house is of considerable length, there might be a window in the middle of the roof, for the admission of light when work is being done within. The door should be in the centre; and in the floor, from the door-sill to the back wall, there should be a trench eighteen inches or two feet wide. The use of this trench is to receive a supply of hot dung, at such times as it may be found necessary to raise a greater heat, or a greater degree of moisture than what is supplied by the external linings. All the rest is common routine, and will be perfectly understood by any gardener, from the following description of the ground plan and section (fig. 790), taken from Mr. Callow's valuable little work. The plan *a, b*, is of half a mushroom-house, thirty-six feet long, and nine feet wide within; *c* shows the plan of half the trench for receiving hot dung; *d d* are flues, the section of which is shown at *e*, for receiving the steam from the linings made at the back and front, in the trenches *ff*; *g g* are the flues inside and outside the back and front walls, which communicate with the cross flues; their sections are shown at *h*; *i i* are two shelves of stone, slate, or board; *k* is the space beneath the bed, filled with loose stones; *l* is the bed, prepared in the usual manner; and *m*, the linings of dung, leaves, or grass. (Ob. on Mushrooms, with a full explanation of an improved mode of culture.)



3863. The following details of culture are common to each of the above modes of rearing the mushroom:—

3864. *Season for commencement.* Mushroom-beds or boxes may be formed and planted at any time of the year; but the month of September is the most natural season; and the time next to be recommended is early in spring. In June, July, and August, the weather is rather too warm; and in the depth of winter, it is not equally easy to excite and cherish the spawn. (Abercrombie.) Nicol makes up a bed in March to last till September, and another at that time to last through the winter, till the bed to be again made in March comes into bearing. He adds, however, that there is no rule for making up these beds, as it may be done at any day of the year with nearly equal propriety. (Calendar, p. 50.)

3865. *Time of growth.* In autumn and spring, common ridges will often begin to produce plentifully in four, five, or six weeks. In summer or winter they are much longer before they become productive. (Abercrombie.) In Wales's method of growing in boxes, they come up in five weeks. Abercrombie says, mushroom-beds have been known to lie dormant for five or six months, and yet afterwards produce abundant crops. Where a bed is cold, Nicol observes, it will be sometimes two or three months of producing mushrooms.

3866. *Symptoms of progress.* Nicol says, when you would know whether the spawn has begun to run, thrust your hand a few inches deep into different parts of the bed, and examine what you bring up. If it smells exactly of mushrooms, and has the appearance of bits of thread, then the spawn is in action. "But generally you will be forewarned of the spawn's running, by a previous crop of spurious fungi, which rise more or less abundantly, according to the fineness or grossness of the materials of which the bed is composed. These fungi generally are either what are called pipes or balls; and sometimes a kind of mushroom, of a very bad sort, thin, flat, with white or pale yellow gills. They have all, however, a nauseous, sickly smell, and may readily be distinguished from the true mushroom, which is thick, hemispherical, with brown or reddish gills."

3867. *Duration of a crop.* Six months is the ordinary duration of a common bed or ridge, made in the open air or in a flued shed. Oldacre says, his beds will continue to produce for several months. To have a succession, he earths a bed every two or three months. Wales's boxes (3852.) continue to produce for six weeks, and sometimes two months.

3868. *Temperature.* Nicol says, if the bed be placed in a flued shed, the temperature in winter should be kept steadily to about 55°. This is also Oldacre's temperature.

3869. *Wales* says, "I have ever found the best adapted and most productive heat to be from 55° to 65°; and the nearer the beds are kept to this heat, the greater will be the success."

3870. *Air* is essentially necessary to the flavour of mushrooms. Oldacre says, air must be admitted in proportion to the heat, otherwise the mushrooms become long in their stems, and weak. The same thing takes place in ridges when the coverings are too thick.

3871. *Water.* Abercrombie and Nicol agree in recommending no water to be given till the spawn begins to run.

3872. *Abercrombie* says, "In autumn, the bed will want no water until the first crop is gathered. Then a sprinkling will help to excite a fresh vegetation. In spring, should a drying air long prevail, it may be necessary to moisten the bed a little. In summer, the bed may be now and then exposed to gentle

showers, or otherwise watering according to the dryness and heat of the season. In order to give water, without wetting the bed excessively or unequally, scatter a thin layer of short hay over the ridge; and let a small quantity of water be gently distributed, to all parts alike, from a rose-pan. Leave it to filter through the hay, and cover the bed up with litter. In winter, the substitute for watering must be some warm mulch from a dung-heap, laid over the dry litter; the moisture evaporating from this will promote the growth of the mushrooms. Excessive moisture is not only apt to destroy the spawn, but it debases the flower of such fungi as can be produced under it. It is also supposed to render the salutary sorts less so, and to make the unwholesome kinds more acrimonious."

3573. Nicol says, "When the spawn is fully formed, give the bed two or three hearty waterings, in order to set it a growing; for, otherwise, it will lie dormant, and show no symptoms of vegetation. Give just as much water (but by no means at once) as will fairly reach to the bottom of all the materials, and afterwards keep the bed in a state neither wet nor dry, but rather inclining to the latter, this being the safe side to err on, as it is more easy to make it damp than to dry it. When a bed has been, as it were, tired of producing, I have sometimes desisted from watering for several months; then by examination I have found a new net of spawn formed all over the surface, the threads being deep-rooted, even to the bottom. By a hearty watering, as above, a most plentiful and lasting supply has been obtained. The idea of treating my bed so, arose by observation of the manner in which field mushrooms are often produced. We frequently see the crop suddenly disappear, and as suddenly appear again, according to the state of the weather, with respect to wet or drought; and that too in the same field."

3574. *Oldacre* waters with extreme caution, using water nearly as warm as new milk, sprinkling very lightly with a syringe, or a small watering-pot. Cold water destroys the bed and the spawn, and thus renders the whole useless.

3575. *Some old authors* advise to take a few full-grown mushrooms, and breaking them down in the watering-pot, to water the beds with the infusion. This, Neill observes, is plainly nothing else than sowing mushroom seed.

3576. *Light*. Abercrombie, Nicol, and most gardeners, and authors, consider light as quite unnecessary for the production of the mushroom. It is very probable, however, that it contributes in some way to their perfection, since in their natural situation, they enjoy a considerable portion of it. Our opinion is, that it should not be entirely excluded from mushroom-houses or beds, on whatever plan they may be constructed. See an interesting proof of value of light in *Chaplain's La Chimie appliquée, &c.*, vol. i. p. 180.

3577. *Gathering the crop*. When the bed is in full production, and the season fine, mushrooms may be gathered two or three times a week. Turn off the straw covering, and return it carefully at each gathering. (*Abercrombie*). "In gathering mushrooms," Nicol observes, "they should always be cut, and never be pulled; as by pulling, many young ones might be destroyed. There are always a number of these forming or clustering about the roots of the old ones, which should not be disturbed. If the spawn be deeply situated in these beds, mushrooms will often form and come to full maturity entirely underground. They may easily be recognised, however, as they are generally large, and push up small hills above their heads. They ought to be uncovered with care, that the spawn about them may be as little disturbed as possible." *Oldacre* says, in gathering mushrooms, avoid disturbing the small ones, that invariably, with good management, surround the stems of those which are more early matured. Twist them up very gently in all instances where you can; and when obliged to cut them, take care to divest the beds of those that are cut, as they would rot and injure those around them.

3578. *Growing mushrooms in the open air*. We have already suggested (§ 3404.), that mushrooms might be grown in the open air during the warmer months; and this, we are informed, was practised twenty years ago, by Mr. Cunningham, a nurseryman at Edinburgh. More recently, it has been successfully tried in the gardens of the Archbishop of Armagh, by Mr. Ellis, who gives the following account of his practice:—"After trying various modes, with different degrees of success, he says, 'In April, 1831, I made a bed upon a pavement seven feet wide, forty feet long, and two feet high; the bottom part, say upwards of eighteen inches, I covered with fresh litter, and the top entirely with an old mushroom bed, from which the best of the spawn was picked, to be afterwards distributed regularly over the surface. Upon this about four inches thick of pasture loam was spread, and a thick straw rope pegged down round the edges, to keep the loam or mould from falling off, and to give a finished appearance to the bed. I now sowed some seeds of short horned carrots, radishes, cauliflowers, tender annuals, &c.; in short, any thing that required a little heat; in fact, it was for these things that I made the bed; the mushrooms being only a secondary consideration. The bed thus finished came into bearing about the middle of June, and continued till November. It was in July and August that I first perceived the value of the carrots; for the tops completely shaded the mushrooms from the scorching heat of the sun, and as effectually sheltered them from the chilling frosts of October. The crop surpassed any thing either my neighbours or myself ever before saw; it must, however, be recollected, that 1831 was a remarkably good year for mushrooms, whichever way they were grown.' By this plan, every farmer in the empire might be taught to produce mushrooms in abundance; since nothing can be more simple than making a bed two feet high, and five or six feet wide, with fresh horse litter on the surface of the ground, in a dry airy situation. The length, of course, is a matter of choice or convenience. The bed will require to be covered with the cleanings from the horse track of a threshing-machine, or from a colt house; over these cleanings spread a few inches of mould, sow the carrot seed, and the work is done." (*Gard. Mag.*, vol. ix. p. 229.)

3579. *Poisonous mushrooms*. For the characters of the true mushroom (*Agaricus campestris*), and the other species and varieties, edible and deleterious, see the fourteenth section of the following chapter.

3580. *Insects*. Mushrooms are liable to be eaten by slugs and wood-lice; the latter being very apt to take shelter among the hay which is generally used as a covering to the beds. Snails and slugs ought to be excluded, or picked up as soon as they find entrance. Wood-lice are not so easily rid of, except at periods when the beds are to be renovated, when the whole house may be syringed with boiling water. A toad kept in a mushroom-house will eat the vermin mentioned, and also worms, and ants, and other insects; but to most people the idea would be disgusting of a toad crawling over any thing intended for the table.

CHAP. VIII.

Horticultural Catalogue.—Hardy Herbaceous Culinary Vegetables.

3581. *The various plants and trees grown in the different departments of horticulture* shall now be more particularly enumerated and characterised, and some account given of their history, use, and culture. We shall commence with the hardy herbaceous vegetables; and the most suitable arrangement for this class of plants seems to be, that arising from a combined view of their habits, culture, and uses in domestic economy. Though no such arrangement can be absolutely perfect, from the circumstance of some of the plants being used for different purposes, yet, by bringing together such as present

most points of union, something better than a mere alphabetical catalogue is formed, of which the following is the outline : —

3882. *The cabbage tribe* ; comprehending the white and red cabbage, cabbage-colewort, Savoy, Brussels sprouts, borecoles or winter greens, cauliflowers, and broccolis.

3883. *Leguminous vegetables* ; comprehending the pea, bean, and kidneybean.

3884. *Esulent roots* ; comprehending the potato, Jerusalem artichoke, turnip, carrot, parsnep, red beet, skirret, scorzonera, salsify, and radish.

3885. *Spinaceous plants* ; comprehending the garden-spinach, white-beet, orache, wild spinach, New Zealand spinach, sorrel, and herb-patience.

3886. *Aliaceous plants* ; comprehending the onion, leek, chives, garlic, shallot, and rocambole.

3887. *Asparaginous plants* ; comprehending asparagus, sea-kale, artichoke, cardoon, rampion, alisanders, hop, bladder-campion, cotton-thistle, and milk-thistle.

3888. *Acetarious plants or salads* ; comprehending small salads, lettuce, endive, succory, dandelion, celery, mustard, rape, corn-salad, garden-cress, American cress, winter cress, water-cress, brook-lime, scurvy-grass, garden-rocket, burnet, buckshorn plantain, ox-eye daisy, and some of those included in other sections, as the sorrel, tarragon, Indian cress, &c.

3889. *Pot-herbs and garnishings* ; comprehending parsley, purslane, tarragon, fennel, dill, chervil, horse-radish, Indian cress, marigold, borage, and some others included in other sections.

3890. *Sweet herbs* ; comprehending thyme, sage, clary, mint, balm, marjoram, savory, basil, rosemary, lavender, tansy, costmary, and some of those in the preceding section.

3891. *Plants used in tarts, confectionary, domestic medicine, and for destroying insects* ; comprehending rhubarb, gourd, angelica, anise, coriander, caraway, rue, hyssop, chamomile, elecampane, liquorice, blessed thistle, wormwood, tobacco, and some others.

3892. *Plants used as preserves and pickles* ; comprehending love-apple, egg-plant, capsicum, caper, samphire, and the red cabbage, Indian cress, radish, kidneybean, marsh marigold, &c. included in other sections.

3893. *Edible indigenous plants neglected, or not in cultivation* ; comprehending the sea-beet, nettle, sea-peas, and a variety of other natives.

3894. *Foreign hardy herbaceous vegetables*, little used as such in Britain ; comprehending the Claytonia and Basella spinach, the maize, the bread-root, &c.

3895. *Edible British fungi* ; comprehending the mushroom, truffle, and morel.

3896. *Edible British fuci* ; comprehending the dulse, tangle, &c.

3897. *Most of the vegetables in the preceding classification* are propagated by seeds, and these seeds the gardener, for the greater part, purchases annually from the seedsman ; raising only in his own garden some few of the more select or important kinds. It follows from this, that the qualities of the seeds vary exceedingly, not only according to the season in which they may have been grown, but according to the means of the seedsmen for procuring the best varieties. Experience also shows that the varieties of the more common culinary vegetables in cultivation are continually changing, from soil, culture, climate, or other causes ; so that a sort of pea, or cabbage, or onion, which is very popular one year, may, in three or four years, be almost forgotten. Varieties also are continually changing their names, and often many names are applied to one variety. Hence a number of the varieties enumerated in the following catalogue were not known when the first edition of this Encyclopædia was prepared in 1890 ; and a number of those mentioned in that edition are now nearly forgotten. From all this it follows, that the business of procuring garden seeds is one of very great difficulty, though it is one of the greatest importance to the cultivator, since a bad variety requires the same care and attention as a good one, while it produces an inferior article, or perhaps fails altogether. As no gardener can grow all or even the greater part of the seeds which he requires, he must necessarily deal with seedsmen ; and, as a matter of prudence, he should choose one in whom he has perfect confidence. He should also give a certain latitude in his orders as to new varieties, always requesting to have sent to him, in addition to the usual sorts, any new sorts which may be considered superior. It were much to be desired, that seedsmen would print their catalogues annually, instead of once in every four or five years ; and that they would include in them all the synonymes, distinguishing them as such, and not introducing them as distinct sorts. This would greatly reduce the apparent number of varieties, and much simplify the business both of gardener and seedsman. As the seed business is at present carried on, there are perhaps twenty names in a list for which there are not more than ten, or sometimes not even five distinct articles ; but the seedsman answers orders for the whole of the twenty names, by sending out the same sorts under several names ; thus perpetuating throughout the country a number of names which can only serve to create confusion. In the following catalogue, we have simplified the lists as much as possible ; in which task we have had the invaluable assistance of Mr. Munro, of the London Horticultural Society's Garden, where

nearly all the culinary vegetables of Europe have been grown, compared, and had their nomenclature adjusted; of Mr. Malcolm and Mr. Forsyth, two of the most experienced seedsmen in London, and of M. Vilmorin, the first seedsman in France.

3898. *A part of the articles in the following catalogue being perennials, are chiefly propagated by division, or by tubers or roots; and these also the gardener must purchase from the nurseryman. There are few of these however, which are not distinct species, or subspecies; and, consequently, there is much less room for error and deception than in the case of seeds.*

SECT. I. *The Cabbage Tribe.*

3899. *The cabbage tribe is of all culinary vegetables the most ancient, as well as the most extensively cultivated. The Brassica oleracea, Tetrad. Siliq. Linn. and Cruciferae Juss., figured in Eng. Bot. t. 637., being extremely liable to sport, or run into varieties and monstrosities, has, in the course of time, become the parent of a numerous race of culinary productions, so various in their habit and appearance, that to many it may appear not a little extravagant to refer them to the same origin. Besides the different sorts of white and red cabbage, and savoy, which form their leaves into a head, there are various sorts of borecoles, which grow with their leaves loose in the natural way, and there are several kinds of cauliflower and broccoli, which form a head of their stalks or flower-buds. All these, from the tree cabbage, growing to the height of twelve feet, to the colza, and some other varieties, which, before they come into bloom, seldom exceed a foot in height, including the turnip-rooted cabbage and the Brussels sprouts, claim a common origin from the single species of Brassica above mentioned. Cabbage was a favourite culinary vegetable with the Romans, and there can be little doubt that it would follow in the train of their victories into other countries; and where this people did not introduce it by conquest, their successors probably did so during the spread of religious corporations. Hence we may conclude that the cabbage must have been known in England before the commencement of the Christian era, and that in Ireland and the most northern parts of Scotland, it would find its way with the establishment of monasteries in the dark ages. This general remark will apply to all the culinary vegetables and fruits cultivated by the Romans. The cabbage, in a wild state, is a biennial, and grows naturally on the sea-shore in different parts of England, more particularly at Dover, where it is abundant on the chalk cliffs, and at Penzance; in both which places it is sometimes used by the inhabitants.*

3900. *A new arrangement of the cultivated species of Brassica has been made by Prof. Decandolle (see Hort. Brit., p. 263.); but, for garden purposes, we shall adopt the usual divisions of white or green close-headed cabbages, red or purple close-headed cabbages, blistered or Savoy close-headed cabbages, Brussels sprouts, borecoles or open-leaved cabbages, cauliflowers, and broccolia. All these varieties are generally propagated by seed; but they may all be also propagated by cuttings; and this mode has, in some cases, been found the best with certain varieties.*

SUBJECT. 1. *White Cabbage.* — *Brassica oleracea* var. *a capitata* L. and Dec. *Chou pommé*, or *cabus blanc*, Fr.; *Weiss kopfkohl*, Ger.; *Witte kool*, Dutch; *Capolo*, Ital.; *Berza*, Span.; and *Verça*, Port.

3901. *The common garden cabbage is too well known, and too universally used, to require any description. By proper culture it produces in British gardens, from May to November, firm, compact heads, glaucous, green, or greenish-yellow externally, but blanched within; and varying, in different sorts, from three to twelve or fifteen inches' diameter, and from two to fifteen or twenty pounds' weight.*

3902. *Subvarieties. These are very numerous: the sorts chiefly cultivated are—*

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| 1. <i>Knight's early.</i> | 5. <i>Early dwarf's earwig.</i> | 8. <i>Finnish.</i> |
| 2. <i>Small early dwarf, or fine early dwarf.</i> | 6. <i>Purston</i> (a village in Devonshire), <i>Purston</i> , <i>Pentonville</i> , <i>Canal</i> , or <i>curled.</i> | 9. <i>Portuguese</i> , <i>Large-ribbed</i> or <i>Curve Tronchada.</i> |
| 3. <i>Early dwarf's York.</i> | 7. <i>Late earwig</i> , large hollow sugar-head. | 10. <i>Dwarf's Portuguese.</i> |
| 4. <i>Early Bitterness</i> , <i>East Ham</i> , or <i>Early Imperial.</i> | | 11. <i>Field cabbage</i> , <i>Scotch Strasbourg</i> , or <i>drumhead.</i> |

3903. *Estimate of sorts. The first five sorts are suitable for the earliest and secondary summer crops; and the early Bitterness will do also for the principal summer, autumn, and winter supplies. The eleventh sort is generally grown in fields for cattle, or in large quantities in field gardens, for supplying the public markets, especially near shipping towns for sea stores. The Vanack cabbage, though it has been cultivated by the Earl of Egremont, at Petworth, for upwards of half a century, has been only lately brought into notice by the London Horticultural Society. "By timely sowings," Mr. George Lindley observes, "the Vanack cabbage is always in season; it makes excellent spring coleworts, becomes a white-hearted cabbage very early, and pushes fine sprouts from the stump after the cabbage is cut. In quality it is inferior to none of the best cabbages." (Guisde, &c., p. 534.) The Portugal cabbages may be considered articles of luxury, like cauliflower.*

3904. *Propagation. All the kinds are raised from seed annually, of which, according to Abercrombie's seed estimate, "for a seed-bed to raise the early York, and similar varieties, four feet wide by twenty in length, two ounces" will be required. For a seed-bed to raise the large sugar-head, and other luxuriant grown, four feet by thirty-six in length, two ounces. Sow at three different seasons, that is, spring, summer, and autumn, and cover from an eighth to a quarter of an inch. Under a deficiency of winter-standing young plants, for final transplanting in spring, or in order to have some spring-sown plants as*

forward as possible, a moderate portion of some best early sorts may be sown between the middle of February and the middle of March, in a slight hotbed or frame, to nurture the plants till the leaves are an inch or two in length. Then prick them into intermediate beds in the open garden, there to gain strength for final transplanting. (*Abercrombie*.)

3905. *Propagation by cuttings.* This mode is practised in the Brazil, and has been adopted by Peter Kendall, Esq., at Higham Lodge, near Stratford St. Mary's, Suffolk, for several years, with perfect success. The slips, when taken from the cabbage stalk, are exposed a sufficient time to the sun and atmosphere to cauterise the wounded part; in the summer twenty-four hours is sufficient, and two or three days in winter; rubbing a few wood ashes on the part, which assist in cauterising the wound, and prevent bleeding. Plant the slips thus prepared, and then, after cutting the cabbages, the sprouts again afford a supply of slips for plants; and thus a regular succession of cabbages is secured throughout the whole year, with the certainty of preserving the quality of the parent stock unchanged, and of doing away with the necessity of raising plants from seed at all. (*Gard. Mag.*, vol. ix. p. 327.)

3906. *Soil and situation.* The soil for seedlings should be light, and, except for early sowings, not rich. Where market-gardeners raise great quantities of seedling cabbages to stand the winter, and to be sold for transplanting in spring, they choose in general the poorest and stiffest piece of land they have, more especially in Scotland, where large autumnal sowings of winter drumhead and round Scotch are annually made, and where the stiffness of the soil gives a peculiar firmness of texture and hardness of constitution to the plants, and prevents their being thrown out of the soil during the thaws which succeed a frosty winter. Transplanted cabbages require a rich mould, rather clayey than sandy; and, as Nell and Nicol observe, it can scarcely be too much manured, as they are an exhausting crop. Autumnal plantations, intended to stand the winter, should have a dry soil, well dug and manured, and of a favourable aspect. The cabbage tribe, whether in the seed-bed or final plantation, ever require an open situation. Under the drip of trees, or in the shade, seedlings are drawn up weak, and grown crops are meagre, wretched, and ill-favoured.

3907. *Early and main summer crops.* The cabbage being a biennial, the largest crops are obtained by sowing the year previous to that in which you expect to reap. A nice attention is required as to the time for sowing this crop, it being found that two or three days earlier or later in sowing will make as many weeks' difference in the time of heading; and even, in some cases, will prevent heading at all, by throwing the growing season so late in the succeeding summer that the plants run to seed. Experience proves that, for the latitude of London, the first or second week in August is the time most conducive to ultimate success, though some sow at the close of July, to have the plants stronger before the approach of winter; but of a crop so forward, many generally run to seed in the spring. The principal sowing should be neither sooner than about the 5th, nor later than the 12th of August; for, if sown earlier, many of the plants are apt to run in the spring, as just stated; and if sown later, they would not acquire sufficient strength, before winter, to enable them to stand severe weather so effectually as those a little advanced in growth.

3908. *In transplanting cabbage,* keep each sort separate; and plant in soil which has been well manured. Plant some of the dwarf early in rows, from a foot and a half to two feet asunder, to admit of thinning for use in a young cabbage state; those of the middle-sized, intended for main crops, plant at two feet or two and a half distant. The large autumnal kinds plant at least from two feet and a half to a yard asunder, giving water at planting in dry warm weather.

3909. *In their subsequent growth,* if any fall or run to seed, be careful to pull them up directly, and supply the deficiencies with fresh plants. As the crop proceeds, give it two or more timely hoeings, both to cut down all rising weeds, and to loosen the ground between the plants, drawing some earth round the stems, which will strengthen and forward them considerably.

3910. *The different sorts will cabbage in succession* from April to October. Some may be forwarded in cabbaging by tying the leaves together, moderately close, with oster twigs, or strands of bast. The succeeding main crops will not need that assistance, but will head spontaneously in due time. Of the earlier dwarf kinds, some probably will be fit for cutting, in small cabbage heads, at the close of April or beginning of May; the others will be in full growth from May to July; and the succeeding main crops in full heads from July to October.

3911. *Early spring-sown crop.* To succeed the crops of the preceding autumn sowing, it is requisite to sow in the spring, to raise plants for use the same year, partly as young summer cabbages, and partly with full heads, in autumn and winter. For this purpose, sow at the close of February, or in March, and the beginning of April.

3912. *Late spring or summer sown crop.* For late young summer and autumn cabbages and winter plants, you may sow small portions at any time from May to July, principally of the quick-heading kinds; plant out finally in summer and autumn to produce young heads, and small cabbage-hearted coleworts in August, September, October, and thence till midwinter. The large late family cabbages, which make returns for autumn, winter, and early spring, also the largest kinds usually adopted for field-culture, are to be excluded from this sowing, as they are only properly raised as part of the principal crops sown in August, and early in spring. (*Abercrombie*.)

3913. *Watering cabbages.* During long-continued droughts in June or July, or later, cabbages are apt to become stunted in their growth, and covered with aphides. To prevent this, apply copious waterings every evening; water so abundantly supplied is supposed to injure the flavour of some plants, but it is found to have no effect of that kind on cabbages.

3914. *Cabbage-coleworts* are used as young open greens, as greens with closing hearts, and as greens forming a cabbage growth. The best sorts for this purpose are those cabbages which come in early. To have a good supply of coleworts for autumn, winter, spring, and returning summer, it is proper to make three or four sowings in summer and autumn: that is, one sowing toward the middle of June, a second about the middle of July, and a third in the last week of that month. These crops are for transplanting in August, September, and October, and will afford an ample provision of autumn, winter, and early spring coleworts, from September till March or April. At this time the plants of these sowings will mostly start for seeding. To succeed these, make another sowing between the third and sixth of August.

3915. *Gathering the cabbage crop.* After cutting off the head, never neglect immediately to pull up the stalk, and carry it off with all the refuse leaves to the compost-heap. This practice is enjoined as well to prevent the stem from pushing out shoots, and needlessly exhausting the ground, as to promote neatness and order. It is necessary, however, to make an exception in favour of the practice of some, who, instead of removing the roots and stems of the main summer crop, leave them in the ground deprived of their injured leaves, and, with the intervals between the rows stirred and perhaps manured, allow them to stand till spring. Thus treated, they push out in autumn, and in January or February abound in fine cabbage-sprouts, not much inferior to young cabbages. Sometimes this practice is applied to the earliest spring or summer crop, in which case the sprout-cabbages come into use the following autumn. Cabbage coleworts are gathered when the leaves are as broad as a man's hand. The largest are drawn up by the root, which is generally allowed to remain attached to those taken to public markets, as it retains the sap, and tends to preserve them succulent a longer period than if they were wounded close to the succulent leaves.

3916. *Preserving cabbages.* Where this is thought necessary, the plants are laid down on their sides, and the stems covered with earth close to the head, the outer part of the more exposed side of which may be sometimes injured, but the inside remains sound. In Germany, and in the Highlands of Scotland, cabbages are frequently preserved by burying them, in dry soil, so deeply as to be out of the reach

of frost. The cabbages are placed so far apart as not to touch each other, and the heads are not separated from the stems, the entire plant being pulled up, and buried. Where the soil is peaty, cabbages, and other vegetables, when thus treated, will remain in perfect preservation till the following spring or summer.

3917. *The Couse Tronchuda*, Tranzuda, Portugal, or large-ribbed cabbage, *Brásica costata* var. *Dec.* Chou vert à larges côtes, Fr., was introduced in 1831; and the dwarf variety, 15, known in Portugal by the name of *Murciána*, in 1832. As both are too tender to stand the severity of the British winter, the seeds should be sown in August, and the plants kept in a frame till spring, and planted out at the same time as cucumbers, for an early summer crop; and the succession must be kept up by spring and summer sowings. The ribs of the outer and large leaves, when divested of their green parts, and well boiled, make a good dish, somewhat resembling sea kale. The heart or middle part of the plant is, however, the best for use; it is peculiarly delicate, tender, and agreeably flavoured, without any of the coarseness which often belongs to the cabbage tribe. The dwarf sort is much the earliest; and when the lower leaves are taken off for use, it throws out numerous sprouts from the lower part of the stem, which is not the case with the other sort. (*Lindley's Guide*, &c., p. 530.) Mr. Baas cultivated the Tranzuda precisely like the summer cabbage, sowing it in the autumn, and again early in the spring. He advises a good stiff soil, and procuring the seed from Portugal, which, he says, may be easily done through any wine merchant. (*See Gard. Mag.*, vol. ii. p. 435.)

3918. *To save cabbage seed.* The raising of the seed of the different sorts of cabbage, Neill observes, affords employment to many persons in various parts of England. It is well known that no plants are more liable to be spoiled by cross breeds than the cabbage tribe, unless the plants of any particular variety, when in flower, be kept at a very considerable distance from any other; also, in flower, bees are extremely apt to carry the pollen of the one to the other, and produce confusion in the progeny. Market-gardeners, and many private individuals, raise seed for their own use. Some of the handsomest cabbages of the different sorts are dug up in autumn, and sunk in the ground to the head; early next summer a flower-stem appears, which is followed by abundance of seed. A few of the soundest and healthiest cabbage-stalks, furnished with sprouts, answer the same end. When the seed has been well ripened and dried, it will keep for six or eight years. It is mentioned by Bastien, that the seed-growers of Auber-villiers have learned, by experience, that seed gathered from the middle flower-stem produces plants which will be fit for use a fortnight earlier than those from the seed of the lateral flower-stems: this may deserve the attention of the watchful gardener, and assist him in regulating his successive crops of the same kind of cabbage.

SUBJECT. 2. *Red Cabbage.* — *Brásica olerácea* var. *β rubra* L. *Chou pommé rouge*, Fr.; *Roth Kopfkohl*, Ger.; *Rood kool*, Dutch; *Cavolo rosso*, Ital.; and *Berza colarada*, Span.

3919. *The red or purple cabbage* is similar in form to the white, but is of a purple or brownish-red colour.

3920. *Use.* The red cabbage is chiefly used for pickling; and the dwarf red variety, Neill observes, "certainly does make one of the most beautiful pickles that can be presented at table." Both the dwarf and large sorts are sometimes shredded down in winter, in salads, like red beet-root; and the Germans prepare sauer kraut from all or any of the varieties.

3921. *Subvarieties.* There are three principal varieties of red cabbage, viz.: —

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| 1. <i>The large red, or red Dutch</i> ; with a large, firm, round head, usually cultivated in market-gardens. | 2. <i>The dwarf red</i> ; with a small, round, firm, delicate head, less common than the other. | 3. <i>The Aberdeen red</i> ; with an open leafy head, chiefly found in cottage gardens in the north of Scotland. |
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3922. *The propagation, sowing, and culture* are in all respects the same as for the white cabbage; except that the heads are not used when imperfectly formed, or as cole-worts; but the plants should, in all cases, be allowed to stand till they have formed close firm heads. Sow in August for a crop to stand the winter, and to come in at the close of next summer, and thence till the end of autumn. Sow early in spring for returns in the following winter and spring.

SUBJECT. 3. *Savoy.* — *Brásica olerácea* var. *γ sabáuda* L., B. o. var. *γ bulláta* Dec. *Chou de Milan*, ou *pommé frié*, Fr.; *Wirsing*, or *Herzkohl*, Ger.; *Savooij kool*, Dutch; *Cappuccio*, Ital.; and *Berza de Saboyá*, Span.

3923. *The savoy* is distinguished from the other close or hearted cabbages by its wrinkled leaves; and from the Brussels sprouts, by its cabbaging in large full heads. The latter is considered a subvariety.

3924. *Use.* The savoy is in use as a table vegetable from November till spring, unless destroyed by frost, in which case it is succeeded by the borecoles or winter greens. These two classes of the cabbage tribe generally supply the table from November to May.

3925. *Subvarieties.* These are —

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| 1. <i>Large green.</i> | very distinct from the common large green. (<i>See Jardiner</i> , edit. 1833. p. 304.) | 3. <i>Yellow.</i> |
| 2. <i>Chou à plus gros, tardif des Fossés</i> , or German savoy; a superior variety, | | 4. <i>Dwarf green.</i> |
| | | 5. <i>Globe.</i> |

3926. *Estimate of sorts.* The green savoy is the least hardy, and must be used first. The London market is generally supplied with it through the month of November, and until the plants are injured by frost. The dwarf savoy is harder than the preceding, bearing well the attack of the first winter frosts, by which the delicacy of its flavour is materially improved; and from its small size it is better adapted to the tables of private families. Where the whole class is cultivated, this must be considered the second sort in succession. The best plants grow close to the ground, not exceeding a foot in height. The yellow savoy, by its hardiness, enables us to continue the use of savoy till mid-winter. It does not yield to any of the others in goodness, and by many persons it is preferred, being considered as much sweeter than any other kind. (*Hort. Trans.*, vol. ii. p. 303.)

3927. *Propagation.* The savoy is always raised from seed, and for a seed-bed four feet and a half by eight feet, half an ounce of seed will be sufficient.

3928. *Soil and situation.* This succulent answers best on a light rich soil: poor or exhausted ground should be manured according to its defects. Allot an open compartment in the open air, that the seed.

lings and advancing plants may grow stocky, and not draw up weak and long-stemmed, as they are liable to be in close situations, or narrow borders, under walls.

3929. *Times of sowing.* A sufficient succession is obtained by three, or, at most, four sowings, made from the last week of February to the second week in May; for planting out, from May to September.

3930. *Culture.* When the plants, whether in seed-beds or pricked out, have several leaves, two or three inches broad, transplant them finally into the most open compartments of ground, where they will be less annoyed by caterpillars, that they may cabbage with large full heads; planting them at different times as ground becomes vacant. Remove the most forward in May or June, for early autumn heading in August or September. But plant the principal crops in June or July, and from the beginning to the middle of August; taking all possible advantage of showery weather. In drawing the plants, observe if any are clubbed or knotty at the root, and cut off the protuberances close. Plant in rows those removed in May, June, or July, two feet and a half, or not less than two feet asunder, by the same distance in the rows; others late planted in August and September, two feet by eighteen inches. In scarcity of vacant ground, some savoys may be occasionally planted between wide rows of previous standing crops, such as beans, cauliflowers, and early cabbage, that are sufficiently forward to be gathered off by the time the savoys will want the entire ground. Before and after plantings made in dry weather, watering would be of essential service. As the plants of the different successions advance, keep them from weeds by occasional broad-boeing. At the same time, loosen the surface of the earth, and draw some about the stems of the plants: let this be done twice or oftener, to forward them in a free enlarging growth. They will gradually heart, fully cabbaging in September, October, November, December, &c. as they are the crops of the forward or later sowings: they may be cut for use accordingly, and during the winter. The savoys left standing will continue good till the middle or end of February, when, or in the course of March, they open and send up seed-stalks.

3931. *To save seed.* See *Cabbage*. (3918.)

SUBSECT. 4. Brussels Sprouts.—*Brassica oleracea*, a subvariety of var. γ *sabauda* L., and of B. o. var. γ *bullata* Dec. *Chou de Bruxelles*, or *d jets*, Fr.; *Sprossen kool*, Ger.; *Spruit kool*, Dutch.

3932. *The Brussels sprouts* produce an elongated stem, often four feet high, from the axils of the leaves of which sprout out shoots which form small green heads like cabbages in miniature, each being from one to two inches in diameter, and the whole ranged spirally along the stem, the main leaves of which drop off early. The top of the plant resembles that of a savoy planted late in the season. Van Mons says (*Hort. Trans.*, vol. iii.), "If this vegetable be compared with any other which occupies as little space, lasts as long, and grows as well in situations generally considered unfavourable, such as between rows of potatoes, scarlet runners, or among young trees, it must be esteemed superior in utility to most others." Nicol considers it as deserving more general culture in Scotland; and Morgan (*Hort. Trans.*, vol. ii.) says, it is an excellent sort of winter green for the table, but not sufficiently hardy to last through the winter in England.

3933. *Use.* The sprouts are used as winter greens; and at Brussels they are sometimes served at table with a sauce composed of vinegar, butter, and nutmeg, poured upon them hot after they have been boiled. The top, Van Mons says, is very delicate when dressed, and quite different in flavour from the sprouts.

3934. *Culture.* The plants are raised from seed, of which an ounce may be requisite for a seed-bed four feet by ten feet. Van Mons, in the paper already referred to, says, "The seed is sown in spring under a frame, so as to bring the plants forward; they are then transplanted into an open border with a good aspect." By thus beginning early and sowing successively till late in the season, he says, "we contrive to supply ourselves, in Belgium, with this delicious vegetable, full ten months in the year; that is, from the end of July to the end of May." The plants need not be placed at more than eighteen inches each way, as the head does not spread wide, and the side leaves drop off. In this, as in every other respect, the culture is the same as that of the borecole.

3935. *Gathering the crop.* Morgan says, the sprouts must have some frost before gathered; but this, Van Mons assures us, is an erroneous opinion. In Belgium, the small cabbages are not esteemed if of more than half an inch in diameter. It is usual to cut off the top about ten or fifteen days before gathering from the stem. In spring, when the sprouts are disposed to run to flower, their growth is checked by taking up the plants, and laying them in the ground in any shaded spot.

3936. *To save seed.* Van Mons says, it is usual to save the seeds indiscriminately from plants which have or have not been topped; but that he intends to save from the tops only, hoping thereby to improve the progeny. Whatever mode be adopted, the grand object is to place the plants where they will be in no danger of receiving the farina of any other of the *Brassica* tribe.

SUBSECT. 5. Borecole.—*Brassica oleracea* var. δ *sabellica* L., B. o. var. β *acephala* Dec. *Chou vert*, or *non pommé*, Fr.; *Grüne kohl*, Ger.; *Groen kool*, Dutch; *Carolo aperto*, Ital.; *Col*, Span.; *Kale*, Sax.; and *Open Kale*, Scotch.

3937. *The borecole* contains several subvarieties, the common characteristic of all which is an open head, sometimes large, of curled or wrinkled leaves, and a peculiar hardy constitution, which enables them to resist the winter, and remain green and fresh during the season. Morgan says, it is impossible to find a plant of more excellence for the table, or more easily cultivated, than the common borecole.

3938. *Use.* The crown or centre of the plant is cut off so as to include the leaves, which do not exceed nine inches in length. It boils well, and is most tender, sweet, and delicate, provided it has been duly exposed to frost.

3939. *Subvarieties.* These are—

1. *The green borecole*, or Siberian borecole.

2. *The dwarf* or *Colebrook Dale borecole*.

3. *The purple* or *crimson borecole*.

4. *The German kale*, German greens or caulies in Scotland,

and Scotch kale in England.

5. *The variegated borecole*.

6. *The flattened-headed borecole*.

7. *The Egyptian kale*, rabi kale, or rabi rabi.

8. *Ragged Jack*.

9. *The Jerusalem kale*.

10. *The Buda kale*, Russian kale, Prussian kale, and by some

called the *Manchester kale* or *chou-manchester*.

11. *The palm-borecole*, or *chou-palmier*.

12. *The turnip-borecole*, or turnip-borecole (B. o. var. θ *Calloripa* Dec.) *chou navet*, Fr.

13. *Neapolitan borecole*, *chou de Naples*, *carvato torolo ricciato*

14. *The Western perennal kale*, with finely cut leaves.

3940. *Estimate of sorts.* The first four sorts are the most valuable, and the most generally cultivated: the fourth sort is almost universally preferred in Britain; though Mr. George Lindley considers the

second the best of all winter greens. The seventh, eighth, and ninth sorts, being dwarf stemless plants, resist black frosts, and come in for a late supply; the fifth, sixth, eleventh and twelfth sorts are chiefly curious plants; the sixteenth is tender, but worth cultivating in first-rate gardens; the fourteenth has been recommended for cottage gardens.

3041. *Propagation.* All the sorts, except the last, are propagated by seed, which is sold by weight; and for a seed-bed four feet by ten, Abercrombie says, one ounce of seed is necessary. Sow in the last fortnight of March, in April, in the beginning of May, and in August. The first week in April for the principal crop of German kale; and the first week in August for the latest spring crop of Buda kale, and which will be ready to transplant in September. All the sorts may be propagated by cuttings the same as cabbage (18005), if that method should be considered desirable; one kind may also be grafted on another, in the herbaceous manner. The Woburn kale is generally propagated by cuttings, because it requires to stand three or four years before it produces seed.

3042. *Subsequent culture.* "When the plants have leaves one or two inches broad, take out some from the seed-bed, and prick into other open beds, six inches apart, giving water: in which let them have four or five weeks' growth. Those left in the seed-bed, as well as these, will all acquire proper strength for final transplanting in May, or thence till August. Taking the opportunity of rain, if possible, plant them in an open compartment, in rows two feet and a half asunder, for the first forward plantings in summer; the others two feet; allotting the whole similar distances in the rows. Give occasional water, if dry weather, till they have struck root. In their advancing growth, hoe the plants once or twice, to cut down rising weeds, and to draw earth about the bottom of the stems, to encourage their growth in the production of large full heads in proper season, September, October, &c." At the approach of winter, the stems should be earthed up, especially of the taller sorts. When the distances between the plants are such as have been recommended, the hills round each plant will be of such a size and breadth as to cherish the roots of the dwarf varieties, and serve as a protection to the tall sorts in stormy weather.

3043. *Gathering.* The heart is to be gathered of all the tall sorts, after which, with the exception of the German kale, the stalks should be pulled up, and taken to the compost-heap or dunghill; but the stems of the sort above-mentioned are to be left for the sake of their side shoots or sprouts. Of the dwarf sorts, the heart may either be cut off, for which the Buda kale and other dwarfs are well suited; or the leaves may be gathered when the plant begins to grow, which corresponds with the habits of the Egyptian and Jerusalem kale.

3044. *The Woburn kale* is chiefly propagated by cuttings of six or seven inches, which readily take root, and may be planted at once where they are finally to remain, the best season is March and April. This kale shoots up yearly from the stool, like a true perennial plant, scarcely ever flowers, and is considered to produce more than thrice as much as any other borecole, with a very great saving of manure and labour. It is considered by Sinclair as peculiarly adapted for farm and cottage gardens. In cultivating this kale, "about the beginning of April, or as soon as winter greens are out of season, the stems are cut down near to the ground, within two buds of the roots, the soil is then slightly forked over, and afterwards kept clear of weeds by the hoe. This is all that is required." (*Hort. Trans.*, vol. v. p. 289.)

3045. *Blanching the Buda or Russian kale.* Wedgwood writes to the Horticultural Society, "I have been trying an experiment with Buda kale, which has answered completely; this is blanching it as you do sea kale, by turning a pot over it, and letting it remain covered till it is quite blanched. When out and dressed in that state it is excellent, and one advantage will be, that the same plant will furnish two cuttings, for the sprouts are more delicate than the heart even the original heart of the plant. I used no dung to force it; but this might be applied with great advantage; and I think it would be an excellent substitute for sea kale." (*Hort. Trans.*, vol. iv. p. 570.)

3046. *To save seed.* This can seldom be done of more than one or two sorts in the same garden, on account of the risk of promiscuous impregnation by bees, the wind, &c. As the seed, however, will keep for several years, good specimens of one or two sorts may be selected every year in rotation, and placed in spots distant from each other, in autumn, or early in spring. In planting, trench the root and stem into the ground, at nearly double the distance at which they stood in the plantation. This will allow abundance of air to circulate round the blossoms and seed-pods. The seed will be ripe in August, when the pods may be gathered, and threshed out; and the seed, after being exposed to the dry air in the shade for a few days, put up in bags till wanted for use.

SURREY. 6. *Cauliflower.*—*Brassica oleracea* var. *c* *Bôtrytis* L. and Dec. *Chou-fleur*, Fr.; *Blumenkohl*, Ger.; *Bloembool*, Dutch; *Capoli fiori*, Ital.; and *Berza florida*, Span.

3947. *The cauliflower* is one of the most delicate and curious of the whole of the *Brassica* tribe, the flower-buds forming a close firm cluster or head, white and delicate, and for the sake of which the plant is cultivated.

3948. *Use.* The heads or flowers being boiled (generally in a clean linen cloth), are served up as a most delicate vegetable dish.

3949. *The subvarieties* in cultivation are chiefly two, the early and the late.

3950. *Propagation and soil.* The cauliflower is raised from seed, of which half an ounce is sufficient for a seed-bed four feet and a half wide, by ten feet in length. The soil for the seed-bed may be light; but for final transplanting, it can hardly be too rich, the cauliflower, like the vine, being reputed a "rough feeder." Cleanings of streets, stables, cesspools, &c., ought therefore to be liberally supplied during the growth of the plants, when very large heads are desired.

3951. *Times of sowing.* "The early and main superior crop, brought to fruit by the longest nursery attendance; the late summer succession crop, raised by the shortest course; and the Michelmas crop, obtained at the least expense; are sown respectively at three different seasons. The principal sowing is made about the end of the third week in August, or a day or two before or after the 21st, to raise plants to stand over the winter, under frames, hand-glasses, or half sheltered in warm borders, for the early and main superior crops next summer. A secondary sowing in February or March, for succession and late inferior crops the same year in summer and autumn. A final sowing near the close of May, for ordinary crops, to yield fruit the following autumn and winter." Ball finds, that if cauliflower-seed is not sown till the last week in August, and that if the seedlings are not transplanted till the middle or near the end of November before the hard weather sets in, no sort of covering is necessary, nor any other protection than that afforded by a wall having a south aspect. "In such a border, and without any covering, young cauliflower plants have uniformly stood well for many successive winters, and have always proved better and sounder plants for spring planting than such as have had additional shelter. The seedlings protected with glass frames generally grow too gross in the stems, which become partly blackened; and the plants being thus unhealthy, are not fit for planting out. Late raised seedlings, which spend the winter in the open border, uniformly become the largest and finest table cauliflowers during the summer, though they certainly do not come in quite so early. Cauliflower plants, it is probable, are often killed with too much attention. Seedlings raised late in autumn seem to be very tenacious of life." (*Caled. Hort. Mss.*, vol. iii. p. 192.)

3952. *Sowings to stand the winter.* "Time of sowing and first culture. For the early and general crops next summer, make a considerable sowing in August, about the 18th, and thence to the 24th day of that month; or two different sowings between those extremes, at three or four days' inter-

val, to raise young plants to stand the winter under protection; some being planted out finally the same year in October or November, under hand-glasses; and the others pricked into frames and warm borders, for planting out finally in the spring, into the open ground, to succeed the hand-glass fruit, or for the general summer crop. Sow in a bed of rich, light, mellow earth. After sowing, give occasional light waterings in dry weather, and shade in hot sunny days, till the plants come up. When these have leaves an inch or an inch and a half broad, in September, prick them into intermediate beds, three or four inches apart; watering, and occasionally shading from the mid-day sun, till they have taken root; to remain in such beds to gain strength till October."

3063. *Hand-glass division.* "Then towards the close of October, transplant a quantity finally into rich ground, which has been well dunged, under hand-glasses, in rows three feet and a half or four feet asunder (with intervening alleys a foot wide), and three feet apart in the row. Set three or four plants centrally under each glass, about four inches apart, with the design of retaining only one or two of the best in the spring. Give a moderate watering at planting, and put on the glasses close till the plants take root, discoverable in a week or ten days by their showing a renewed growth; then raise the glasses on the warmest side, one or two inches in mild days, to admit free air to the plants. Continue the glasses all the winter; but in all temperate weather, tilt up the south side daily, two or three inches, to give the requisite admission of free air, in order to strengthen and harden the plants; and sometimes, in fine, mild, dry days, you may occasionally take the glasses off, especially if the plants appear to draw, or get on too fast in growth, as they are sometimes apt to run into small button heads in their nursery state, unless for future culture; but put on the glasses early towards the evening; and always keep them on at night, and during cold rain, snow, and frost, shutting them close down in all inclement weather; and during rigorous frosts it would be advisable to give some protection, with long, dry, stable-litter round the glasses, or to cover with mats, removing the covering when settled mild weather occurs. Thus conforming to the vicissitudes of the season, continue the glasses till the close of April or beginning of May; giving larger admissions of free air as the warmer season of spring advances: and sometimes in fine mild weather, admit a moderate warm shower of rain. Meanwhile, in March, if all or most of the plants under the glasses have stood the winter, be careful to leave only one or two of the strongest under each glass; transplanting the superabundant into the open garden, in a compartment of rich mellow earth, improved with rotten dung digged in a spade deep; setting the plants two feet and a half asunder, and giving water. In thinning the plants, be careful to take out those with black shanks: but do not take the trouble to transplant them, for they will prove abortive. At the same time, to assist those remaining under the glasses, draw a little earth about the stem of each. To these continue the glasses till the period mentioned above, to forward them in full growth for the most early production; but as they expand in the herb, raise each glass upon three props, three or four inches high, to admit air freely, and to give a larger scope of room above for the free growth of the plants; or, when farther advanced, you may draw a small ledge of earth round the bottom of each glass, both to raise the props higher, for an additional upward space, and to contain water when occasionally given in dry weather. Towards the end of April, or the beginning of May, when the plants will, in a manner, have filled the glasses, remove these from the most forward, but continue the aid of glass as long as practicable, to accelerate the plants into early heading in May. Thus the most early crop will produce a supply of flower-heads for gathering in succession in May and June."

3054. *Frame division.* "The other plants of the same sowing, designed for wintering in frames, may, in young growth, at the end of September, or beginning of October, be either pricked at once into the winter beds, or be, at that time, removed into a preparatory bed in the open garden, to have a month's growth; in order to be transplanted into the frame-beds at the end of October or beginning of November, in rows across the bed, four by three inches apart. Give a light watering, and put on the lights of the frame close till the plants have taken root; then prop up the lights behind, two or three inches, or draw them off occasionally to the back of the frame in mild, dry days, but keep on when very cold, and in rain, snow, frost, and always at night; and in severe frost cover the glasses and round the frames with dry, long, straw litter and mats; but in all mild, dry weather, admit the air fully, as in managing the hand-glasses. Then in March or beginning of April, transplant the whole into the open garden, in rows two feet and a half asunder; and they will come into full production in July and August."

3055. *Half-sheltered portion.* "In want of frames or hand-glasses, you may, in October, either prick some plants into a warm south border, close under the fence, three inches apart, to be protected, in right exposure, with mats, dry litter, or reed panels; or you may prick some in a bed arched over with hoops, to receive a covering of mats during cold nights, or heavy rain, snow, and frosts, in the daytime in winter. Give the full air in all moderate weather, till March or April: then all to be transplanted finally as above."

3056. *Drummond, of the Cork botanic garden,* protects cauliflower-plants during winter by planting them in excavations made in the common soil of the garden, and covered with frames thatched with long straight wheat-straw. He uncovers constantly in mild weather, whether nights or days. (*Hort. Trans.*, vol. v. p. 365.)

3057. *Secondary sowing, or first spring-raised crop.* "For late succession summer cauliflowers, to succeed the autumn-raised, early, and main summer crops; or, if none were raised to stand the winter, sow in the spring, February, or beginning of March, in a moderate hot-bed, or, where that cannot be had, in a warm border under a frame or hand-glass; and when the young plants have leaves an inch broad, prick them into other beds of the same description, three inches apart, to gain strength by three or four weeks' growth, in order to be planted out in the open garden, at the end of April or the beginning of May; where they will produce tolerable heads in July or August. Sow also in the open garden during the last fortnight in March, and the first in April for a late succession, with small flower-heads in August and throughout autumn. Plants of the last crop, removed as late as May, for fruiting the same year, should be planted in a shady border."

3058. *Second spring-raised crop.* "The next and last sowing is for the late autumn and winter crop, commonly called the Michaelmas crop; to be made towards the 94th of May, in a bed of light earth. Prick out the young plants in June, to remain in the intermediate bed till about the middle of July; then to be transplanted two feet and a half asunder. Give occasional watering till they have taken good root. They will begin to produce heads in October, but the fruit will be of superior size in November and December, if temperate weather follow."

3059. *Final culture of the three crops.* "With respect to the culture of the different crops after being finally transplanted, it is to hoe the ground occasionally, in order to cut down weeds; and as well to loosen the earth, and draw some round the stems of the plants. When the early crops are nearly advanced to full growth, in May and June, one or two good waterings to the roots will contribute to their producing large heads. In the dry weather of meridian summer, water those not in flower twice a week; and those in flower, every second day. As the flower-heads show themselves, turn down some of the larger leaves, to defend them from sun and rain, and to preserve them white and close, in perfection." (*Abercrombie*.)

3060. *Crop for winter use.* Cockburn sows the seeds of early cauliflower in a south border in the beginning of July, thins to twelve or fourteen inches apart, and in November finds heads produced from ten to thirty inches in circumference. He then removes them with balls, and plants them so as their heads do not touch in earth, in a shed which will keep out ten degrees of heat. All decayed leaves are taken off, and when severe frost occurs, the plants are covered with dry short hay. "By this management," he says, "I have been able to send three dishes of the cauliflowers to table every week during the autumn and winter, and shall be able to continue to do so till February." (*Hort. Trans.*, vol. v. p. 281.)

3961. *Preserving during winter.* For this purpose it is usual to pull up the plant entire, and hang it up in a shed or cellar, or to lay the plants in sand in cellars or sheds, covering the flower with the leaves, and being careful to remove every decayed part as it appears. When a shed or cellar is not at hand for this purpose, a mode may be resorted to which has been adopted by Smith, and described by him in the *Caled. Hort. Mem.*, vol. i. p. 129, and which consists in burying the entire plant in a pit about eighteen inches deep, dug along the bottom of a wall. On a dry day he takes up the plant, and, wrapping the leaves round the head of the flower, deposits them in the trench, the heads sloping downwards, and the roots extending upwards, so that the roots of the one layer cover the tops of another. Next, he covers up the whole closely with earth, sloping it from the wall, and beating it smooth with the back of the spade, so that rain may run off. In this way he preserves it in a good state from November to January. M'Intosh keeps cauliflowers as long as he chooses by burying them in bog mould. He does this in the summer season, as well as during winter; for sometimes, during long droughts, the supply from the open garden would otherwise be deficient. (*Gard. Mag.*, vol. i. p. 240.) The best mode, however, of prolonging the cauliflower season, is by raising the plants with balls, and trench-planting them in frames, or the borders of peach or grape houses not in action, taking care to keep the soil dry, and to remove decaying leaves; or, where frames are in sufficient quantity, to place a few over the plants as they stand in the compartment.

3962. *To save seed.* "Mark and leave some of the prime plants of the thoroughly-matured early and main crops in May and June, when the flower-heads are in highest perfection; as those of late production will not ripen seed effectually. The stools will afford ripe seed in September; when be careful to watch the chaffinches, green-birds, &c., and to gather the branches as the seed upon them ripens. Lay them elevated from the ground, in some sunny, airy situation, to dry and harden to full maturity: after which let the seed be beaten and rubbed out, cleaned and sifted from the husky parts, spread on a cloth to dry the whole equally; and then put up for sowing the following year." (*Abercrombie*.)

3963. *Insects.* Cauliflowers, when first planted out, are frequently infested with slugs, or the larvæ of different cabbage butterflies, to attract the former of which, it is not uncommon to sow a little radish-seed on the cauliflower ground a fortnight before transplanting; the slugs preferring the tender leaves of the radish to those of the cauliflower, the latter are thus suffered to escape. Caterpillars can only be kept under by picking them off by the hand.

SUSSECT. 7. *Broccoli.* — *Brassica oleracea*, a variety of var. *s. Botrytis*, L. and Dec. *Broccoli*, Fr.; *Italienische Kohl*, Ger.; *Scotsche Kool*, Dutch; *Broccoli*, Ital.; and *Brocoli*, Span.

3964. The few *broccoli*s that were known in Miller's time are supposed to have proceeded from the cauliflower, which was originally imported from the Isle of Cyprus, about the middle of the 16th century. Miller mentions the white and purple *broccoli* as coming from Italy; and it is conjectured, that from these two sorts all the subsequent kinds have arisen, either by accidental or premeditated impregnations.

3965. *Use.* The same as the cauliflower.

3966. *Subvarieties.* The common characteristic of broccoli, as distinguished from cauliflower, is colour in the flower and leaves, and a comparatively hardy constitution to stand the winter. Maher observes (*Hort. Trans.*, vol. i. p. 116.), that as all plants of the *Brassica* tribe become less alkaline, and more palatable in proportion as they approach to a pale or white colour, such varieties of broccoli will undoubtedly be preferable to purple ones, if they turn out equally hardy. H. Ronalds, of Brentford, has given (*Hort. Trans.*, vol. iii.) a *Description of the different sorts of Broccoli, with an Account of the Method of cultivating them*, from which we shall chiefly compose this article. The sorts which follow are placed in the order in which they come in perfection to table.

3967. *Purple Cape, or autumnal broccoli.* This has a close, compact head, of a beautiful purple colour: the leaves are nearly entire, erect, concave, lobed at bottom, and much waved, short, and regularly surrounding the head; the veins and midrib are stained with purple, which stain is a test of its being true; the head is exposed to the view in growing; in general it is not very large; as it enlarges, the projecting parts of the flower show a greenish-white, mixed with the purple colour. When boiled, the whole flower becomes green. If the season is showery, and this variety is planted in good ground, it becomes as large as cauliflower.

3968. *Culture of the purple broccoli.* Sown about the middle of May, and beginning and end of June, it will produce in regular succession from August to December, or until frost destroy the heads. Sown in July and August, if the winter is mild, it will bring good heads in spring. When sown in the beginning of September, and the plants preserved in frames as cauliflowers, fine heads may be expected in the months of June and July. Thus, by good management, this kind may be in use during the greater part of the year; but it is not hardy enough to be depended on for the winter months. The plants grow from one foot to one foot and a half high, and should be placed about two feet apart in every direction.

3969. *Maher's mode of treating the purple broccoli* is as follows:—"Three crops are sown annually: the first between the 15th and 18th of April; a second between the 18th and 24th of May; the third between the 19th and 25th of August: these successive crops supply the family from September till the end of May. The seeds are scattered exceedingly thin, in a border of very rich light earth. Not a weed is suffered to appear, and when the young plants have from eight to ten leaves, which is in about a month, they are finally planted out, at the distance of two feet every way, in a piece of sandy loam, which has been well prepared for the purpose by digging, and enriching it with a large proportion of very rotten dung, frequently turned over to pick out every sort of grub or insect deposited in it. The ground is kept constantly clean by hoeing whenever a seed-leaf of any weed springs up, and the loose surface is drawn together into a heap round the stem of each plant. The second crop is treated exactly as the first, but the weaker plants left in the seed-bed are permitted to remain eight or ten days longer, to gain more strength. They are then transplanted into pots of the size called *stevens*, filled with very rich compost, placing them close to each other in the shade, and duly watering the plants, till they begin to grow freely. After this, the pots are plunged in the open ground at two feet distance from each other every way, and about three inches under the general level, leaving a hollow or basin round each plant, to retain any water given to them when necessary. By the time the pots are filled with roots, and that autumnal rains render watering unnecessary, the basins are filled up by drawing the earth round each plant, at the same time pressing it firmly down, to prevent the wind from shaking them. A few of these plants in pots sometimes show flowers too soon; and to guard them from early frost, a leaf or two is broken down over them. On the approach of settled frost in December and January, all the pots are taken up and removed to a frame, pit, or shed, where they can be sheltered from the extreme severity of the winter, but have air when it is milder, and this method of supply is preferred for the table in the hardest winters. To make broccoli succeed in pots, I find, by experience, that it should be potted immediately from the seed-bed. If it is transplanted oftener, the head or flower is both less in size, and runs much sooner after it forms. For the same reason, I never prick out or transplant the general crops; and as the temperature of our climate does not suffer vegetation to go on briskly from October to March, by following this method, the heads of flower will remain a long time in a state of rest after they are formed, without bursting, and heads from six to seven inches diameter are the ordinary produce of our plants. The seeds of the third crop are sown

in a frame, or under hand-glasses, and about the third week in October the plants become strong enough to remove, as in the two former crops."

3970. *Green Cape, or autumnal broccoli*. This sort differs but little from the preceding, except in colour, and in the heads, as well as the plant, proving in general larger. The leaves are long and narrow, much like those of a cauliflower; they are very little waved, and, consequently, have a general appearance of smoothness; the veins and midrib are green. The head, which has some resemblance to a cauliflower, is of a greenish-white colour, and is usually somewhat covered by the leaves. These two sorts are very sportive, running much into each other, and have a strong tendency to degenerate, yet are quite distinct, and when so, very beautiful. The greatest care should be taken in saving the seeds from the plants which are perfectly true. This remark applies generally to all the sorts.

3971. *Greene's early cauliflower*. If this sort is sown at three different times, from the beginning of May until the end of June, it will bear its heads in succession from Michaelmas to Christmas. If the weather is not severe. The leaves covering the head, defend it from slight attacks of frost; they have long naked foot-stalks, are wider and shorter than those of the green cape, are lobed at bottom, but not much waved; the veins and midrib are whitish green; the head is large, and quite white. It should be planted at about two feet apart.

3972. *Green close-headed winter broccoli*. This is a new and good sort, apparently a seedling from the green cape, which it closely succeeds in coming into use. The plants are dwarf; leaves spreading, and moderately indented; they are numerous, much waved, and large; the veins are white; the flower-groves exposed, nearly resembling that of the green cape in appearance, and does not attain a great size.

3973. *Culture*. The peculiarity of this variety is, that it continues to bear during the whole of the winter, if the weather is mild. A single plantation, from seeds sown in May, Ronalds found to yield heads fit for use through the months of November, December, January, and February. Plant from one foot and a half to two feet distance.

3974. *Early purple, or sprouting broccoli*. This is a very excellent kind, of a deep purple colour; if the true sort, it is close-headed at first; afterwards it branches, but it is apt to come green, and too much branched, especially in rich ground. The plants are from two to three feet high, growing strong and tall; the leaves are much indented, of a purplish-green colour; they spread out wide, but not long, though the stalks are so; the head is quite open from the leaves; small leaves are sometimes intermixed with the head: the plants produce sprouts of flowers from the axis of the leaves.

3975. *Culture*. When sown in April, it begins to produce in November, and continues bearing the heads and sprouts throughout the winter, in mild seasons; if sown in June, it produces abundance of sprouts in March and April. It should be planted three feet apart in rich ground.

3976. *Early white broccoli*. The heads of this sort are of a close texture, and of a pure white colour. It grows to about three feet in height; with erect, concave, light-green, and nearly entire leaves.

3977. *Culture*. To obtain heads fine and early, the seed should be sown in February, or beginning of March, on a slight hotbed. The plants, when about three or four inches high, must be transplanted into beds of light rich earth, three or four inches apart, and defended from the frost and cold nights by a mat covering; they will be strong enough to plant out at two or three feet distance by the end of April: under this treatment, they will produce beautiful heads in November, and continue to do so until Christmas, if the weather is tolerably mild. This sort, as well as several others, is sometimes cut in considerable quantities by the market-gardeners, previous to an expected frost, and kept in sheds or cellars for the supply of the market.

3978. *Dwarf brown close-headed broccoli*. From its resemblance, I take this to have sprung from the sulphur-coloured broccoli, from which, however, it differs, by coming in earlier; as well as in the shape and colour of its head; the leaves are also shorter and broader than those of the sulphur-coloured; they are small, not much waved, dark-green, with white veins; they grow upright, and do not cover the head at all. Most of the crowns are green on their first appearance, but soon change to large, handsome, brown heads.

3979. *Culture*. If sown about the middle of April, it is in use through March and April. Two feet distance is sufficient for the plants, when put out.

3980. *Tall large-headed purple broccoli*. This sort produces large, tall, purple heads, at two and three feet in height.

3981. *Culture*. If sown towards the end of March, it will prove a useful kind in March and April. The plants should be three feet asunder, in good ground.

3982. *Cream-coloured or Portsmouth broccoli*. This is a very noble sort, exceeding all the others in size. It is of a buff or cream colour, and has a very compact firm head: its leaves are large and broad, with white veins; they spread out widely, but the small centre leaves cover the flower. A head sent by Oldacre, from the garden of St Joseph Banks, to the Horticultural Society, on the 5th of May, 1815, measured more than two feet in circumference, although it was quite close.

3983. *Culture*. Seeds sown in the middle of April will be in perfection during the following February, March, and April. It bears near the ground. The plants should be planted three feet asunder.

3984. *Sulphur-coloured broccoli*. A hardy and valuable sort; if sown in April, it produces in the following April, and beginning of May, fine, compact, conical, sulphur-coloured heads, some of them slightly dotted with purple. The leaves have long foot-stalks, are much indented, and of a bluish-grey colour.

3985. *Culture*. Two feet distance will be sufficient for the plants to grow well.

3986. *Spring white, or cauliflower broccoli*. This sort grows very robust, with large leaves, flat and narrow, with thick veins; the leaves encompass and compress the head, so as to render it generally invisible when fit to cut, which is a great preservative from the frosty mornings common in the spring months.

3987. *Culture*. Sow in March, and plant out at three feet distance. When in good ground, it will produce very fine heads, perfectly white, throughout the months of April and May of the following year.

3988. *Late dwarf close-headed purple broccoli*. This is the latest purple broccoli, being in perfection throughout April and the greater part of May. The plants seldom rise above a foot in height; the flower at first shows small and green, but soon enlarges, and changes to a close, conical, purple head; the leaves are short and small, dark-green, with white veins, much sinuated, deeply indented, and forming a regular radius round the flower, giving the whole plant a singular and beautiful appearance.

3989. *Culture*. The seed should be sown in April, and the plants must stand from one foot and a half to two feet apart.

3990. *Latex green, or Siberian, or Danish broccoli*. This is the latest and hardiest of all the broccolis, for the severest winters will not destroy it. The leaves are much undulated and indented, narrow and long, with a tinge of purple colour in the stems.

3991. *Culture*. If sown towards the end of April, it will produce large, compact, green heads during the whole succeeding May. Two feet distance is sufficient for the plants.

3992. *Knight's protecting broccoli* is a variety lately originated by the President of the Horticultural Society. It is said to produce a bristled leaf on one side of the flower, which rises up, and folds over it, thus protecting it from the sun or the rain. It may be treated like the latest green or Danish, to which it seems most nearly allied.

3993. *General observations on the culture of broccoli*. All the sorts are raised from seed; and for a bed four feet in width by ten feet, Abercrombie says, one ounce of seed is sufficient.

3994. *Seed-bed*. Ronalds, in the paper above quoted, directs the seed-beds to be prepared of rich mould, well dug, and, if dry, watered the evening before sowing. The seeds must be thinly sown, and the beds

should be covered with mats or litter till the plants appear; the covering may then be removed, and the plants watered occasionally as the state of the weather requires; should that continue very dry, the best method is to transplant, when the plants are about two or three inches high, into other beds, about four inches asunder. Being several times refreshed by sprinklings of water, they will, in a fortnight or three weeks, be sufficiently strong for a second remove. This mode offers some advantage in giving time to clear off any crops of peas, &c. thereby obtaining ground which could not otherwise be conveniently had at the first season of planting out. The first four sorts on the list, which are considered as congeners, should be only once transplanted, as the check their removal occasions is apt to produce the heads prematurely, which, in that case, will be small, and indifferent in quality. If the season is showery, it will be needful to cover the beds, as soon as sown, with netting, to keep off the birds; also to sprinkle the plants when they appear with lime-water, or to strew on them fresh-slacked lime, to destroy the slugs. In this case, when the plants are six or eight inches high, they may be planted at once at the distances recommended for each sort.

3995. *Wood*, a writer in the *Caledonian Horticultural Memoirs*, says he has paid a considerable degree of attention to the culture of broccoli, and has made considerable progress therein. He finds that manuring with a compound of sea-weed and horse-dung produced the largest and finest heads he had seen during a practice of fifty-four years.

3996. *Culture without transplanting.* M'Leod grows cape broccoli in a very superior manner without transplanting. In the end of May, after having prepared the ground, he treads it firm, and by the assistance of a line, sows his seeds in rows two feet apart, dropping three or four seeds into holes two feet distance from each other in the row. When the seeds vegetate, he destroys all except the strongest, which are protected from the fly, by sprinkling a little soot over the ground; as the plants advance, they are frequently flat-hoed until they bear their flowers; they are once earthed up during their growth. A specimen of the broccoli thus grown was exhibited to the Horticultural Society: the head was compact and handsome, measuring two feet nine inches in circumference, and weighing, when divested of its leaves and stalk, three pounds; the largest of its leaves was upwards of two feet long. M'Leod adopts the same mode in the cultivation of spring-sown cauliflowers, lettuces, and almost all other vegetables, avoiding transplanting as much as possible. (*Hort. Trans.*, vol. iv. p. 559.)

3997. *Club of the root.* In old gardens, infested, as is often the case, with an insect which in summer insinuates itself into the roots of all the *Brassicæ* tribe, and causes a disease usually called the club, trenching the ground deep enough to bring up four or six inches of fresh undisturbed loam or earth, will probably bury the insects too deep for mischief, and provide fresh ground for the benefit of the plants. In gardens much exhausted by repeated cropping, if this mode cannot be adopted, a good quantity of fresh loam from a common or field, dug in, would materially improve the broccoli, and be of lasting use to future crops. Broccoli, in general, succeeds best in a fresh loamy soil, where it is thought to come more true in kind, and is harder, without dung; but if this situation cannot be had, deep digging, with plenty of manure, is the only remaining alternative to procure good crops. Soap-ashes, dug into the ground in considerable quantities, are said to be a good preservative from the club; and if the roots of the plants, just previously to planting, are dipped and stirred well about in mud or soap-ashes with water, its adherence will, in a great measure, preserve them from attack: perhaps a mixture of stronger ingredients, such as soot, sulphur vivum, tobacco, &c. would be still better. (*Hort. Trans.*, vol. iii.)

3998. *Preserving broccoli during winter.* Ronalds observes, that, though broccoli come larger and finer on the spot where they are planted, yet it is prudent to take up a part of the later "sorts in the beginning of November, disturbing the roots as little as possible, and lay them in sloping, with their heads towards the north, only a few inches above the ground, and about eighteen inches asunder. By this means the crown of the plant, lying low, is soon covered and protected by the snow, which generally falls previously to long and severe frosts; the plant is also rendered tougher in fibre, and harder, by the check received in this last removal." Broccoli might probably be preserved, during severe winters, by sticking the ground over with old pea-sticks, or with branches of hazel, or other shrubs, so as to form a sort of artificial copewood over the plants; or each separate row might have a row of the fronds of the spruce fir placed on each side of it, meeting in the middle, so as completely to protect the plants. Mulching them close up to their necks with fern would, probably, produce the same effect.

3999. *Knight*, having practised laying in his broccoli plants in November, in the usual way, found but small heads produced from them in the succeeding spring; till he tried trenching or laying them in in the month of September, and "low as that the centre of the stem at the top of each plant was level with the surface of the ground." The plants are watered, and the roots are properly marked, and in April lays them in by the heels in a compound of cleanings of old ditches, tree-leaves, and dung. When the head begins to open or expand, he cuts out the centre, leaving only four or five of the outside shoots to come to seed. Lifting, he says, prevents them from producing proud seed, as it is called, or degenerating. The above method produces seed the most genuine of all the others he has tried. The sulphur broccoli he finds the most difficult to procure seed from. (*Caled. Hort. Mem.*, vol. ii. p. 267.) Abercrombie says, broccoli-seeds degenerate in this country, and that the best seed is obtained from Italy.

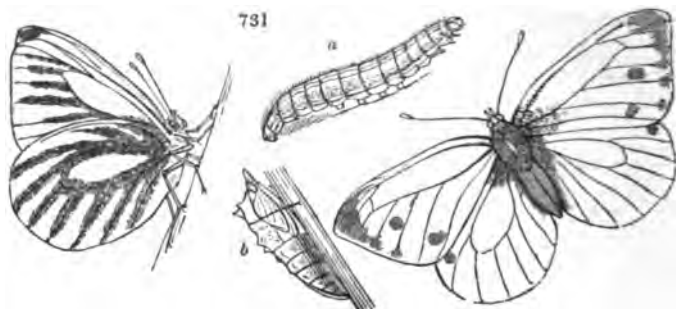
4000. *Gathering.* In gathering broccoli, five or six inches of the stem are retained along with the head; and in dressing, the stalks are peeled before boiling. Some of the sorts produce sprouts from the sides of the stems, with small heads, that should be gathered when ready, and are very good when boiled.

4001. *To save seed.* Wood, already mentioned, selects the largest, best formed, and finest heads, taking particular care that no foliage appears on the surface of the heads; these he marks, and in April lays them in by the heels in a compound of cleanings of old ditches, tree-leaves, and dung. When the head begins to open or expand, he cuts out the centre, leaving only four or five of the outside shoots to come to seed. Lifting, he says, prevents them from producing proud seed, as it is called, or degenerating. The above method produces seed the most genuine of all the others he has tried. The sulphur broccoli he finds the most difficult to procure seed from. (*Caled. Hort. Mem.*, vol. ii. p. 267.) Abercrombie says, broccoli-seeds degenerate in this country, and that the best seed is obtained from Italy.

SUBJECT. 8. Of the Insects which infest the Cabbage Tribe.

4002. *The whole of the cabbage tribe* are liable to be attacked, in every stage of their growth, by various insects. Slugs and snails also injure the young plant very much, if not diverted from it by the more tempting food of young radishes, sown as before mentioned (§ 3963.). The roots of the *Brassicæ* family are injured and frequently killed by the larvæ of the *Tipula oleracea*, vulgarly called gaffer long-legs. This larva may be known by its long, rounded form, and by its being destitute of feet: it may be, in a great measure, destroyed by cutting slices of potato, sticking them upon skewers, and then burying them two or three inches in the ground, close to the plants most injured. By this food the worms are enticed; and by taking the bait up every one or two days, great numbers will be caught. The cauliflower is more particularly attacked by a fly, or dipterous insect, which deposits its egg in the part of the stalk which is covered by the earth, and the maggots, when hatched, occasion the plant to wither and die, or to produce a worthless head. Against this enemy no defence has yet been devised. There

are three butterflies which, in their caterpillar state, commit great ravages on the leaves of all the cabbage tribe: these are the large garden white butterfly (*Pontia brassicae* F.), the small garden white (*Pontia rapae*), and the green veined white (*Pontia napi*) (fig. 731.). The caterpillar of the first is greenish yellow, marked with black spots;



of the second, green, with small yellow rings on the sides of the body; that of the third (a) is also green, but striped down the back and sides with orange. The most effectual method of destroying these is by picking the caterpillars from the plants. When full fed, they remove to the trunks of trees, old walls, pales, &c., where they fasten themselves by a transverse thread, and change into their chrysalis state (b): in such situations they may be sought after, and the next brood considerably diminished. Fowls, ducks, and sea-gulls are of much use in keeping these and other insects within due bounds, but are apt to scratch the soil, destroy young plants, or eat roots. Turkeys are preferable.

4003. *Preventive device.* We have not witnessed the result of the following experiment, and therefore cannot speak as to its efficacy:—"If in a patch of ground where cabbages are to be planted some hemp-seed be sown all round the edge, in the spring, the strong smell which that plant gives in vapour will prevent the butterfly from infesting the cabbages. The Russian peasantry, in those provinces where hemp is cultivated, have their cabbages within those fields, by which they are free from caterpillars." (*J. Busch, in Hort. Trans.*, vol. iv. p. 568.)

4004. *The principal disease to which the cabbage is liable* is the club in the root. The part swells, and becomes a tubercle as large as a gooseberry, and sometimes the size of a hen's egg. This is produced by the grub or larva of a small weevil, the *Curculio contractus* of Marsham, which is introduced, in the egg state, through a hole made by the snout of the parent insect. Insects of the same species frequently produce similar tubercles on the roots of the turnip, and are known to farmers by the name of the grub. When the club attacks plants before transplantation, the part of the root on which it appears should be cut off; in the case of transplanted crops, there is no remedy but taking up, cutting off, and re-transplanting. Some, in planting, apply ashes, lime, &c. at the roots, but nothing of this sort has been found of much advantage. In general, frequent transplanting (as pricking out twice or oftener before making the final plantation) is a palliative, as it promotes fibrous roots, and the club attacks chiefly those which are ramosa.

SECT. II. Leguminous Plants.

4005. *The leguminous esculents* are of great antiquity as culinary vegetables. The space occupied by this tribe in the kitchen-garden, during the spring and summer months, is very considerable; probably amounting to an eighth part of the open compartments, and warm borders; but towards autumn, as the crop ripens, it is given up to be succeeded by other crops, chiefly of the cabbage and turnip tribes. These, independently of other circumstances, having fibrous or surface-roots, succeed well to the tap-roots of the bean and pea. In cottage gardens, the bean is very profitably grown among cabbages and potatoes; and the pea and kidneybean may occupy a space to be filled up in October with winter greens. We shall take them in the order of the pea, bean, and kidneybean.

SUBSECT. 1. *Pea.*—*Pisum sativum* L. (*Lam. III. i. 163.*); *Diad. Decén. L.* and *Leguminosae J. Pois*, Fr.; *Erbse*, Ger.; *Ervvat*, Dutch; *Pisello*, Ital.; *Peasles*, Span.; and *Ervilha*, Port. See *Encyc. of Agr.*, § 5191.

4006. *The pea* is a hardy annual, a native of the south of Europe, and cultivated in this country from time immemorial. It was not very common, however, in Elizabeth's time, when, as Fuller informs us, peas were brought from Holland, and were "fit dainties for ladies, they came so far, and cost so dear."

4007. *The use of the pea* is familiar in cookery. In one variety, called the sugar-pea (*pois sans parchemin*, Fr.), the inner tough film of the pods is wanting; and such pods, when young, are frequently boiled with the seeds or peas within them, and eaten in the manner of kidneybeans. This variety is comparatively new, having been introduced about the middle of the 17th century. Dried peas are also used in soups, but it is found that after they have been kept a year they do not break, or fall well in the soup; it is also understood among dealers in peas, that those which have been grown on stiff land, or on sandy land, that has been limed, marled, or gypsumed, will not boil, whether new or old. See *Encyc. of Agr.*, § 5218.

4008. *The varieties of the pea are numerous: the principal are—*

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| <p><i>Dwarf-growing Peas.</i>
 <i>Early frame</i>, Early single blossomed, Early double blossomed, Early double frame, Early single frame, Early superfluous, <i>Pole à plus hâit</i>.
 <i>Early Warwick</i>: this is said to be ten days earlier than the <i>Early frame</i>.
 <i>Early Cheese</i>, Golden Cheviot, Hottspur, Nimble tailor, Golden Hottspur, <i>Pole Michaux</i>.
 <i>Bishop's early dwarf</i>, <i>Mag.</i>, vol. i. p. 153.
 <i>Early dwarf Spanish</i>, or <i>San</i>.</p> | <p><i>Large blue dwarf Spanish</i>, or <i>Green's dwarf</i>. (<i>See Gard. Mag.</i>, vol. vi. p. 366.)
 <i>White Prussien</i>, Prolific, Poor man's profit.
 <i>Blue Prussien</i>.
 <i>Spanish Marotte</i>, or Black spotted.
 <i>Dwarf Marrowfat</i>.
 <i>Knight's dwarf</i>, Marrow. (<i>See Gard. Mag.</i>, vol. i. p. 153.)
 <i>Dwarf green imperial</i>, Master's garden.
 <i>Dwarf crooked sugar</i>, <i>Pole sans parchemin</i>, or <i>manège tout</i>, <i>Zweig sackenbott</i>.</p> | <p><i>Tall-growing Peas.</i>
 <i>Tall marrowfat</i>, Woodcock marrow, White roundival.
 <i>Knight's tall marrowfat</i>.
 <i>Tall green imperial</i>.
 <i>Wallington</i>.
 <i>Egg</i>.
 <i>Tall crooked sugar</i>, <i>Pole sans parchemin</i> & <i>peas cosses</i>, <i>Grosse schotische sackenbott</i>.</p> |
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4009. *Estimate of sorts.* The varieties, besides differing in the colour of the blossoms, height of the stalks, and modes of growth, are found to have some material differences in hardness to stand the winter, time of coming in, and flavour of the fruit. The first five sorts are the best for sowings to be made from the end of October till the middle of January, and for late crops sown between the middle of June and the beginning of August. The fine flavour of the marrowfat is well known. A few dwarf marrowfats may be sown in December and January, as mild weather may occur: but the time for sowing full crops of the larger kinds of peas is from the beginning of February till the end of April. Knight's pea is very prolific, and retains its fine sweet flavour when full grown. The egg, the moratto, the Prussian blue, the roundivals, and the large sugar, are all very fine eating peas in young growth; and, like the marrowfat, may be sown freely, according to the demand, from the third week of February till the close of April, and, in smaller crops, until the middle of June. The names of peas, however, are continually varying, and even the varieties constantly changing; as a proof of which we may mention that some sorts which were highly appreciated in 1851, when the first edition of this work appeared, are now, in 1853, nowhere to be found. Gardeners therefore must necessarily rely much on the seedman; and, rather than order particular sorts, state the object in view, and request to have such varieties as may be considered most suitable for attaining that object. For example, if instead of ordering the early frame for his earliest crop, a gardener were to say, "Send me the very earliest pea that you have," he would, in that case, now receive No. 2 of our list, which is said to be ten days earlier than the frame: and, at any future period, if a still earlier pea should be originated, he would receive that.

4010. *Times of sowing.* "To try for a crop as early as possible, sow, of the sort preferred as hardy and forward, a small portion on a sheltered south border, or other favourable situation, at the close of October, or rather in the course of November. Follow with another sowing in December, that, if the former should be casually cut off in winter, this, coming up later, may have a better chance to stand; and if both survive the frost, they will succeed in fruit in May and June." According to Lindley, "a much better way of obtaining an early crop, and at one twentieth part of the trouble, is to sow the peas in January, in shallow pots, and place them under a common frame, where they may be protected from frost. Towards the middle of March the plants must be turned carefully out of the pots, so as not to injure their roots, and planted out an inch apart in drills, under a south wall, at three feet and a half or four feet from the foot of the wall, drawing a ridge of mould six inches high at the back of the plants, and protecting them by a few closely-placed spruce-fir branches on the north side. In this manner peas may be brought much forwarder than those sown upon the border, and under the greatest care and attention." (*Guide to the Orchard and Kitchen Garden*, p. 567.) See Mr. Judd on this subject, in *Gard. Mag.*, vol. i. p. 104, and Main on a similar practice in Scotland, *Ibid.*, vol. vi. p. 555. Another mode practised with great success is to use larger pots, say four or six inches in diameter; place a number of peas in each pot, and put them in a cool frame or vinery from November till March. They are then to be transplanted in rows four feet apart, and two feet asunder in the rows, turning out the balls without disturbing the roots. For a few nights at first they may be covered with large pots; but soon afterwards they must be staked. For other details of this practice, see *Gard. Mag.*, vol. vii. p. 463. Mr. Knight sows two dozen of peas round the margin of a pot nine inches in diameter; about the middle of January, sticking in beside them a circle of twigs about a foot high. They are then placed in a hotbed, where they remain till the middle of March, when they will be found fourteen inches high, and fit to transplant to the open border. (*Gard. Mag.*, vol. viii. p. 434.) Mr. Bishop recommends as a plan far preferable to that of raising peas in pots or boxes on a hotbed, to have a quantity of turf cut into pieces of about nine or ten inches long, and three or four broad; to place these in a regular manner over the surface of the bed, grass side downwards; to sow a row of peas on each row of turf, and afterwards to cover them with soil. When they are fit for transplanting, nothing more is required than to lift out the turf piece by piece, with the peas growing upon it, and to place them where they are to produce their crop. (*Gard. Mag.*, vol. i. p. 127.) For the Brussels practice with early peas and beans, see *Ibid.*, vol. ii. p. 461. "For more considerable, and less uncertain returns, either in succession to the above, or as first early and intermediate crops, sow larger portions in December or January, if open temperate weather. To provide for main crops, make successive sowings of the suitable sorts from February till the end of May. It frequently proves, that the fruit from a sowing at the beginning of February is not a week later than that from a crop raised in November; nay, the February-sown plants sometimes surpass all that have stood the winter, in forward returns, as well as quantity. From the middle of February make successive sowings every three weeks in the course of March, April, and May; or twice a-month in summer, when a continued succession is to be provided till the latest period. At the close of the sowing season, July and the first week of August, sow a reduced quantity each time; because the returns will depend on a fine mild autumn following, and whatever fruit is obtained will be small and scanty."

4011. *Quantity of seed.* Of the small early kinds, one pint will sow a row of twenty yards; for the larger sorts for main crops, the same measure will sow a row of thirty-three yards. For an instance of the failure of seed under peculiar circumstances, see *Gard. Mag.*, vol. vi. p. 233, and 503.

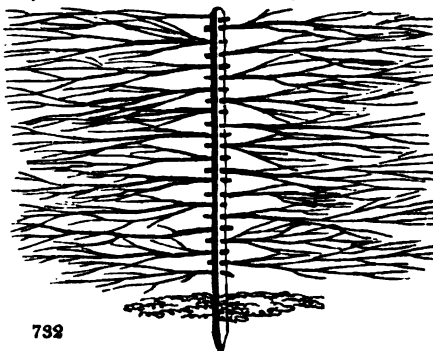
4012. *Process in sowing.* "For early sorts, make the drills one inch and a half deep; and let parallel drills be two feet and a half, three, or four feet asunder. Peas that are to grow without sticks require the least room. For summer crops and large sorts, make the drills two inches deep, and four, five, or six feet asunder. When peas are intended to be staked, it is considered a good plan never to sow more than two rows together in one place, and then at three feet apart. A much larger crop, and a great saving of ground is by this means obtained. It is well known, that the outside of double rows bear much more abundantly than the inside; and if only two rows in one place, and two more in another were sown, there would be four outside; whereas, if they were all sown together, there would be but two outside. Two rows in one place occupy three feet six inches in width, and two rows in another, the same, making together seven feet; but if four rows were sown together, they would take up eleven or twelve feet of ground. Here, therefore, is a saving of ground of nearly one half. (*Gard. Mag.*, vol. iv. p. 235.) As to the distances along the drill, distribute the peas according to their size and the season: the frame, three in the space of an inch; the dwarf marrowfat, two in an inch; the Prussian blue and middle-sized sorts, three in two inches; the large marrowfat and Knight's, a full inch apart; and the largest sorts, an inch and a half or two inches apart."

4013. *Protecting from mice and birds.* Cut a quantity of dried furze into pieces about an inch in length, and after the peas are sown in drills in the usual manner, cover them about an inch in thickness with the furze, and afterwards, with the soil, which tread in, in the usual manner. (*Gard. Mag.*, vol. iii. p. 117.) Birds are scared off by fixing pegs in the ground along each side of the rows, about four inches high, and about four feet from each other. To these worsted threads are attached, and sometimes crossed from one row

to the other. When the birds attempt to perch on the strings, they are overthrown, and so frightened that they never attempt it again. Some tar the string, supposing that the small will deter the birds, but experience proves that the string is equally effective without the tar as with it. (*Gard. Mag.*, vol. iv. p. 234.)

4014. *Soil and situation.* "The soil should be moderately rich, and deep, and strong, for the lofty growers. Peas are not assisted, but hurt, by unreduced dung recently turned in. A fresh sandy loam, and a little decomposed vegetable matter, is the best manure. The soil for the early crops should be very dry. For early crops, put in from October till the end of January, let the situation be sheltered, and the aspect sunny. Before the end of December, every one or two rows should stand close under a south, or south-eastern fence. In January, several parallel rows may be extended, under a good aspect, farther from the fence. After January, till the end of May, sow in an open situation. For the late crops, return again to a sheltered sunny border."

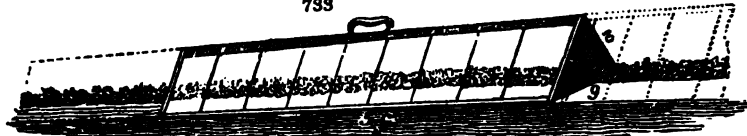
4015. *Subsequent culture.* "As the plants rise from half an inch high to two or three inches, begin to draw earth to the stems, doing this when the ground is in a dry state; and earthing gradually higher as the stems ascend. At the same time, with the hoe loosen the ground between the young plants, and cut down rising weeds. Early crops should be protected during hard frosts by dry straw or other light litter, laid upon sticks or brushwood; but remove the covering as soon as the weather becomes mild. If in April, May, and the course of summer, continued dry weather occurs, watering will be necessary, especially to plants in blossom and swelling the fruit; and this trouble will be repaid in the produce. Rows partly cut off may be made up by transplanting. This is best done in March. In dry weather, water, and in hot days, shade, until the plants strike. All peas fruit better for sticking, and continue longer productive, especially the larger sorts. Stick the plants when from six to twelve inches high, as soon as they begin to vine. Provide branchy sticks of such a height as the sort will require: for the frame and other dwarf sorts, three feet high; for the middle-sized sorts, four or five feet; and for the marrowfat and larger kinds, six, nine, or ten feet. Place a row of sticks to each line of peas, on the most sunny side, east or south, that the attraction of the sun may incline the plants towards the sticks. Place about half the number on the opposite side, and let both rows stand rather wider at top than at the ground. Some gardeners stop the leading shoot of the most early crop when in blossom; a device which accelerates the setting and maturity of the fruit." Tall growing peas are sometimes staked by means of oak or cast-iron standards, stuck in with branches as shown in (*Fig. 732.*) or with wires or cord drawn through the holes in the standards. (*See Gard. Mag.*, vol. iv. p. 107.) Slender poles, such as the tops of trees, may be used instead of the standards, connecting them by lines, with excellent effect. (*Ibid.*, vol. vii. p. 103.)



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rain, and yet leave them open to the full influence of the winter and spring sun. Some cover during nights and in severe weather, with two boards nailed together lengthwise, at right angles, which forms a very secure, and easily managed covering, but excludes light. A better plan would be to glass one of the sides, to be kept to the south, and to manage such *reto-glasses* (*Fig. 733.*), as they might be called,

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when over peas, beans, spinach, &c., as hand glasses are managed when over cauliflower; that is, to take them off in fine weather, or raise them constantly or occasionally by brickbats or other props, as the weather and the state of the crop might require.

4017. *Knight sowed peas in the open air and peas in pots on the first day of March. In the last week of the month those in pots were transplanted in rows in the open ground; on the 29th of April the transplanted plants were fifteen, and the others four inches high, and in June, the former ripened two days before the latter. (Hort. Trans., vol. v. p. 341.) Had a single, or even two peas only been planted in each pot, and the plants turned out with their balls entire, the crop, no doubt, would have ripened still earlier.*

4018. *Management of a late crop.* One of the best varieties for this purpose is Knight's marrow pea, which may be sown at intervals of ten days from the beginning to the end of June. "The ground is dug over in the usual way, and the spaces to be occupied by the future rows of peas are well soaked with water. The mould upon each side is then collected, so as to form ridges seven or eight inches above the previous level of the ground, and these ridges are well watered. The seeds are now sown in single rows along the tops of the ridges. The plants grow vigorously, owing to the depth of soil and abundant moisture. If dry weather at any time set in, water is supplied profusely once a week. In this way the plants continue green and vigorous, resisting mildew, and yielding fruit till subdried by frost." (*Hort. Trans.*, vol. ii.) Oldacre, for a late crop, sows in drills six inches deep, covers with three inches, and then gives a thorough soaking of water, after which he fills up the drill with the dry soil, and passes a heavy roller two or three times over the whole compartment. (*See Gard. Mag.*, vol. ix.)

4019. *Gathering the crop.* "The early crops are generally gathered very young. In the main crops take them as they become pretty plump, while the peas are yet green and tender. Leave some on to grow old; the young pods will then fill in greater perfection, and the plants will continue longer in bearing."

4020. *Packing and sending to a distance.* When peas are put together in quantities exceeding layers

of an inch in thickness, and the air excluded, the process of fermentation commences in a few hours, deprives the peas of its sweetness, and lessens its flavour. This may be observed every day in the pea season, in the peas sent to Covent Garden market in sacks, when contrasted with those sent in sieves, or flat shallow baskets. For this reason, when gardeners in the country send peas to town, they should always pack them in thin layers, between thick layers of fern, hay, or straw.

4021. *To save seed.* "Either sow approved sorts in the spring, for plants, to stand wholly for seed, to have the pods ripe in full perfection; or occasionally leave some rows of any main crop; let all the early podded ripen, and gather the late formed only for the table, as the last gleanings of a crop seldom afford good full seed. For public supply, extensive crops are commonly raised in fields. Let the seed attain full maturity, indicated by the pods changing brown, and the peas hardening: then to be hooked up and prepared for threshing out in due time, cleaned, and housed." Peas will retain their power of germination for from two to three years, if kept in the pod; but taken out of the pod, seldom more than eighteen months, and some sorts not a year.

4022. For the method of forcing peas, see Chap. VII. Sect. XII.

SUBJECT. 2. Garden Bean. — *Vicia Faba* L.; *Diadél. Decand.* L. and *Leguminosæ* J. *Fève de marais*, Fr.; *Grosse Bohne*, Ger.; *Boon*, Dutch; *Fava*, Ital.; and *Alover janas*, Span. See *Encyc. of Agr.* § 5222.

4023. *The garden bean* is an annual plant, rising from two to four feet high. It is supposed to be a native of the East, and particularly of Egypt, but has been known in this country from time immemorial, having, in all probability, been introduced by the Romans.

4024. *Use.* The seeds are the only part used in cookery; and are either put in soups, or sent up in dishes apart.

4025. *Varieties.* The following are the principal sorts planted in British gardens: —

1. *Early Masagan*: Masagan, *Fève de masagan*, Stedolph's new variety.
2. *Long-pod*: Common long-pod, Hang-down long-pod, Early long-pod, Large long-pod, Evered long-pod, Turkey, Lebanon, Early moon, Sandwich, Windsor long-pod, *Fève à longue cosse*, *Rapace de gros fève*.

3. *Windsor*: Kentish Windsor, Large Windsor, Taylor's large Windsor, Broad Windsor, Maudslayi, Small Spanish, *Fève de Windsor*.
4. *Green Windsor*: Tokes, *Fève verte de Windsor*.
5. *Green long-pod*: Green Nonpareil, Green Gemma, *Fève verte*.

6. *White-Mooned*.
7. *Red-Mooned*, Early asper, *Fève à fleur asper*.
8. *Dwarf*: *Fève*: Bog, Cluster, Dwarf cluster, *Fève naïve chausse*.
9. *Green Chaus*, *Fève verte* (See *Jard. edic.* 1833.)

4026. *Estimate of sorts.* The Masagan is one of the earliest, hardest, and best flavoured. Masagan is a Portuguese settlement on the coast of Africa, near the Straits of Gibraltar; and it is said that seeds brought thence afford plants that are more early and more fruitful than those which spring from home-saved seed. The dwarf-fan or cluster-bean is likewise an early variety, but it is planted chiefly for curiosity; it rises only six or eight inches high; the branches spread out like a fan, and the pods are produced in small clusters. The long-pod bean has been long noted for its fruitfulness. Of all the large kinds, the Windsor are preferred for the table. When gathered young, the seeds are sweet and very agreeable; when the plants are allowed to grow, and then they produce very large seeds, and in tolerable plenty, though they are not accounted liberal bearers. The green China is late, but very productive; and the fruit remains green even when ripe and dried.

4027. *Times of sowing for early and successional crops.* "For the earliest crop, plant some Masagans in October, November, or December, in a warm border, under an exposure to the full sun. Set them in rows two feet or two feet and a half asunder, about an inch and an half or two inches deep, and two or three inches apart in the rows; or some may also be sown in a single drill, under a south wall." The most successful plan for nurturing a crop over the winter is to sow the beans thickly together in a bed of light earth, under a warm aspect, for the intermediate object of protecting the infant plants the better from rigorous weather; and with the view of transplanting them at the approach of spring, or when the size of the plants (two or three inches in height) require it, into warm borders, at the distances at which the plants are to fruit. For this object, the width of a garden-frame is a convenient width for the bed, which should slope a little to the south. Sow two inches deep, either in drills or in rows, to that depth of the earth with a hoe or spade, scattering in the beans at the distance of about a square inch. At the approach of frost, protect the rising plants with a frame, hand-glasses, or the half-shelter of an awning of matting. In February or March, as soon as mild weather offers, transplant them into a warm south border, placing one row close under a protecting fence as far as that advantage can be given. Ease them out of the seed-bed with their full roots, and with as much mould as will adhere; pull off the old beans at bottom, and prune the end of the tap-root. Then plant them at the proper final distances, closing the earth rather high about the stems. Besides the benefit of previous protection, the fruiting of the beans is accelerated about a week by transplanting. Further, if severe frosts kill the early advanced plants, or if it was omitted to sow an early crop at the general season, a quantity may be sown thick in a moderate hot-bed, in January or February, or in large pots placed therein, or in a stove, to raise some plants quickly, for transplanting as above; previously hardening them by degrees to the full air. In all cases, as the young plants come up, give occasional protection in the severity of winter; and hoe up a little earth to the stems. Plants which can have no other shelter should be covered lightly with dry haulm or straw; but such a covering must be carefully removed as often as the weather becomes mild. To succeed the above, plant more of the same sort, or some of the long-pod, in December or January, when mild weather, for larger supplies, in more open exposures. And in order to obtain either a more full succession, or a first general crop, plant some large long-pod, and broad Windsor, at the end of January, if open weather, in some warm compartment of good mellow ground. Some of the large long-pod, and green Windsor beans, may also be planted in fuller crops in February, if the weather permit, both for succession and principal supplies. You may likewise plant any of the kinds, in full and succession crops, in February, March, and April."

4028. *For the main summer crops,* "adopt principally the green and common Windsor, and the long-pod; all to be planted under a free exposure, in the main compartments. The Windsor ranks first in regard to favour; but proves, on common soils, not so plentiful a bearer as the long-pod. Plant also full succession crops, in March and April, and smaller portions in May and June, for late production." (*Abercrombie*.)

4029. *Quantity of seed.* For early crops, one pint of seed will be requisite for every eighty feet of row; for main crops, two quarts for every 240 feet of row; and for late crops, nearly the same as the early. For the main crops, the quantity cultivated in proportion to that for early or late crops, is generally treble or quadruple, as to the extent of ground; but a less quantity of seed is requisite for the same space.

4030. *Method of sowing.* "Plant all the sorts in rows, two feet and a half apart, for the smaller, or very early, or very late kinds; and three feet for the larger; the smaller beans two inches deep, and three inches distant in the row; the larger three inches deep, and four inches distant in the row."

4031. *Transplanting.* Speechly constantly transplants his early bean-crops, and considers that this plant may be as easily transplanted as cabbage, or any other vegetable. It is a practice with him to plant beans alternately with potatoes in the same row; the rows three feet apart, and the potatoes eighteen inches apart in the row, so that the beans are nine inches from the potatoes. The beans are trans-

planted, by which means they have the start and advantage of the potatoes and weeds, and as they come in early, may be gathered before they can possibly incommode or injure the potatoes. (*Practical Hints*, &c. p. 17.)

4032. *Manual process.* "The work of sowing is most generally effected by a dibble, having a thick blunt end, to make a wide aperture for each bean, to admit it clean to the bottom, without any narrow hollow part below: strike the earth fully and regularly into the holes, over the inserted beans. Or the planting may be performed occasionally in drills drawn with a hoe the proper depth and distance as above: place the beans at intervals along the bottom of each drill, and earth them over evenly; which method, though suitable to any kinds, may be more particularly adopted in sowing the early and other small sorts."

4033. *Soaking seed in summer.* "In planting late crops in June and July, if the weather be dry, it is eligible to give the beans a previous soaking for several hours in soft water; or, if they are to be sown in drills, water the drills beforehand, then directly put in the beans, and earth them in while the ground remains moist."

4034. *Subsequent culture.* "As the plants come up, and advance from two to four or six inches high, hoe up some earth to the stems on both sides of each row, cutting down all weeds. Repeat the hoeing as future weeds arise, both to keep the ground about the plants clean, and to loosen the earth to encourage their growth. In earthing up, great care must be taken that the earth do not fall on the centre of the plant so as to bury it; for this occasions it to rot or fall. After earthing up, stir between the rows with a three-pronged fork. As the different crops come into full blossom, pinch or cut off the tops, in order to promote their fruiting sooner, in a more plentiful production of well-filled pods." (*Abercrombie*.) Nicol says, "Topping is unnecessary for any but the early crops; being practised to render them more early." Most gardeners, however, are of opinion, that topping improves the crop both in quantity and quality.

4035. *To forward an early crop, see this article under Pea.* (4016.)

4036. *To produce a very late crop.* Neill mentions an expedient sometimes resorted to to produce a late crop. A compartment of beans is fixed on; and when the flowers appear, the plants are entirely cut over, a few inches from the surface of the ground. New stems spring from the stools, and these produce a very late crop of beans. By the same means the bean has been rendered biennial.

4037. *Gathering.* For table use, gather only such as are tender, the seeds decreasing in delicacy after they attain about half the size which they should possess at maturity. When they become black-eyed, they are tough, and strong-tasted, and much inferior for eating.

4038. *To save seed.* "Either plant some of the approved sorts, in February or March, wholly for that purpose; or leave some rows of the different crops ungathered, in preference to the gleanings of gathered crops. The pods will ripen in August, becoming brown and dry, and the beans dry and hard: then pulling up the stalks, place them in the sun, to harden the seed thoroughly, after which thresh out each sort separately." (*Abercrombie*.) The seed will keep its vitality rather longer than that of the pea; some sorts will keep as long as four or five years.

4039. *To force the bean, see* § 3807.

SUBJECT. 3. *Kidneybean.*—*Phaseolus* L.; *Diadl. Deehn.* L. and *Leguminosæ* J. *Haricot*, Fr.; *Schminkbohne*, Ger.; *Turkeche Boon*, Dutch; *Fagiolo*, Ital.; and *Fasole*, Span.

4040. *The common dwarf kidneybean*, erroneously termed French bean, is the *P. vulgaris* L. (*Lob. Ic.* 2. p. 59.) It is a tender annual, a native of India, and was introduced in 1597, or earlier. Flowers from June to September. The species called the *runner* is the *P. multiflorus*, Willd. (*Schk. Han.* 2. 7. 199. a.), a half hardy annual, and a native of South America, introduced in 1633. It is rather more tender than the other; and produces flowers from July to September. The fruit of both sorts may be had in perfection from the open garden, by successive crops, from June to October. It is an article of field culture in most warm countries, especially France and some parts of America; and where the winters are not sufficiently severe to kill the roots of the scarlet runner, the plants will spring up again the second, and even the third year. Indeed the roots, if taken up and preserved like georginas, may be planted in April, when they will produce a second crop. The history of this discovery will be found in the *Gardener's Magazine*, vol. vii. p. 485. and vol. viii. p. 53.

4041. *Use.* The unripe pods are chiefly used in Britain as a legume, for which they are in great estimation throughout the year; being produced by forcing when they cannot be grown in the natural ground. They are also used as a pickle. On the continent, the ripe seeds are much used in cookery; forming what are called *haricots*, and entering into some sorts of soups. In the end of the season, when frost is expected, the haubn of the kidneybean crop is gathered and dried like that of the pea in this country, and the ripe beans afterwards threshed out, and preserved for use through the winter.

4042. *The varieties of the kidneybean cultivated in France and Spain, and in similar climates, are innumerable, and are continually fluctuating. In Britain they are comparatively few. The varieties of the dwarf species (Kidney nain, or sans rames, Fr.; Gemeine bohne, or Zwerg bohne, Ger.) are:*

Early purple-speckled.
Early black, or negro.
White Dutch.

Centenary white.
Black-speckled.
Red-speckled.

Large White Spanish.
Chinese.

Royal Dwarf.
Mag., vol. vi. p. 653.)

4043. *Varieties of the runner or climbing species (Haricot à rames, Fr.; Stangen bohne, Ger.):—*

Scarl runner: the most plentiful and lasting bearer; preferable for the main crop of runner, or twisting kidney-beans.

Large white runner: a variety of the scarlet. The seed and blossom white, but the pods similar to the scarlet kind.

White Dutch runner: bears very long smooth pods, but does not continue so long in flower as the two former. Luscious, or new variegated.

4044. *Constitution and habits.* Both the above classes of kidneybeans, dwarfs, and runners, are tender in their nature, unable to grow freely in the open garden before April or May; the seed being liable to rot in the ground from the effects of wet, if planted before the beginning of the former month, even in a dry soil. The plants are also affected by sharp cold, and make but little progress till settled warm weather. However, when sown in the proper season, from April or May through the course of summer, till the beginning of August, they succeed well, making liberal returns of fruit from June or July till October. The dwarfs require no support; but the runners, ascending eight or ten feet high or more, require the sticks or poles to climb upon, or lines suspended from a contiguous building or fence. They produce pods their whole length. (*Abercrombie*.)

4045. *Estimate of sorts.* The dwarfs bear sowing a little sooner, and make returns quicker than the runners. They are, besides, more convenient to cultivate on a large scale; and the smaller pods which they produce, are esteemed by many to have more delicacy of flavour. On these accounts, it is usual to raise the larger supply from the dwarf species. The early yellow, early black, and early red-speckled, are

among the most hardy and most forward; the early white comes in a few days later, but is of superior flavour. The Canterbury and black-speckled are plentiful and lasting bearers. Growers for sale, in general, depend on the Canterbury, and black and red speckled, for main crops; but the others just named are also profitable sorts, and acceptable to the consumer. The dwarf kidneybean continues to produce young pods in abundance and in perfection only about three weeks or a month. The runners yield a succession of fruit from the same sowing a much longer time than the dwarfs. The scarlet runner ranks first for its prolific property and long continuance in fruit; the pods are thick, fleshy, tender, and good, and may be eaten green of a much larger size than those of any of the dwarf species. The white variety is equally eligible for a principal crop. The Dutch runner grows as luxuriantly as hops, and is also a great bearer, in fine long pods, but not so lasting as the former. As to the smaller runner kinds, these are rather degenerate varieties of the Canterbury and white Dutch; casually shooting into runners: they bear, in tolerable abundance, slender neat pods, which are very good and tender eating; though not so eligible for a principal crop of runners as the scarlets. The Lausanne is equal in value to the scarlet runner, and differs chiefly from it in having variegated, or red and white blossoms. This and the scarlet runner are decidedly the best kidneybeans for small gardens, and for being grown by cottagers.

4046. *Quantity of seed.* Half a pint will sow a row eighty feet in length, the beans being placed from two and a half to three inches apart.

4047. *Soil.* The soil for both species should be light and mellow, inclining to a dry sand for the early sowings, and to a moist loam for the sowings in summer.

4048. *Separate culture of dwarf.* About the beginning of April, if the weather be temperate, fair, and settled, make the first sowing, or in a dry south border, or other sheltered compartment with a good aspect, or sow in a single row close under a south fence; beginning with a small proportion of the most hardy early sorts. It is a good method to follow in a week with a second sowing in case the former should fail. You may sow for a larger crop about the middle or 20th of April. For the early crops, make the drills two feet asunder. The common depth is an inch and a half for the smaller-sized beans.

4049. *Culture of runners.* The runner kidneybeans may be sown in a small portion, towards the end of April, if tolerably warm dry weather; but as these beans are rather more tender than the dwarf sorts, more liable to rot in the ground by wet and cold, especially the scarlets, the beginning or middle of May will be time enough to sow a considerable crop; and you may sow a full crop about the beginning of June. Allot principally the scarlet and large white runners. Some Dutch runners are very eligible as a secondary crop. The first crops should have the assistance of a south wall. Intermediate crops may be sown in any open compartment, or against any fence not looking north. The latest sown will continue bearing the longer under a good aspect and shelter. In sowing, draw drills about an inch and a half, or not more than two inches deep. Let parallel rows be at least four feet asunder, to admit in the intervals tall sticks or poles for the plants to climb upon.

4050. *Taking the crop.* Gather the pods, both from dwarfs and runners, while they are young, fleshy, brittle, and tender; for then are they in highest perfection for the table; and the plants will bear more fully, and last longer in fruit, under a course of clean gathering, not leaving any superabundant pods to grow old.

4051. *To save seed.* Either sow a portion for that object, or leave rows wholly ungathered of the main crops, or preserve a sufficiency of good pods promiscuously. The beans saved should be the first-fruits of a crop sown at a period which broues the entire course of growth into the finest part of summer. Let them hang on the stalks till they ripen fully in August and September; then let the haulm be pulled up, and placed in the sun, to dry and harden the seed, which should be afterwards cleared out of the husks, bagged up, and housed.

4052. *Forwarding an early crop.* The kidneybean is often partially forced in hot-houses or frames, with a view to its fruiting in the open garden; and supplies of green pods are also kept up throughout the winter and spring months, by forcing in hot-houses and pits; for the details of both practices, see the preceding chapter, § 3783.

4063. *Insects.* Pulse of all kinds, but particularly the pea, the bean, and the kidneybean, are exposed to the attacks of many tribes of insects, among which the aphides, or plant lice, are the most pernicious. Snails and slugs, which frequently devour the plants on their first appearance above the ground, may be enticed away or destroyed by the methods before recommended. The aphid peculiar to the pea is called by some the green-fly; while that appropriated to the bean is black, and is named by many the collier. (Fig. 734. b, natural size; a, magnified.) The earlier the seeds are sown, the better chance the plants have of escaping. The best remedy, particularly with beans, is to top the plant when the insects begin to appear, and to carry away the tops to bury or burn them. In a matured state, a small beetle (*Bruchus pisi* L.) (d) deposits its eggs within the pea, which serves as food for the grub, and is thus destroyed; the peculiar form of the antennæ or horns, when magnified (c) will sufficiently distinguish this insect, which, however, is not extensively injurious among us.



SECT. III. Esculent Roots.

4054. *The esculent-rooted culinary plants* delight in a light, rather sandy, deep, and well-stirred soil. It must be dry at bottom; but a moist atmosphere and moderate temperature are greatly favourable to the growth of almost the whole of the plants we have included in this section. Hence the excellence of the potato crop in Ireland, and the size to which turnips, carrots, parsneps, &c. attain in Britain and Holland, compared to what they do in France and Germany. The space occupied in the kitchen-garden by this class of vegetables is considerable; but as it is regulated in some degree by the quantity of the more common roots grown in the farm for culinary use, it is less subject to estimation. In most gardens, however, the esculent roots taken together may occupy as much space as the legumes. In cottage gardens, they may be considered as occupying one half of the whole, to be in part succeeded by winter greens.

SUBSECT. 1. *Potato.* — *Solanum tuberosum* L. (*Bauh. Prod.* 89. t. 89.); *Pent. Dig. L.* and *Solaneæ* B. P. *Pomme de Terre*, Fr.; *Kartoffel*, Ger.; *Aardappel*, Dutch; *Tar-tuff bianchi*, or *Pomo di Terra*, Ital.; *Batatas Inglesas*, Span.; and *Batata da terra*, Port. See *Encyc. of Agr.* § 5921.

4055. *The potato* is a perennial plant, well known for the tubers produced by its roots. It is found wild in South America, both in Buenos Ayres and in Chili; but Humboldt is doubtful if it be really indigenous there. Some tubers, said to be of the wild potato, have been received by the Horticultural Society, and grown by them; they differ so little from those of the cultivated potato, that Sabine conjectures, "that the original

cultivators of this vegetable did not exercise either much art or patience in the production of their garden-potatoes." (*Hort. Trans.*, vol. v. p. 257.) Sir Joseph Banks (*Hort. Trans.*, vol. i. p. 8.) considers that the potato was first brought into Europe from the mountainous parts of South America, in the neighbourhood of Quito, where they were called *papas*, to Spain, in the early part of the sixteenth century. From Spain, where they were called *batatas*, they appear to have found their way first to Italy, where they received the same name with the truffle, *tartufl*. The potato was received by Clusius, at Vienna, in 1598, from the governor of Mons, in Hainault, who had procured it the year before from one of the attendants of the Pope's legate, under the name of *tartufo*, and learned from him, that it was then in use in Italy. In Germany it received the name of *kartoffel*, and spread rapidly even in Clusius's time. To England the potato found its way by a different route, being brought from Virginia by the colonists sent out by Sir Walter Raleigh in 1584, and who returned in July 1586, and "probably," according to Sir Joseph Banks, "brought with them the potato." Thomas Heriot, in a report on the country, published in De Bry's *Collection of Voyages* (vol. i. p. 17.), describes a plant called *openawh*, with "roots as large as a walnut, and others much larger; they grow in damp soil, many hanging together, as if fixed on ropes; they are good food, either boiled or roasted." Gerard, in his *Herbal* published in 1597, gives a figure of the potato under the name of *the potato of Virginia*, whence, he says, he received the roots; and this appellation it appears to have retained, in order to distinguish it from the *batatas*, or sweet potato (*Convolvulus Batatas*), till the year 1640, if not longer. "The sweet potato," Sir Joseph Banks observes, "was used in England as a delicacy long before the introduction of our potatoes: it was imported in considerable quantities from Spain and the Canaries, and was supposed to possess the power of restoring decayed vigour. The kissing comfits of Falstaff, and other confections of similar imaginary qualities, with which our ancestors were duped, were principally made of these and of eringo roots." Gough, in his edition of *Camden's Britannia*, says, that the potato was first planted by Sir Walter Raleigh on his estate of Youghall, near Cork, and that it was "cherished and cultivated for food" in that country before its value was known in England; for, though they were soon carried over from Ireland into Lancashire, Gerard, who had this plant in his garden in 1597, under the name of *Batata virginiana*, recommends the roots to be eaten as a delicate dish, not as common food. Parkinson mentions, that the tubers were sometimes roasted, and steeped in sack and sugar, or baked with marrow and spices, and even preserved and candied by the comfit-makers. The Royal Society, in 1663, took some measures for encouraging the cultivation of potatoes, with the view of preventing famine. Still, however, although their utility as an article of food was better known, no high character was bestowed on them. In books of gardening, published towards the end of the seventeenth century, a hundred years after their introduction, they are spoken of rather slightly. "They are much used in Ireland and America as bread," says one author, "and may be propagated with advantage to poor people." "I do not hear that it hath been yet essayed," are the words of another, "whether they may not be propagated in great quantities, for food for swine or other cattle." Even the enlightened Evelyn seems to have entertained a prejudice against them: "Plant potatoes," he says, writing in 1699, "in your worst ground. Take them up in November for winter spending; there will enough remain for a stock, though ever so exactly gathered." The famous nurserymen, London and Wise, did not consider the potato as worthy of notice in their *Complete Gardener*, published in 1719; and Bradley, who, about the same time, wrote so extensively on horticultural subjects, speaks of them as inferior to skirrets and radishes. The use of potatoes, however, gradually spread, as their excellent qualities became better understood. But it was near the middle of the eighteenth century before they were generally known over the country: since that time they have been most extensively cultivated. In 1796, it was found, that in the county of Essex alone, about 1700 acres were planted with potatoes for the supply of the London market. This must form, no doubt, the principal supply; but many fields of potatoes are to be seen in the other counties bordering on the capital, and many ship-loads are annually imported from a distance. In every county in England, it is now more or less an object of field-culture. The cultivation of potatoes in gardens in Scotland was very little understood till about the year 1740; and it was not practised in fields till about twenty years after that period. It is stated in the *General Report of Scotland* (vol. ii. p. 111.), as a well ascertained fact, that in the year 1725-6, the few potato-plants then existing in gardens about Edinburgh, were left in the same spot of ground from year to year, as recommended by Evelyn; a few tubers were perhaps removed for use in the autumn, and the parent-plants were then well covered with litter to save them from the winter's frost. Since the middle of the eighteenth century, the cultivation of potatoes has made rapid progress in that country; so that they are now to be seen in almost every cottage garden. The potato is now considered as the most useful esculent that is cultivated; and who, Neill asks, "could, *a priori*, have expected to have found the most

useful plant among the natural family of the Irididæ L., several of which are deleterious, and all of which are forbidding in their aspect."

4056. Use. The tubers of the potato, from having no peculiarity of taste, and consisting chiefly of starch, approach nearer to the nature of flour or the farina of grain, than any vegetable root production; and for this reason it is the most universally liked, and can be used longer in constant succession by the same individual without becoming unpalatable, than any other vegetable, the seeds of the grasses excepted. "It is commonly eaten plainly boiled, and in this way it is excellent. The tender tops of potato stalks are used both in Canada and Kamtshatcha as spinach. Potatoes are also baked, roasted, and fried. With the flour of potatoes, puddings are made nearly equal in flavour to those of millet; with a moderate proportion of wheat-flour, bread of excellent quality may be formed of it; and potato starch, independently of its use in the laundry, is considered an equally delicate food as sago or arrow-root." As starch and sugar are so nearly the same, that the former is easily converted into the latter, hence the potato yields a powerful spirit by distillation, and a strong wine by the fermentive process. Thirty-one different uses of potatoes will be found noticed in the *Gard. Mag.*, vol. i. p. 438.

4057. Varieties. These are very numerous, not only from the facility of procuring new sorts by raising from seeds but because any variety cultivated for a few years in the same soil and situation, as in the same garden or farm, acquires a peculiarity of character or habit, which distinguishes it from the same variety in a different soil and situation.

4058. The varieties of potatoes are innumerable, and they are continually undergoing change. The same variety also bears many different names in different parts of the country. In general, every town and district has its peculiar and favourite varieties, early as well as late; so that, excepting as to the best early kinds, and the best for a general crop in all soils, any list, however extended, could be of little use. There are some excellent sorts of party-coloured potatoes in Scotland, which degenerate when removed from one district to another; and most of the Scotch and Irish varieties degenerate in England. The best mode, therefore, to order potatoes for planting, is to give a general description of the size, colour, form, and quality wanted, and whether for an early or late crop. In the following selection, we have adopted the names known to the London, Edinburgh, Dublin, Bristol, and Liverpool seedsmen.

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| <p>Early Potatoes.</p> <ol style="list-style-type: none"> 1. <i>The ash-leaved kidney</i>; one of the best for forcing, as well as for the first crop in the open air. 2. <i>The lady's finger</i>, or <i>Rufford kidney</i>; highly prized in Lancashire as the earliest variety, mealy, and of excellent flavour. 3. <i>The ash-leaved round</i>, or <i>early round</i>; mealy. 4. <i>Pea's seedling</i>, or <i>Foxley</i>; round, yellowish-white, and waxy. 5. <i>Beau's early</i>; cultivated by the growers for the London market. | <ol style="list-style-type: none"> 6. <i>The early Champion</i>; very prolific, large, round, white, and in general culture for the London market. Summer Potatoes. 7. <i>The purple eye</i>; large, round, and mealy. 8. <i>Red-headed kidney</i>; mealy, and of a peculiar flavour. 9. <i>Lancashire pink eye</i>, or <i>Scotch red</i>. Winter Potatoes. 10. <i>Providence</i>; round, mealy, and an excellent bearer. | <ol style="list-style-type: none"> 11. <i>Devonshire apple</i>; round, red, and mealy. 12. <i>Prince's beauty</i>; prolific and mealy. 13. <i>Black skin</i>, or <i>dark purple</i>; middle size, very mealy, and a long keeper. 14. <i>Red collars</i>; large, prolific, and very mealy; much grown in Wiltshire, Somersetshire, and Gloucestershire. 15. <i>White long keepers</i>; good. 16. <i>Manchester blue</i>; a strong growing, prolific, round potato, which does not require earthing up, and which will keep a year without injury. (See <i>Copper</i> in <i>Gard. Mag.</i>, vol. x.) |
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4059. Estimate of sorts. The following list, by one of the best practical gardeners in England, will give a succession of good potatoes throughout the year, without forcing :

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| <p><i>May, June, and July.</i> — Ash-leaved, red, and other kidneys.
<i>July, and August.</i> — Purple eye.</p> | <p><i>September, October, and November.</i> — <i>Providence</i>.
<i>November, December, and January.</i> — <i>Devonshire apple</i>, <i>Prince's beauty</i>.</p> | <p><i>February, March, April, and May.</i> — <i>Red collars</i> and <i>White long keepers</i>. (<i>Gard. Mag.</i>, vol. vi. p. 60.)</p> |
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4060. Propagation. The potato may be propagated from seed, cuttings or layers of the green shoots, sprouts from the eyes of the tubers, or portions of the tubers containing a bud or eye. The object of the first method is, to procure new or improved varieties; of the second, little more than curiosity, or to multiply as quickly as possible a rare sort; and of the third, to save the tubers for food. The method by portions of the tubers is the best, and that almost universally practised for the general purposes, both of field and garden culture.

4061. By seed. Gather some of the ripest apples in September or October, take out and preserve the seed till spring, and then sow it thinly in small drills. When the plants are up two or three inches, thin them to five or six inches' distance, and suffer them to grow to the end of October, when the roots will furnish a supply of small potatoes, which must then be taken up, and a portion of the best reserved for planting next spring in the usual way. Plant these, and let them have the ensuing summer's full growth till October, at which time the tubers will be of a proper size to determine their properties. Having considered not only the flavour of each new variety, but the size, shape, and colour, the comparative fertility and healthiness, earliness or lateness, reject or retain it for permanent culture accordingly. (*Abercrombie*.)

4062. To produce seeds on early potatoes. The earliest varieties of potatoes, it has been already remarked, do not produce flowers or seeds. Knight, desirous of saving seed from one of these sorts, took a very ingenious method of inducing the plants to produce flowers. "I suspected the cause," he says, "of the constant failure of the early potato to produce seeds, to be the prematurely early formation of the tuberous root; which draws off for its support that portion of the sap which, in other plants of the same species, affords nutriment to the blossoms and seeds: and experiment soon satisfied me that my conjectures were perfectly well founded. I took several methods of placing the plants to grow in such a situation, as enabled me readily to prevent the formation of tuberous roots; but the following appearing the best, it is unnecessary to trouble the Society with an account of any other. Having fixed strong stakes in the ground, I raised the mould in a heap round the bases of them, and in contact with the stakes: on their south sides I planted the potatoes from which I wished to obtain seeds. When the young plants were about four inches high, they were secured to the stakes with shreds, and nails, and the mould was then washed away, by a strong current of water, from the bases of their stems, so that the fibrous roots only of the plants entered into the soil. The fibrous roots of this plant are perfectly distinct organs from the runners, which give existence, and subsequently convey nutriment to the tuberous roots; and as the runners spring from the stems only of the plants, which are, in the mode of culture I have described, placed wholly out of the soil, the formation of tuberous roots is easily prevented; and whenever this is done, numerous blossoms will soon appear, and almost every blossom will afford fruit and seeds." Knight considering that the above facts, which are more fully explained in the *Philosophical Transactions* for 1806, were sufficient to prove, that the same fluid or sap gives existence alike to the tuber, and the blossom, and seeds, and that, whenever a plant of the potato affords either seeds or blossoms, a diminution of the crop of tubers, or an increased expenditure of the riches of the soil, must necessarily take place, succeeded in producing varieties of sufficiently luxuriant growth and large produce for general culture which never produced blossoms. (*Hort. Trans.*, vol. i. p. 188.)

4063. By cuttings, or the layers of the stalks, or suckers. Make cuttings of the young stalks or branches, of five or six inches in length, in May or June; attending to the general directions for forming cuttings. Choose, if possible, showery weather; or strike them under a hand-glass, or in a half empty pot covered with a pane of glass, as in striking cucumber-cuttings.

4064. Layers. In June or July, when the potato-stalks are advanced one or two feet long, choose such plants as stand somewhat detached, and lay down the shoots on the ground with or without cutting, in the common mode of layering. Cover them with earth about three inches, leaving the points of the shoots exposed. These shoots will emit roots at every leaf, and produce full-grown potatoes the same year attaining perfection in autumn.

4065. *Suckers.* Remove in June offset sucker shoots, with a few roots to each; plant them carefully, and they will produce a late crop like the layers.

4066. *By sprouts or shoots from the tubers.* In default of genuine early sorts; or, to save the tubers for use in seasons of scarcity, the sprouts which are generally found on store-potatoes in spring, and picked off and thrown away as useless, may, when carefully planted in loose well-prepared soil, be made to yield a crop; and this crop will be fit for use a little sooner than one produced from cuttings or sections of the same tubers, in which the buds are not advanced. Almost every thing, however, depends on the fine tilth, and good state of the ground.

4067. *By portions of the tubers.* This is the only method fit for general purposes. In making the sets or sections, reject the extreme or watery end of the tuber, as apt to run too much to haulm, and having the eyes small, and in a cluster; reject also the root or dry end, as more likely to be tardy in growth, and, as, according to some, producing the curl. Then divide the middle of the potato so, as to leave not more than one good eye in each set. Where the potato scoop is used, take care to apply it so that the one or bud may be in the centre of each set, which this instrument produces, of a semi-globular form. The larger portion of tuber left to each eye, so much the greater will be the progress of the young plant. The scoop is only to be used in seasons of scarcity, when the portion of tuber saved by it may be used for soups for the poor, or for feeding cattle. See *Encyc. of Agri.*, § 2463, and figs. 231 and 232.

4068. *Size of the sets.* Knight has found that for a late crop small sets may be used, because the plants of late varieties always acquire a considerable age before they begin to generate tubers; but for an early crop he recommends the largest tubers, and he has found that these not only uniformly afford very strong plants, but also such as readily recover when injured by frost: for being fed by a copious reservoir beneath the soil, a reproduction of vigorous stems and foliage soon takes place, when those first produced are destroyed by frost, or other causes. He adds, "when the planter is anxious to obtain a crop within the least possible time, he will find the position in which the tubers are placed to vegetate by no means a point of indifference; for these being shoots or branches, which have grown thick instead of elongating, retain the disposition of branches to propel their sap to their leading buds, or points most distant from the stems of the plants of which they once formed parts. If the tubers be placed with their leading buds upwards, a few very strong and very early shoots will spring from them; but if their position be reversed, many weaker and later shoots will be produced; and not only the earliness, but the quality of the produce, in size, will be much affected." (*Hort. Trans.*, vol. iv. p. 448.)

4069. *Quantity of sets.* In respect to proportioning the quantity of sets to the space to be planted, Abercrombie directs, "For a plot of the early and secondary crops, eight feet wide by sixteen in length, planted in rows fifteen inches asunder by nine inches in the row, a quarter of a peck of roots or cuttings. For full-timed sorts and main crops, a compartment, twelve feet wide by thirty-two in length, planted in rows two feet distant by twelve inches in the row, half a peck of roots or cuttings will be required."

4070. *Soil and manure.* The best soil for the potato is a light, fresh, unmixt loam, where they can be grown without manure. Here they have always the best favour. In a wet soil, they grow sickly, and produce watery tubers, infected with worms and other vermin. To a poor soil, dung must be applied; littersy dung will produce the earliest and largest crop; but mellow dung, rotten leaves, or vegetable earth, will least affect the flavour of the tubers.

4071. *Season for planting.* Early crops in the open air may be planted either in the autumn, and treated as will afterwards be mentioned, or in March, after the sets have been forwarded in a warm cellar, or by other means. "The last fortnight of March and first fortnight of April is the most proper time for planting the main crops, a little earlier or later, as the spring may be forward or late, the ground dry or wet. Occasional plantings may be made in May, or even the beginning of June." (*Abercrombie*.)

4072. *Methods of planting.* The sets of whatever kind, or the plants forwarded in pots, to be turned out with their balls entire for producing an early crop in the open air, should always be inserted in regular rows; the object of which is to admit with greater facility the stirring the earth between, and the weeding up of the plants. The rows may be fifteen inches apart for the small early sorts; and for the larger, twenty inches or two feet, according to the poorness or richness of the soil. In the lines traced, make holes for the sets at eight, twelve, or fifteen inches' distance, letting their depth not be less than three, nor exceed five inches.

4073. *Planting on a level surface* will answer on a light soil. In small gardens, the planting may be performed by a common large dibble with a blunt end. For planting considerable crops, a strong larger dibble, about a yard long, is used, with a cross handle at top for both hands, the lower end being generally shod with iron, and having a short cross iron shoulder about four or five inches from the bottom, as a guide to make the holes of an equal depth; one person striking the holes, and a boy directly dropping a set into each hole. Strike the earth in upon them fully with a dibble, hoe, or rake, either as each row is planted, or when the whole planting is finished. Sometimes the process is to open a small hole with the spade, and to drop in a set, which set is covered in by the opening of the next hole.

4074. *On strong heavy land*, the planting ought to be on raised beds with alleys, or in drills on the crops of parallel ridges. The beds may either be raised by previous digging, throwing on good earth till the terrace rise to the desired height, or in the different method described below. To plant in drills, trace them at the medium distance above specified: form them to the proper depth with a narrow spade or large hoe; in these place the sets a foot or fifteen inches apart, and earth over. To avoid the inconveniences of low wetland ground, whether it be arable or grass land, or a cultivated garden, potatoes are planted in raised beds four feet wide, with alleys half that width between. The beds are thus raised:—Without digging the surface, lay some long loose litter upon the intended beds. Upon this litter place the sets, about a foot apart; and upon the sets apply more litter, equally distributed over the whole: then digging the alleys, turn the earth up to the same depth. The plants will produce very good crops.

4075. *Subsequent culture.* "From the March or April planting, the stems generally rise fully in May. After the plants have appeared, give a deep hoeing with the pronged hoe on dry days, cutting up all the weeds, and stirring the ground about the rising stalks of the plants. When advanced from six to twelve inches high, hoe up some earth to the bottom of the stems, to strengthen their growth, and promote the increase below: continue occasional hoeing to eradicate weeds, till the plants cover the ground, when but little further care will be required. Permit the stalks to run in full growth, and by no means cut them down, as is sometimes practised; the leaves being the organs for transmitting the beneficial influence of the sun and air to the roots, which is most necessary to the free and perfect growth of the tubers." (*Abercrombie*.)

There are some varieties of late potatoes, such as the Manchester blue, which produce their tubers at the extremity of runners at some distance from the main stem of the plant; and there are others, such as most of the early kinds, which produce their tubers at the extremities of short runners, close round the main root. Now the earthing-up must be regulated by the distance at which the majority of tubers are produced from the main stem of the plant; and, consequently, some sorts should not be earthed up at all; but rather, if a very large crop is wanted, the whole surface should be slightly covered with a layer of soil, as is done in the lazy bed, or Irish manner of cultivation; in which, when the plants are three or four inches high, the trenches between the beds are deepened, and the excavated soil scattered over the bed. See some valuable reasoning on this subject by Mr. Hayward, in *Gard. Mag.*, vol. ix. p. 322; and the experience of Mr. Capper with the Manchester potato, in the same work, vol. x.

4076. *Injury from spring frosts.* Early potatoes, when they first come through the ground, are liable to be injured by spring frosts; but there is an easy and effectual remedy for every gardener who will take the trouble, and that is to water them so as to thaw off the frost before sun-rise. In Ayrshire, where even late potatoes are liable to this injury, whole fields of them are sometimes so watered on a single

farm; all the hands being called to business by the break of day, and the water being sprinkled on the young sprouts from vessels of any sort by means of a small bundle or wisp of straw, like a priest's aspergillus.

4071. *Pinching off the blossoms.* It is now generally admitted, that a certain advantage, in point of produce, is obtained by pinching off the blossoms as they appear on the plants. The fact has been repeatedly proved, and satisfactorily accounted for by Knight, who estimates that it may add an ounce in weight to the tubers of each plant, or considerably above a ton per acre. (*Hort. Trans.*, vol. I. p. 190.)

4078. *Taking the crop.* "Clusters of roots in the early planted crop will sometimes by June or July be advanced to a sufficient size for present eating, though still small. Only a small portion should be taken up at a time, as wanted for immediate use, as they will not keep good above a day or two. In August and September, however, they will be grown to a tolerably good size, and may be taken up in larger supplies, though not in quantities for a length of time. Permit the main winter crops to continue in growth till towards the end of October or beginning of November, when the stalks will begin to decay — an indication that the potatoes are fully grown: then wholly dig them up, and house for winter and spring. Let them then be taken up, before any severe frost sets in; having, for large crops, a proper potato-fork of three or four short flat tines, fixed on a spade-handle. Cut down the haulm close, and clear off forward: then fork up the potatoes, turning them clean out of the ground, large and small; and collect them in baskets."

4079. *Housing and preserving the crop.* Abercrombie recommends "housing potatoes in a close, dry, subterranean apartment, laid thickly together, and covered well with straw, so as to exclude damp and frost." There they are to be looked over occasionally, and any that decay picked out. In spring, when they begin to shoot, turn them over, and break off the sprouts or shoots from each tuber, perfectly close, in order to retard their future shooting as much as possible. Potatoes so stored will continue good all the winter and spring, till May and June.

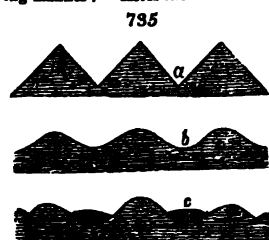
4080. *Piling, pying, or burying,* are terms used to designate a good method of preserving potatoes in winter. They are piled on the surface of the ground, in a ridged form, of a width and length at pleasure, according to the quantity, but commonly about five or six feet wide. This is done by digging a spit of earth, and laying it round the edge, a foot wide (if turf the better), filling the space up with straw, and then laying on a course of potatoes; then dig earth from the outside, and lay upon them. Put straw a few inches along the inside edge, then put in more potatoes, and so on, keeping a good coat of straw all the way up between the potatoes and the mould, which should be about six inches thick all over; beat it close together, and the form it lies in, with the trench all round, will preserve the potatoes dry; and the sharpest frost will hardly affect them; in a severe time of which, the whole may be covered thickly with straw. In the spring, look over the stock, and break off the shoots of those designed for the table; repeating this at intervals, to preserve the potatoes the longer good.

4081. *Different methods of growing early potatoes.* We have already given (§ 3797.) the different methods of forcing potatoes, and the preceding paragraph may be considered as representing the usual routine of their culture and management in gardens. We shall now lay before our readers all the best modes of producing early crops of potatoes, as practised in Britain, whether in gardens or fields. All these modes will be found described at length in the first ten volumes of the *Gardener's Magazine*.

4082. *The planting of early potatoes* is carried to a very high degree of perfection in Lancashire. It is stated in *The Lancashire Agricultural Report*, in respect to the raising of seed potatoes, that upon the same ground from which a crop has already been taken, the early seed potatoes are in some places afterwards planted; which, after being got up about November, are immediately cut up into sets, and preserved in oat husks or sawdust, where they remain till March, when they are planted, after having had one sprout taken off, which is also planted. The sprouts are of a length sufficient to appear above ground in the space of a week. But the most approved method is, to cut the sets, and put them on a room floor, where a strong current of air can be introduced at pleasure, the sets laid thinner, as about two layers *l*, depth, and covered with the like materials (chaff or sawdust) about two inches thick: this screens them from the winter frosts, and keeps them moderately warm, causing them to vegetate; but at the same time admits air to strengthen them, and harden their shoots, which the cultivators improve by opening the doors and windows on every opportunity afforded by mild soft weather. They frequently examine them; and when the shoots are sprung an inch and a half, or two inches, they carefully remove one half of their covering, with a wooden rake, or with the hands, taking care not to disturb or break the shoots. Light is requisite, as well as air, to strengthen and establish the shoots; on which account a green-house has the advantage of a room, but a room answers very well with a good window or two in it, and if to the sun still better. In this manner they suffer them to remain till the planting season, giving them all the air possible by the doors and windows, when it can be done with safety from frost: by this method the shoots at the top become green, leaves are sprung, and are moderately hardy. They then plant them in rows, in the usual method, with a setting-stick; and carefully fill up the cavities made by the setting-stick; by this method they are enabled to bear a little frost without injury. The earliest potato is the superline white kidney; from this sort, upon the same ground, have been raised four crops, having sets from the repository ready to put in as soon as the others were taken up; and a fifth crop is sometimes raised from the same lands, the same year, of transplanted winter lettuce. The first crop had the advantage of a covering in frosty nights.

4083. *In the western parts of Lancashire* the early potato is cultivated in warm situations, and brought to market in the end of May and during June. The chief sorts there grown for this purpose are, the lady's finger, or early Rufford kidney, and the early round potato. The cultivators, aware that the buds from the root and top end of the tuber germinate at different periods, assort their sets in the following manner: — The sets near the top end (*fig. 734. a*) are found to come to maturity a fortnight earlier than those at the root end (*d*); and these, therefore, form two classes of sets for an earlier and a later crop. The sets from the middle (*b, c*) are put together for an intermediate crop. The sets are planted in the month of March or beginning of April, in drills of twenty-four drills in twenty yards, in the following manner: — After the drills are formed (*fig. 735. a*), loose earth is brushed with a spade or harrowed down, to the depth of six inches, in the interval between them (*b*); dung is then placed over this loose earth, to the depth of four or five inches (*c*); the potato sets of the earliest degree (*fig. 734. a*) are then laid on the manure, at four or five inches apart, for the early crop; and sets of the second degree (*fig. 734. b*), at from six to eight inches apart, for later crops; and so on. The sets for the early crop are then covered with a spade, to the depth of two inches, and subsequently covered, at two or three different times, to the depth of about five inches. The second and third crops are usually covered with the plough. Some lay the potatoes intended for plants early in the year, before they are wanted to be cut, loose and separate in straw, or on warm boarded floors; and others put them on flakes or frames, in warm situations near the fire, for the same purpose, in order that they may sprout; and when so sprouted to the length of half an inch or an inch, they are then carefully cut as described, assorted, and planted. (*Gard. Mag.* vol. I. p. 407.)

4084. *In the north of Lancashire* the potatoes are removed from their winter quarters in the last week



of January, and spread out on a floor or placed on shelves in a room where a fire is kept, or in an upper room of a warm house. On the 2d of February they are covered with a blanket or woollen cloth for about four weeks, which is then taken off in order to harden the sprouts. Towards the latter end of March the sprouts will be found about two inches long, and, if they are carefully set, the potatoes will be ready in seven or eight weeks afterwards. Some bring the sets forward by spreading them out, and slightly covering them with light mould under the stage or on the shelves of a green-house, or in a cucumber frame, or in a loft over a stable or cow-house. (*Gard. Mag.* vol. ii. p. 48.)

4085. In *Denbighshire* the early potatoes cultivated are the Foxley, the Nelson, and the Rufford kidney. Potatoes intended for sets the following year are taken up before they are ripe, just when the outer skin peels off, and before the stalk or stem begins to wither; they are then laid upon a gravel walk, or any dry surface fully exposed to the sun; they remain in that situation for a month or six weeks, when they become quite green and soft, as if roasted, and often much shrivelled; they are then put away in a cellar or pit, where they will remain dry, and neither invaded by frost nor much heat. In February they are examined, and every eye being then generally found full of long sprouts, they are fit to be planted. The tubers are therefore cut, seldom into more than two sets, viz. the eye or top part, which is planted by itself, and found to come a fortnight earlier; and the root or bottom part, which succeeds them. (*Gard. Mag.* vol. ii. p. 172.)

4086. In *gardens in the South of England* potatoes are planted in a warm border from the first week of October till the latter end of November. They are placed nine or ten inches under the surface, and well covered with dung. About the latter end of March they begin to appear above the surface, when the ground is deeply hacked with a mattock, and made very loose about the plants; then in a fortnight or three weeks more the surface again, but the plants need not be earthed up unless they are very much exposed to the wind, when a little may be drawn about them to keep them steady. By this method the sub-leaved kidney potatoes may be gathered by the 19th or 16th of May, even in situations not very favourable for early crops, and nearly three weeks earlier than they can be gathered from sets planted in the same situation in the latter end of February; and if ordinary care is taken in planting, no danger need be apprehended from the frost. (*Gard. Mag.* vol. vi. p. 53.)

4087. In *Cornwall* early potatoes are planted in October, spring up a few weeks afterwards, are ready before the autumnal frost stops their growth, and the soil being covered with litter to exclude the frost, they are begun to be used about the end of December, and continue in use till May, when they are succeeded by the spring planted crops. Of late years Covent Garden market has received supplies of early potatoes from Cornwall, treated in the above manner. (*Gard. Mag.* vols. ii. v. vi.)

4088. In *various parts of the country*, young potatoes for the table during winter are produced in the following manner:—Large potatoes are picked out from the winter stock of any early variety, and buried in dry soil to the depth of five feet. This depth, and the circumstance of treading the soil firmly over the potatoes, so far exclude both heat and air as to prevent vegetation. About the middle of July following, take the tubers out of the pit, and pick out all the buds except a good one in the middle of the potato. Plant these potatoes in a dry border sloping to the south; the soil being in good condition, but not manured. Place the eye or bud of the potato uppermost, and as their growth will be rapid at this season, earth them up carefully to preserve their stems from the wind. About the end of October the young potatoes formed by the plants will average the size of pigeon's eggs, and all that is now required to be done is, to cover them well up with long litter to preserve them from the frost. During winter they may be dug up as wanted, and their delicate waxy taste will resemble that of new potatoes. (*Gard. Mag.* vol. viii. p. 56.)

4089. Mr. Knight procured a crop of young tubers by planting large ones in September; not a single shoot from these tubers appeared above the soil, but a portion of the matter of the old tuber was merely transformed into rotting ones, as frequently happens when potatoes are laid between layers of earth in boxes. (*Ibid.* p. 515.)

4090. Mr. Laidley recommends the greatest attention to having sets with no more than a single eye to each in the first crop of early potatoes. He says he has always found crops from sets having single eyes, ten days or a fortnight earlier than those produced from sets which have been cut with two eyes or more. He has tried both modes several years, planting the single-eyed sets in alternate drills with the other, and the difference has proved uniformly the same. (*Guide*, &c., p. 569.)

4091. *Curl disease.* The disease called curl has in many places proved extremely troublesome and injurious. It has given rise to much discussion, and to detail all the various opinions would be a useless task. It may, however, be remarked, that the experiments of Dickson (*Caled. Hort. Mem.*, vol. i. p. 53.) show, that one cause is the vegetable powers in the tuber planted having been exhausted by over-ripening. That excellent horticulturist observed, in 1808 and 1809, that cuts taken from the waxy, wet, or least ripened end of a long flat potato, that is, the end nearest the roots, produced healthy plants; while those from the dry and best ripened end, farthest from the roots, either did not vegetate at all, or produced curled plants. This view is supported by the observations of a very good practical gardener, Daniel Crichton, at Minto, who, from many years' experience, found (*Id.*, p. 440.) that tubers preserved as much as possible in the wet and immature state, and not exposed to the air, were not subject to curl. And Knight (*Hort. Trans.*, 1814) has clearly shown the beneficial results of using, as seed-stock, potatoes which have grown late, or been imperfectly ripened in the preceding year. Dickson lays down some rules, attention to which, he thinks, would prevent the many disappointments occasioned by the curl. He recommends, 1. The procuring of a sound healthy seed-stock of tubers for planting from a high part of the country, where the tubers are never over-ripened: 2. The planting of such potatoes as are intended to supply seed-stock for the ensuing season, at least a fortnight later than those planted for a crop, and to take them up whenever the stems become of a yellow green colour, at which time the cuticle of the tubers may be easily rubbed off between the finger and thumb: 3. The preventing those plants that are destined to yield seed-stock for the ensuing year, from producing flowers or berries, by cutting off the flower-buds; an operation easily performed by children, at a trifling expense. Shirreff (*Caled. Hort. Mem.*, vol. i. p. 81, and in the *Farmer's Magazine*) controverts Dickson's opinion, and accounts for the curl disease as the effects of old age, on the hypothesis that plants, like animals, will not live beyond certain periods, &c. The essay is ingenious, but totally speculative. Young, who has paid much attention to the subject, has brought forward a variety of facts to show that the "curl on the young stem rising weakly arises chiefly from the two causes mentioned by Dickson and Crichton, over-ripe tubers, or the employment of seed-stock that has been improperly kept during winter, that is, kept exposed to the light and air instead of being covered with earth or sand, or straw, so as to preserve their juices." (*Caled. Hort. Mem.*, vol. iii. p. 278.) The same view, it may be remarked, had occurred to Dr. Hunter. A fact ascertained by Knight deserves to be particularly noticed: it is this; that by planting late in the season, perhaps in June, or even in July, an exhausted good variety may in a great measure be restored; that is, the tubers resulting from the late planting, when again planted at the ordinary season, produce the kind in its pristine vigour, and of its former size. Crichton, who has made a variety of experiments on the effects of exposure to the air in hampers and open floors, and on exclusion of the air by covering with earth (*Caled. Mem.*, vol. i. p. 460), concludes, "that the curl in the potato may often be occasioned by the way the potatoes are treated that are intended for seed. I have observed, that wherever the seed-stock is carefully pitted, and not exposed to the air in the spring, the crop has seldom any curl; but where the seed-stock is put into barns and out-houses for months together, such crop seldom escapes turning out, in a great measure, curled; and if but few curl the first year, if they are planted again, it is more than probable the half of them will curl next season." Mr. Main is of opinion "that the curl is an atmospheric disease. The curl, though now rarely seen about London, was once very prevalent there, as it was about Edinburgh fifty years ago: but about

London now no attention is paid to which end of the potato is planted; either does equally well; so that all that has been said about one end being more suitable for sets than another, is all mere speculation."

4092. The scab, or ulcers on the surface of the tubers in potatoes, has never been satisfactorily accounted for; some attributing it to the ammonia of horse-dung, others to the alkali of lime, and some to the use of coal-ashes. Frequently changing the soil is the only preventive which can be prescribed for this, or for the grub or worms which also attack potatoes.

4093. For forcing potatoes, see the preceding chapter, § 3797.

SUBJECT. 2. Jerusalem Artichoke.—*Heliánthus tuberosus* L. (Jac. Vind. 2. t. 161.); *Syng. Polyg. Frust. L.* and *Corymbifera* J. Poire de Terre, Fr.; Erde Apfel, Ger.; Aardpeeren, Dutch; Girasole, Ital.; and Girasol, Span.

4094. The Jerusalem artichoke is a hardy perennial, a native of Brazil, and introduced in 1617. It has the habit of a common sunflower, but grows much taller, often rising ten or twelve feet high. The season of its flowering is September and October; but though its roots endure our hardest winters, the plant seldom flowers with us, and it never ripens its seed. The roots are creeping, and are furnished with many red tubers, clustered together, perhaps from thirty to fifty to a plant. To cause it to flower, these tubers should be removed as soon as formed, so as to throw the strength which would otherwise be employed on them, into the stem, on the principle mentioned § 4062. Before potatoes were known, this plant was much esteemed. The epithet Jerusalem is a mere corruption of the Italian word *girasole* (from *girare*, to turn, and *sol*), or sunflower; the name Artichoke is bestowed from the resemblance in flavour which the tubers have to artichoke bottoms.

4095. *Use.* The roots are esteemed a wholesome, nutritious food, and are eaten boiled, mashed with butter, or baked in pies, and have an excellent flavour. Planted in rows, from east to west, the upright herb of the plant affords a salutary shade to such culinary vegetables as require it in the midsummer months, as lettuce, turnips, strawberries, &c.

4096. *Propagation.* It is raised by planting, either some small offset tubers of the main roots, or mid-dling-sized roots cut into pieces for sets, which is more eligible. Preserve one or two full eyes to each cutting.

4097. *Quantity of sets.* For a row 120 feet in length, the sets being inserted two feet apart, half a peck, or sixty roots, will be sufficient. (*Abercrombie*.)

4098. *Culture.* It will grow in any spare ordinary part of the garden; but to obtain fine large roots, give it an open compartment of pretty good mellow ground. The season for planting is February, March, or beginning of April. Having dug the compartment, plant them, either by dibble, in rows two feet and a half asunder, about eighteen inches in the lines, and three or four inches deep; or, in drills by a hoe, the same depth and distance. The plants will come up in April and May. In their advancing growth, hoe and cut down all weeds, drawing a little earth to the bottom of the stems. The root will multiply into a progeny of tubers, in a cluster, in each plant, increasing in size till September and October: you may then cut away the stems, and dig up the produce as wanted. Or, in November, when they are wholly done growing, it will be proper to take up a quantity, and lay in dry sand under cover, to be ready as wanted, in frosty weather, when the others are frozen up in the ground, or affected by the frost. As the roots of this plant are very prolific, the smallest piece of a tuber will grow. In taking up the produce, you should therefore clear all out as well as possible; as any remaining part will come up the following year disorderly, and pester the ground; and would thus continue rising for many years, but not eligible to cultivate for a good crop. Therefore, to answer a demand, make a fresh plantation every year. (*Abercrombie*.)

SUBJECT. 3. Turnip.—*Brassica Rapa* L. and Dec. (*Eng. Bot.* 2176.); *Tetrad. Stilq. L.* and *Crucifera* J. Navet, Fr.; Steckrübe, Ger.; Raap, Dutch; Navone, Ital.; and Nabo, Span. See *Encyc. of Agr.*, § 5373.

4099. The turnip is a biennial plant, growing in a wild state in some parts of England; but better known as an inhabitant of the garden and the farm.

4100. *Use.* The use of the root, boiled and mashed as a dish, in broths, soups, and stews, or entire, is familiar over all Europe. The top shoots from such as have stood the winter, are gathered whilst tender, and dressed as spring greens or spinach. The seed is also sometimes sown as small salading. "The navet, petit Berlin, Teltow, or French turnip, Dickson observes (*Hort. Trans.*, vol. i.), enriches all the foreign soups. Stewed in gravy, it forms a most excellent dish, and being of a yellowish white, and of the shape of a carrot, when mixed alternately with those roots upon a dish, it is very ornamental. In France, as well as in Germany, few great dinners are served up without it in one shape or other." In using it, there is no necessity to cut away the outer skin or rind, in a small dish, indeed, the flavour chiefly resides; scraping it will be quite sufficient. Justice observes that it is neither fit to be eaten boiled alone nor raw; but that two or three of them in seasoning will give a higher flavour than a dozen of other turnips. (*British Gardener's Director*, p. 159.)

4101. *Varieties.* The turnips in general cultivation are the

1. Early white Dutch.

2. Early dwarf, six weeks, or half.

3. Early dwarf, or stubble.

4. Yellow Dutch.

5. Maltese golden; an excellent and beautiful root.

6. Yellow stone.

7. French, petit Berlin, Teltow (Teltow is in the district of Brandenburg, and is about twenty miles from Berlin), Märtsche, or Teltower

Räbe; the smallest of turnips, not having more leaves on it than on a radish. (*See Gard. Mag.*, vol. i. p. 307.)

4102. *Estimate of sorts.* The first three sorts are the fittest for early, first succession, and main summer crops for the table. The early white Dutch is proper both for the most early and first succession crops, as is also the early stone. The French, or Teltow, is of excellent flavour. It was anciently used throughout the south of Europe, and was more cultivated in this country a century ago than it is now. It is still in high repute in France, Germany, and Holland. It is grown in the sandy fields round Berlin, and also near Altona, whence it is sometimes imported to the London market. Before the war, the queen of Geo. III. had regular supplies sent to England from Mecklenburgh. It is (or was, in 1814) grown in immense quantities in the neighbourhood of Moscow.

4103. *Seed estimate.* For a seed-bed four feet and a half by twenty-four, the plants to remain and be thinned to seven inches' distance half an ounce.

4104. *Time of sowing.* This root can be obtained most part of the year, by sowing every month in spring

and summer. Make, first, a small sowing in the last fortnight of March, or the first days of April, for early turnips in May and June; but, as these soon fly up to seed the same season, adopt a larger early sowing about the middle of April. The first main sowing should follow at the beginning or towards the end of May, for roots to draw young about the end of June, and in full growth in July and August. Sow fall crops in June and July, to provide the main supplies of autumn and winter turnips. Make a final smaller sowing in the second or third week of August, for late young crops, or to stand for the close of winter and opening of spring: the turnips of this sowing continue longer than those of the previous sowings before they run in the spring. As the crops standing over winter shoot up to seed-stalks in February, March, or April, the root becomes hard, stringy, and unfit for the table. Make the sowings a day or two before or after the prescribed times for the opportunity of showery weather; or, if done at a dry time, give a gentle watering. The Teltow should be sown twice or thrice a year: the first and second times in April and May, on a very poor soil, for gathering in June and July; and the third time about the middle of August, for a winter stock. This last sowing may be made on richer soils than the two first; it being found from experience that the flavour of turnips of every kind is much less injured by a rich soil in autumn than in spring.

4105. *Soil and situation.* The turnip grows best in a light moderately rich soil, broken fine by good tilth. Sand or gravel, with a mixture of loam, produces the sweetest-flavoured roots. In heavy excessively rich land, the plant sometimes appears to flourish as well; but it will be found to have a rank taste, and to run more speedily to flower. A poor, or exhausted soil, ought to be recruited with a proportion of manure suited to the defect of the staple earth. Dung, when requisite, should have been laid on the preceding autumn; for when fresh, it affords a nidus for the turnip-fly. Let the early crop have a warm aspect, and the lightest driest soil. Sow the crops raised after the 1st of May in the most open exposure.

4106. *Process in sowing as precautions against the fly.* The directions given by various writers on this head are so numerous, and not unfrequently so contradictory, that we shall merely notice those which appear to us the most rational. As to the choice of seed, it should be bright and well dried. In seasons when the turnip-fly is dreaded, old seed may be mixed in equal parts with new, the mixture divided, and one half steeped twenty-four hours in water. By this means four different times of vegetation are procured, and as many chances of escaping the fly; this is a most judicious plan, and has been very successful. Next as to preparing the ground; it appears from a trial made by Mr. Knight, at the suggestion of Sir H. Davy, that lime slaked with urine, and mixed with a treble quantity of soot, if sprinkled in with the seed at the time of sowing, will protect the seed and germs from insects; but this method can only conveniently be adopted in drill sowing. Steeping the seeds in sulphur, or throwing soot, ashes, &c. along the drills, very seldom succeeds. Neill recommends sowing late, where it can be done, or sowing thick, to insure at least a part of the crop.

4107. *When the cotyledon or seed-leaves appear above-ground,* the following method, practised by Mr. Gorrie, seems entitled to general adoption. This method is to dust the young plants with lime. "A bushel of quicklime," Mr. Gorrie says, "is sufficient to dust over an acre of drilled turnips; and a boy may soon be taught to lay it on, almost as fast as he can walk along the drills. If the seminal leaves are powdered in the slightest degree, it is sufficient; but should rain wash off the lime before the rough leaf has shot up, it will be necessary to repeat the operation if the fly appears." (*Cal. Hort. Mem.*, 1.)

4108. *Abercrombie* directs to "sow broadcast, allowing half an ounce of seed for every 100 square feet, unless some particular purpose will be answered by drilling. In the former method, scatter the seed regularly and thinly; in dry weather, tread or roll it in lightly and evenly; but after heavy showers, merely beat it gently down; rake in fine. Let drills be an inch deep, and twelve or fifteen inches asunder. In the heat of summer it is of great importance to wait for rain, if the ground be too extensive to be properly watered; for the fermentation caused by copious rain and heat gives an extraordinary quick vegetation to the seed, which in a few days will be in the rough leaf, and out of all danger from the fly. This insect is weakened or killed by drenching showers, and does no injury to the turnip when much rain falls. It is desirable to have the last sowing finished by the 20th of August."

4109. *Reparation of a destroyed sowing.* When a crop is destroyed by the fly, the necessary reparation is immediately to dig or stir the ground, and make another sowing; watering soon, and occasionally afterwards, unless rain falls. Turnips have been transplanted; but the operation is one of great nicety, and of very doubtful success, excepting in the case of the Swedish turnip, which succeeds perfectly. See *Gard. Mag.*, vol. II. p. 463, and vol. III. p. 118.

4110. *Subsequent culture.* As soon as the plants have rough leaves about an inch broad, hoe and thin them to six or eight square inches' distance, cutting up all weeds. As the turnips increase in the root, a part may be drawn young by progressive thinning, so as to leave those varieties, excepting the Teltow, designed to reach a full size, ultimately ten or twelve square inches. The Teltow may be thinned out to half the distance of other varieties. Water garden-crops sometimes in hot weather. One great advantage attending the cultivation of the Teltow is, that it requires no manure whatever; any soil that is poor and light, especially if sandy, suits it, where it seldom exceeds the size of one's thumb or middle finger; in rich manured earth, it grows much larger, but is not so sweet or good in quality, excepting, as we before observed, in autumn.

4111. *Taking the crop and preserving it by housing.* "In the successive crops, begin to draw as above in a thinning order, that such others as are coming forward may have room to enlarge in succession; by which means a regular supply will be procured till March or April of the second season; specific sorts being sufficiently hard to continue good throughout our ordinary winters. But of the winter crops for the table, draw a portion occasionally in November, December, or whenever there is an appearance of the frost setting in severe. Cut the tops off close, and house the roots in some lower shed or cellar, laid in sand, ready for use while the ground is frozen." Instead of cutting the tops and roots close off, some prefer leaving about an inch of the top, and the whole of the root; and, when the bulbs are kept in a sufficiently cool store, this seems preferable, as more likely to retain the sap.

4112. *Turnip-tops.* These are to be gathered from among the earliest spring-produced leaves, either from the crown, or flower-stalk. They are equally good from any of the varieties, and less acrid from those of the Swedish. Sometimes very late sowings are made in September and October, which never bulb, but which are preserved entirely for their produce as greens in spring.

4113. *Field-turnips.* Where a family can be supplied from the field, the roots will always be found of a better flavour than those produced in the garden; and the same remark applies to all the *Brassicæ* tribe, excepting the cauliflower and broccoli, and to potatoes and most tuberous roots.

4114. *To save seed.* "Either leave, in the spring, some of the best sound roots of the winter-standing crop, or leave, in May or June, a part of the spring-sown crop of the same year; or, to be more certain of good kinds, transplant, in November or February, a quantity of full-grown well-shaped roots of the autumn or winter crop, into large, deepish drills, two feet asunder; inserting the bottom fibre into the nether ground, and the main root fully to the bottom of the drill; and earth well over. The plants will shoot in large branchy stalks in summer, and ripen seed in July or August." (*Abercrombie*.) It is preferable, however, to procure turnip-seed, as indeed that of most other vegetables, from the regular seed-men; as the seed-farmers have opportunities of keeping the sorts distinct, which cannot be had within the precincts of a walled garden. In the *Gard. Mag.*, vol. I. p. 174., will be found an interesting account of the method of rearing the turnip, carrot, and radish seeds in the East Indies.

4115. *Insects and diseases.* There are no less than six different insects which feed upon the turnip, and frequently produce the greatest damage. From the moment the seed is committed to the ground, it is exposed to the wire-worm, which frequently destroys one fourth of the crop. On the appearance of the

cotyledon leaves, the fly, the flea, or black jack, but which in fact is a small jumping beetle (*Haltica nemorum*), makes its appearance. In the mean time, another beetle enemy (*Curchillo contractus* Marsh.), like a small weevil, deposits its eggs in the cuticle; the grub hatches, and decay follows. When the rough leaves appear, they furnish food to the black larva or caterpillar of a *Tenthredo* or saw-fly: this pest appeared in such vast numbers in 1783, that many thousand acres were ploughed up. (*Phil. Trans.*, 1783.) The mature leaves are next devoured by the green caterpillars of the turnip butterfly, or small garden white (*Pontis ripes* F.); lastly, the grub of another small weevil produces knots and tubercles at the roots. Now, it is obvious that all these insects require to be eradicated or subdued by totally different operations; and that to prescribe a recipe without expressing what particular evil it is intended to counteract, is little less rational than the advertisements of quack doctors, who undertake to cure all human diseases by a single nostrum. In the absence of published information on this head, judicious persons must exercise their own judgment, by making themselves well acquainted with the cause, before they attempt a cure. (*See MSS.*) Garden turnips, like those of the field, are subject to a disease called anbury, or fingers and toes, produced by a species of *Cynips* L. The root is covered with excrescences, which after some time become soft and spongy, and finally burst and decay. No effectual remedy has yet been discovered for this disease, though it is alleged (*Gard. Mag.*, vol. viii. p. 498.) that soap-boilers' waste, or any other substance of similar alkaline quality, incorporated with the soil, will render the root offensive to the parent fly. The anbury, and various trials which have been made to prevent or cure it, will be found described at great length in *Gard. Mag.*, vol. viii. p. 323.

SUBJECT. 4. Carrot. — *Daucus Carota* L. (*Eng. Bot.* t. 1174.); *Pentand Digyn.* L. and *Umbellifera* J. *Carotte*, Fr.; *Möhre*, or *Gelbe Rübe*, Ger.; *Geels Wortel*, Dutch; *Carota*, Ital.; and *Zana koria*, Span. See *Ency. of Agr.*, § 5443.

4116. The carrot is a hardy biennial, and common in many parts of Britain, in sandy soils, and by road-sides. The root of the plant, in its wild state, is small, dry, sticky, of a white colour, and strong-flavoured; but the root of the cultivated variety is large, succulent, and of a red-yellow, or pale straw-colour.

4117. *Use.* It is used in soups and stews, and as a vegetable dish. Parkinson informs us, that in his day, ladies wore carrot-leaves in place of feathers. In winter, an elegant chimney ornament is sometimes formed, by cutting off a section from the head or thick end of a carrot containing the bud, and placing it in a shallow vessel with water. Young and delicate leaves unfold themselves, forming a radiated tuft, of a very handsome appearance, and heightened by contrast with the season of the year.

4118. The varieties of the carrot are as follows:—

- | | | |
|--|---|---|
| 1. Common early horn. | 5. Long red, Chertsey, Stedley, Surrey. | 8. Purple, Carotte violette, Vilmoren's |
| 2. Early short red horn, Carotte courte bête. | 6. Carotte orange longue. | 9. La violette (see <i>Jard.</i> , edit. 1833.) |
| 3. Long horn, Long red horn. | 7. Long white, Carotte blanche. | 9. Yellow, Carotte Jaune. |
| 4. Long orange, Sandwich, Carotte orange pile de Planchon. | 7. Long yellow, Carotte jeune longue, Vilmoren's short yellow, La jeune courte (see <i>Jardier</i> , edit. 1835.) | 10. Altringham, Altringham, Green-topped, Supposed to be new. |

The early horn is the principal kind used by gardeners for early crops, and the long orange, or the Altringham for main crops. The long red is generally used for agricultural purposes. The short yellow is a new sort, recently obtained from seed by M. Vilmoren; and the violet of that seedsman is a very large and exceedingly sweet variety sent to him from Spain.

4119. *Soil.* The carrot requires a light mellow soil, mixed with sand, which should be dug or trenched one or two spades deep, breaking well all the lumpy parts, so as to form a porous bed, and an even surface. The orange and red sorts, on account of their longer roots, require a soil proportionally deeper than the horn. Carrots may be grown in peat mould without any mixture of sand, and with very little dung. (*See Gard. Mag.*, vol. viii. p. 56.) A soil in which carrots had been subject to be eaten by white maggots, was renovated by a mixture of old turf and quicklime in the proportion of eighty loads per acre, so as to grow large carrots free from insects.

4120. *Seed estimate, and sowing.* The seeds have numerous forked hairs on their borders, by which they adhere together, and therefore should, previously to sowing, be rubbed between the hands, and mixed with dry sand, in order to separate them as much as possible. They are also very light, and therefore a calm day must be chosen for sowing; and the seeds should be disseminated equally, and trodden in before raking. Previously to sowing, if convenient, the seed should be proven, by sowing a few in a pot, and placing it in a hotbed or hothouse, as it is more frequently bad than most garden-seeds. For a bed four and a half feet by thirty, one ounce will be requisite, and the same for one hundred and fifty feet of drill-row.

4121. *Times of sowing.* To have early summer carrots, sow on a warm border in the beginning of February; or, to have them still more forward, sow in a moderate hotbed, giving copious admissions of air. In the open garden, "begin with the early horn in the last fortnight of February, or first week of March, as dry, fine, and open weather may occur. The first-sown beds should be assigned a favourable situation, and covered for a time with haulm. Follow with the orange in the first fortnight of March, and make successive sowings thence till the 20th of April, for main crops. Add smaller sowings twice in May, for plants to draw young late in summer: also sow a few at the commencement of July for a later succession of young carrots in summer and autumn. Lastly, in the beginning of August, two separate small sowings may be made, for plants to stand the winter, and afford young roots early in spring, March and April."

4122. *Culture.* "When the plants are up two or three inches in growth, in May and June, they will require thinning and clearing from weeds, either by hand or small hoeing. Thin from three to five inches' distance such as are designed for drawing in young and middling growth. But the main crop, intended for larger and full-sized roots, thin to six or eight inches' distance. Keep the whole clean from weeds in their advancing young growth. Some of small and middling growth will be fit for drawing in June and July; large sizeable roots, in August and September; and those of full growth, by the end of October." (*above-quoted.*)

4123. *Preserving during winter.* "Carrots are taken up at the approach of winter, cleaned, and stored among sand. They may be built very firm, by laying them heads and tails alternately, and packing with sand. In this way, if frost be excluded from the store-house, they keep perfectly well till March or April of the following year. Some persons insist that the tops should be entirely cut off at the time of storing, so as effectually to prevent their growing; while others wish to preserve the capability of vegetation, though certainly not to encourage the tendency to grow." Carrots have been kept two years, perfectly fresh and fit for use, by simply burying them in pits like potatoes. (*Gard. Mag.*, vol. vii. p. 191.)

4124. *Forcing.* Carrots may be forced on a mild hot-bed of dung or leaves, by sowing them in January, and giving them abundance of light and air. By the end of February the frame and lights may be removed, and the bed at night covered with hoops and mats. The carrots will be fit for using in soups by the beginning of April. The early horn and the Altringham are the best sorts for forcing. (*M'Innes's Practical Gardener*, p. 635.)

4125. *To save seed.* Plant some largest and best roots in October, November, or the last fortnight of February, two feet or twenty inches apart, and six inches asunder in the row; insert them a few inches over the crowns. When they come into flower, stick them like peas, to preserve them from being blown

down by the wind, as well as to keep the seed from being shaken out. In the northern districts, where the winter is severe, preserve the carrots intended for seed in sand till March, and then plant them as above. They will yield ripe seed in autumn, of which gather only from the principal umbel, which is likely not only to afford the ripest and largest seed, but the most vigorous plants. A considerable quantity of carrot-seed for the supply of the London seedmen is raised near Westersfield in Essex, at Alkrincham, and in the neighbourhood of Knutsford in Cheshire, and much is imported from Holland.

4196. *Insects*. Carrots are often much injured by a small centipede (*S. elictica* L.); another voracious insect, with many legs; and by different species of ring-worms (*larvæ*). These insects eat into the root, where they lie concealed, and defy all endeavours to destroy them. The upper part of the root is also often attacked by the grub of a dipterous insect; but this may generally be remedied by late sowing, which permits the grubs to feed upon other food, and to attain their fly state, before the carrot seed comes up.

SUBJECT. 5. Parsnep. — *Pastinaca sativa* L. (*Eng. Bot.* t. 556.); *Pentind. Digijn.* L. and *Umbellifera* J. *Pansais*, Fr.; *Pastinake*, Ger.; *Pingsternabel*, Dutch; *Pastinaca*, Ital.; and *Charibaria*, Span. See *Encyc. of Agr.*, § 5471.

4127. The *parsnep* is a biennial British plant, found in calcareous soils by road-sides. The garden *parsnep* has smooth leaves, of a light or yellowish green colour, in which it differs from the wild plant, the leaves of which are hairy and dark green; the roots also have a milder taste: it does not, however, differ so much from the native plant, as the cultivated does from the native carrot.

4128. *Use*. The *parsnep* has long been an inmate of the garden, and was formerly much used. In Catholic times, it was a favourite Lent root, being eaten with salted fish. "In the north of Scotland," Neill observes, "parsneps are often beat up with potatoes and a little butter;" of this excellent mess children are very fond, and they do not fail to thrive upon it. In the north of Ireland, a pleasant table beverage is prepared from the roots, brewed along with hops. Wine is also sometimes made from parsneps; and an excellent ardent spirit is distilled from them, after a similar preparatory process to that bestowed on potatoes destined for distillation.

4129. *Varieties*.

Common parsnep, swelling, large swelling.	Hollow-crowned, hollow-headed, Female	Twist-rooted, Female round.
Guernsey, Female long of the French,	Libonnais of Guernsey.	Stem.
Pansais coquin of Guernsey.		

The Guernsey *parsnep* appears to be an improved variety of the common sort: it sometimes grows in Guernsey to the length of four feet. The hollow-crowned *parsnep* also grows to a large size, and is thought by Mr. George Lindley (*Guide to the Orchard and Kitchen Garden*, p. 58.) to be "most deserving of cultivation, being very hardy, tender in its flesh, and of a most excellent flavour." The *Slam* has a root of a yellowish colour, not very large, but tender and particularly rich in taste.

4130. *Soil*. The soil most proper for the *parsnep* should be light, free from stones, and deep. It should be dug or trenched before sowing at least two spits deep; and the manure should either be perfectly decomposed, or, if recent, deposited at the bottom of the trench.

4131. *Seed estimate, and sowing*. Sow in the end of February, or in March, but not later than April; and for a bed five feet by twenty, the plants to remain thinned to eight inches' distance, half an ounce of seed is the usual proportion. Having prepared either beds, four or five feet wide, or one continued plot, sow broad-cast, moderately thin, and rake the seed well into the ground; or, what is preferable, sow in drills eighteen inches apart. Those who are curious in parsneps should procure their seeds from Guernsey or Jersey.

4132. *Culture*. When the plants are about one, two, or three inches high, in May or June, let them be thinned and cleared from weeds, either by hand, or by small hoeing; thinning them from eight or twelve inches' distance. Keep them afterwards clean from weeds till the leaves cover the ground, after which no further culture will be required. The roots will be pretty large by the end of September, from which time a few may be drawn for present use: but the *parsnep* is far best at full maturity, about the close of October, indicated by the decay of the leaf. The root will remain good for use till April and May following.

4133. *Preserving during winter*. The *parsnep* is not so liable as the carrot to be hurt by frost, if left in the ground; but it is best, in the beginning of November, when the leaves decay, to dig up a portion of the roots, and to cut the tops off close, laying them in sand, under cover, ready for use in hard frosty weather. The rest will keep good in ground till they begin to shoot in the spring; then, in February or March, dig them up; cut the tops off; and, preserved in sand, the root will remain till about the end of April.

4134. *To save seed*. "Transplant some of the best roots in February, two feet asunder, inserted over the crowns; they will shoot up in strong stalks, and produce large umbels of seed, ripening in autumn." (*Abercrombie*.)

SUBJECT. 6. Red Beet. — *Beta vulgaris* L. (*Schh. Han.* i. t. 56.); *Pent. Dig.* L. and *Chenopodiæa* B. P. *Betterave*, Fr.; *Rothé Rübe*, Ger.; *Biet*, or *Karrot*, Dutch; *Barba Bietola*, Ital.; and *Betarraga*, Span.

4135. The *red beet* is a biennial plant, rising with large, oblong, thick, and succulent leaves, generally of a reddish or purple colour; the roots often three or four inches in diameter, of a foot or more in length, and of a deep-red colour. It produces greenish flowers in August. The *red beet* is a native of the sea-coast of the south of Europe; it was cultivated in this country by Tradescant, the younger, in 1656, and then called *beet rave* (or beet-radish), from the French name *betterave*. The field beet, or mangold-würzel, is supposed to be a hybrid between the red beet and the white species to be afterwards noticed as a spinaceous plant. For the process for making beet-root sugar, see *Gard. Mag.*, vol. v. p. 326., and vol. vi. p. 150.; and also *Encyc. of Agr.*, § 5482.

4136. *Use*. The roots of the red beet are boiled and sliced, and eaten cold, either by themselves, or in salads; they also form a beautiful garnish, and are very much used as a pickle. Dried and ground, they are sometimes used as "a supplement to coffee." Dried in an oven in thin slices, they are also used in confectionary. (*N. Cours d'Agriculture*, art. *Bette*.)

4137. *Varieties*. These are numerous, but the principal are —

Large rooted; Betterave rouge gros.	Slut; Betterave rouge rond pécose.	In France, and said to have the flavour of a nut; Betterave rouge de Castelnau-d'Auri.	There are also some yellow-rooted sorts, none of which are in general cultivation in gardens. (<i>Forst. Trame</i> , vol. III. p. 471.)
Long-rooted.	Small-red; Petite betterave rouge.	Green-topped; much grown in Scotland.	
Dwarf; one of the best.	Castelnau-d'Auri; much esteemed		
Twist-rooted; m. early va.			

4138. *Seed and soil.* The beet is always raised from seed, and for a bed four feet and a half by twelve feet, one ounce is requisite. The soil in which it naturally delights is a deep rich sand, dry and light rather than moist. Sowing in seed-beds and transplanting has been tried; but though it may answer for the spinach or pot-herb beets (the white and its varieties), it will not answer where the object is a large clean root.

4139. *Sowing.* The beet is sown annually in the last week of March, or beginning of April. If sown earlier, many of the plants are apt to run into flower, and so become useless. "The ground on which it is sown should have been previously enriched by mellow compost and sea-sand; but rank dung is not to be laid in, as it is apt to induce canker. For the long-rooted kind, trench to the depth of eighteen inches. Sow either broad-cast on the rough surface, and rake well into the earth; or, as the seed is large, sow in drills an inch or two deep, and a foot asunder; or dot it in with a thick blunt-ended dibble, in rows that distance, making holes ten or twelve inches apart, about an inch and a half deep; drop two or three seeds in each hole, but with the intention to leave only the best plant."

4140. *Subsequent culture.* "When the young plants are advanced into leaves, one, two, or three inches in growth, they must be thinned and cleared from weeds, either by hand or small hoeing, especially those sown promiscuously broad-cast and in drills: thin the latter to twelve inches' distance; and those holed in by dibble, to one in each place. They will acquire a large full growth in the root by September or October, to take up for use as wanted, and in continuance all winter and spring following: or in November, it may be proper to dig up a quantity, cut off the leaves, and deposit the roots in dry sand, under cover, ready for use in winter, in case of hard frosty weather, which would fix them fast in the ground; or the rest may be dug up at the same time, and trenced in close together in some dry compartment, to be covered occasionally in severe frost, to prevent their being frozen in, that they may be readily taken up as wanted. Towards spring, in February or the beginning of March, if any remain in the bed where raised, their removal then, being trenced in close together over the root, will, in some degree, check their shooting, and preserve them from running, so as to keep them good all the spring till May and June." (*Abercrombie*.)

4141. *Howing.* In the northern counties, the winter stock of beet is commonly lifted and housed in sand, in the manner of carrots. In digging up the roots for this purpose, great care must be taken that they be not in anywise broken or cut, as they bleed much. For the same reason, the leaves should be cut off at least an inch above the solid part of the root.

4142. *To save seed.* Either leave a few strong roots standing in the rows; or select a few, and transplant them to a spot where they will be in no danger, when in flower, of being impregnated with any other variety. They will shoot up the second year, when their flower-stalks should be tied to stakes, to prevent their breaking over.

SUBJECT. 7. *Skirret.* — *Sium Sisarum* L. (*Schk. Hand. i. t. 69.*); *Pent. Dig. L.* and *Umbellifera J. Chervia*, Fr.; *Zuckerswizzel*, Ger.; *Suckerswoortel*, Dutch; *Sisaro*, Ital.; and *Chirira-tordeca*, Span.

4143. *The skirret* is a perennial tap-rooted plant, a native of China, known in this country since 1548. The lower leaves are pinnated, and the stem rises about a foot high, terminated by an umbel of white flowers, in July and August. The root is composed of fleshy tubers, about the size of the little finger, and joined together at the crown or head; they were formerly much esteemed in cookery. In the north of Scotland, the plant is cultivated under the name of *crummock*.

4144. *Use.* The tubers are boiled, and served up with butter; and were declared by Worldidge, in 1682, to be "the sweetest, whitest, and most pleasant of roots."

4145. *Culture.* This plant grows freely in a lightish soil, moderately good. It is propagated both from seed, and by offsets of established roots. The better method is to raise seedlings, to have the root in perfection, young and tender.

4146. *By seed.* "Sow between the 21st of March and the 15th of April; a fortnight later rather than any earlier for a full crop, as plants raised from spring are apt to start for seed in summer. Sow on an open compartment of light ground, in small drills eight inches apart. When the plants are one or two inches high, thin them to five or six inches asunder. They will enlarge in growth till the end of autumn; but before the roots are full grown, in August, September, or October, some may be taken up for consumption as wanted: those left to reach maturity will continue good for use throughout winter, and in spring, till the stems run."

4147. *By slips.* "Having some plants of last year's raising, furnished with root-offsets, slip them off; taking only the young outward slips, and not leaving any of the larger old roots adhering to the detached offsets: which plant by dibble, in rows from six to nine inches asunder. They will soon strike, and enlarge, and divide into offsets: which, as well as the main roots, are eatable and come in for use in proper season."

4148. *To save seed.* Leave some old plants in the spring; they will send up stalks, and ripen seed in autumn.

SUBJECT. 8. *Scorzonera*, or *Viper's Grass.* — *Scorzonera hispánica* L. (*Lam. III. t. 647. f. 5.*); *Syng. Polyg. Æqu. L.* and *Cichoriæea J. Scorzonère*, or *Salsafra d'Espagne*, Fr.; *Skorzoner*, Ger.; *Skorzeneere*, Dutch; *Scorza nera*, Ital.; and *Escorzanera*, Span.

4149. *The scorzonera* is a hardy perennial, a native of Spain, the south of France, and Italy, cultivated in this country since 1576. The stem rises two or three feet high, with a few embracing leaves, and is branched at top; the lower leaves are linear, eight or nine inches long, and end in a sharp point; the flowers are yellow, and appear from June to August. The root is carrot-shaped, about the thickness of one's finger; tapering gradually to a fine point, and thus bearing some resemblance to the body of a viper.

4150. *Use.* The outer rind being scraped off, the root is steeped in water, in order to abstract a part of its bitter savour. It is then boiled or stewed in the manner of carrots or parsneps. The roots are fit for use in August, and continue good till the following spring.

4151. *Culture.* "To have an annual supply, sow every year; for although the plant, as to its vegetable life, be perennial, the root continuing only one season useful, it must be treated merely as a biennial. The quantity of seed for a bed four feet and a half by ten feet, to be sown in drills fifteen inches asunder, is one ounce. Sow every spring, at the end of March, or in April: follow with a secondary sowing in May. This root likes a deep light soil. Allot an open compartment. Sow either broad-cast, and rake in evenly; or in small drills, twelve or fifteen inches asunder, and earth over half an inch or an inch deep. When

the young plants are two or three inches high, thin them to six or eight inches' distance. Clear out all weeds as they advance in growth. The plants having a free increase all summer, the roots will, some of them, be of a moderate size to begin taking up in August, others in September, but will not attain full growth till the end of October, when, and during the winter, they may be used as wanted; or some may be dug up in November, and preserved in sand under cover, to be ready when the weather is severe. The plants left in the ground continue useful all winter till the spring; then those remaining undrawn, shoot to stalk in April and May, and become unfit for the table."

4152. *To save seed.* "Leave some old plants in the spring; which will shoot up in tall stems, and produce ripe seed in autumn." (*Abercrombie*.)

SUBJECT. 9. Salsify, or Purple Goat's Beard. — *Tragopogon porrifolius* L. (*Eng. Bot.* 638.); *Synp. Polyg. Ægu.* L. and *Cichoraceæ J. Salsifis*, Fr.; *Bocksbart*, Ger.; *Bocksbard*, Dutch; *Sassifia*, Ital.; and *Barba Cabrera*, Span.

4153. *The salsify* is a hardy biennial, a native of England, but not very common. The root is long and tapering, of a fleshy white substance; the herb smooth, glaucous, and rising three or four feet high. The leaves, as the trivial name imports, resemble those of the leek; the flowers are of a dull purple colour, closing soon after mid-day; the seed, as in other species of goat's beard, is remarkable for having attached to it a broad feathery crown. It has taken place, in gardens, of the *T. pratensis*, which was cultivated in Gerrard's and Parkinson's time, but is now entirely neglected.

4154. *Use.* The roots are boiled or stewed like carrots, and have a mild, sweetish flavour; the stalks of year-old plants are sometimes cut in the spring, when about four or five inches high, and dressed like asparagus.

4155. *Culture.* "Salsify is raised from seed, annually, in the spring; and for thirty feet of drill, one ounce of seed is sufficient. Allot an open situation. The soil should be light and mellow, fall two spits deep, that the long tap-root may run down straight. Sow in March, April, and in May, for first and succession crops, either broad-cast in beds, and rake in the seed, or in small drills, eight or ten inches asunder. The plants are to remain where sown. When they are two or three inches high, thin them about six inches apart. In the dry hot weather of summer, water now and then till the ground be soaked. The roots having attained a tolerable size in August and September, may be taken up occasionally for present use. Those remaining, perfect their growth in October, for a more general supply; and will continue good all winter, and part of the following spring. For winter use, take up a portion before frost hardens the ground, and preserve in sand. Such year-old plants as remain undrawn, in the following spring shoot up with thick, fleshy, tender stalks; these are occasionally gathered young to boil; the roots continuing good till the plant runs to stalk in April or May."

4156. *To save seed.* "Leave or transplant some of the old plants in spring; which will shoot, and produce ripe seed in autumn." (*Abercrombie*.)

SUBJECT. 10. Radish. — *Raphanus sativus* L. (*Lam. III. t. 568.*); *Tetradyn. Siliq. L.* and *Crucifera J. Radis* and *Rave*, Fr.; *Rettig*, Ger.; *Tumme radije*, Dutch; *Rafano*, Ital.; and *Rabano*, Span.

4157. *The radish* is an annual, a native of China, and was mentioned by Gerrard in 1584. "The leaves are rough, lyrate, or divided transversely into segments, of which the inferior less ones are more remote. The root is fleshy, and fusiform in some varieties, in others sub-globular; white within, but black, purple, yellow, or white, on the outside; the flowers pale-violet, with large, dark veins; pods long, with a sharp beak."

4158. *Use.* Formerly the leaves were often boiled and eaten; but now the roots are chiefly employed. These are eaten raw in spring, summer, autumn, and winter. The young seedling leaves are often used with cresses and mustard, as small salad; and radish seed-pods, when of plump growth, but still young and green, are used to increase the variety of vegetable pickles, and are considered a tolerable substitute for capers.

4159. *Varieties.* These may be divided into the spring, autumn, and winter sorts. Spring radishes may be subdivided into the long or spindle-rooted (*Rave*, Fr.), and the round or turnip-rooted (*Radie*, Fr.); the autumn sorts are chiefly oval or turnip-rooted; and the winter radishes are ovate or oblong, and dark-coloured. "The character of a good long-rooted radish," Strachan observes, "is to have its roots straight, long, free from fibres, not tapering too suddenly, and especially to be fully formed on the top, or well shouldered, as it is called, and without a long neck; the roots should be ready to draw whilst the leaves are small, whence the name *short-top radish*; and if they soon attain a proper size, and also force well, they are then called *early and frame radishes*." (*Hort. Trans.*, vol. iii. p. 438.)

Spring and Summer Kinds.

Long early. Shouldered, and its subvarieties — *Short-top scarlet*, and *Early frame scarlet*: which are the two sorts most generally cultivated.

Purple: an early sort of good flavour, but at present neglected.

Long white: the original variety cultivated in Gerrard's time, white, semi-transparent, and delicate.

Turnip-Radishes.

White: root globose like a turnip.

Early white: a subvariety. The pink: rose-coloured, scarlet, and crimson are names applicable to one sort which approaches to the pear-shape.

Autumn Kinds.

White Rave: the root larger than any of the long-rooted kinds, white, tapering like a carrot, flavour nutty, like that of the turnip. (*Hort. Trans.*, vol. iii. p. 115.)

Yellow turnip: root large, ovate, yellow, or dusky-brown, and rough without, but the flesh white.

Round brown: root large, shape irregular, externally mottled with greenish brown, and the flesh soft, and of a greenish white.

The red Mole: the leaves are few, and the root is of a beautiful rose colour and not long; it is brought to the Paris market as an early radish. (*Ben Jardi*, edit. 1833.)

Winter Radishes.

White Spanish: root large, oval, outside white tinged with green, flesh hot, firm, solid, and white.

Orange brown: root middle-sized, pear-shaped, outside coat rough and brown, marked with white circles, flesh hot, firm, solid, and white; plant very hardy.

Black Spanish: root large, irregularly pear-shaped, rough and black externally, and the flesh hot, firm, solid, and white; very hardy.

Purple Spanish: a subvariety of the black, with a purple skin.

(*Christie*, in *Hort. Trans.*, vol. iv. p. 18.)

4160. *Estimate of sorts.* The spindle-rooted kinds are cultivated in the largest proportion for the first crops. The small turnip-rooted sorts may be sown in spring as secondary crops, and in summer and autumn for more considerable supplies. The winter sorts have a coarser flavour than the other kinds; but being of a hardy nature, are frequently sown. They are sliced in salads, or occasionally eaten alone with salt, vinegar, and other condiments.

4161. *Propagation.* All the varieties are raised from seed.

4162. *Soil and situation.* The soil should be light and mellow, well broken by digging; for sowings between the middle of October and the middle of February, let the site be a dry sheltered border, open to the full sun. From the middle of February to the end of March, any dry open compartment will be suit-

able. As spring and summer advance, allot cooler and shaded situations. A scattering of the smaller growing sorts may be sown among some broad-cast crops of larger growth, such as spinach, lettuce, and onion; it may be also drilled between wide rows of beans, or on ground intended to be sown with a late spring crop.

4163. *Times of sowing.* "The crops raised between the middle of October and the middle of February are usually confined to the spindle-rooted kinds. Of the early short-top red, a first small sowing may be made at the end of October, another in November, and a third in the last fortnight of December, if open temperate weather; respectively to stand over the winter: but make the principal early sowings in January, or the beginning of February. From this time sow every fortnight or ten days, in full succession crops, till the end of May; as well the white and red small turnip-rooted as the autumn sorts. The winter sorts are sometimes raised at the beginning of summer; but the fittest season to sow them is from the end of June to the end of August; that is, in July for use in autumn, and in August, to provide a supply throughout winter."

4164. *Seed, process in sowing, and common culture.* "Sow each sort separately; for a bed four feet six inches by twelve feet, two ounces of seed will be required of the spring sorts, and an ounce and a half for the autumn varieties. All the kinds may be sown either broad-cast or in drills; but the latter is preferable, as allowing the roots to be drawn regularly, with less waste. If you sow broadcast, it is a good method to make beds four or five feet wide, with alleys between a foot wide, the earth of which may be used to raise the beds, or not, as the season may make it desirable to keep the beds dry or moist. Avoid sowing excessively thick, as it tends to make the tops run, and the roots stringy. Rake in the seed well, full half an inch deep, leaving none on the surface to attract the birds. If you trace drills, let them be for the spindle-rooted kinds half an inch deep, and about two inches and a half asunder; for the small turnip-rooted, three quarters of an inch deep, and four or five inches asunder; and for the black turnip or Spanish, six or eight inches asunder, because the root grows to the size of a middle-sized turnip. As the plants advance in growth, thin them so as to leave the spindle-rooted about two inches square distance, and the other sorts three, four, or five, leaving the most space to the respective sorts in free-growing weather. In dry warm weather, water pretty frequently: this swells the roots, and makes them mild and crisp."

4165. *Occasional shelter.* "The crops sown between the end of October and the end of February, besides being favoured in situation, will want occasional shelter, according to the weather. On the first approach of frost, whether the seed is just sown, or the plants have appeared, cover the ground, either with clean straw, dry long haulm, or dried fern, two or three inches thick, or with mats supported on short stout pegs. The covering will keep off the birds, and by its warm effect on the mould, forward the germination of the seed. The time for removing or restoring it must be regulated by the weather; as the plants should be exposed to the full air whenever it can be safely done. If the season be cold without frost, take off the covering every morning, and put it on towards evening; and if the weather be sharp and frosty, let it remain on night and day, till the plants have advanced into the first rough leaves, and afterwards occasionally, till the atmosphere is settled and temperate. Replace it constantly at night, till there is no danger of much frost happening; then wholly discontinue the covering."

4166. *Pots for picking.* "Eradicate seed-pods should be taken for picking when of plump growth, in July and August, while still young and green."

4167. *To save seed.* "Transplant a sufficiency of the finest plants in April or May, when the main crops are in full perfection. Draw them for transplanting in moist weather, selecting the straightest, best-coloured roots, with the shortest tops, preserving the leaves to each; plant them, by dibble, in rows two feet and a half distant, inserting each root wholly into the ground, down to the leaves. Keep the red and salmon-coloured kinds in separate situations, to prevent a commixture of their farina, and to preserve the kinds distinct. With proper watering, they will soon strike, and shoot up in branchy stalks, producing plenty of seed; which will be ripe in September or October. In transplanting for seed the turnip-rooted kinds, select those with the neatest-shaped roundest roots, of moderate growth, and with the smallest tops. They, as the others, will yield ripe seed in autumn. To obtain seed of the winter sorts, sow in the spring to stand for seed; or leave to transplant, in that season, some of the winter-standing full roots. As the different kinds ripen seed in autumn, cut the stems; or gather the principal branches of pods; and place them in an open airy situation, towards the sun, that the pod, which is of a tough texture, may dry, and become brittle, so as readily to break, and give out the seed freely, whether it be threshed or rubbed out."

4168. *For forcing the radish,* see the preceding chapter, § 3812.

SECT. IV. *Spinaceous Plants.*

4169. As the excellence of *spinaceous plants* consists in the succulency of the leaves, much depends on giving them a rich soil, stirring it frequently, and supplying water in dry seasons. The space they occupy in the garden is not considerable, say a thirtieth part; more especially as some of them, the common spinach for example, often comes in as a temporary crop between rows of peas, or beans, or among cauliflowers and broccolis, &c. The plant of this class the most deserving of culture in the cottage garden is the Swiss chard, which produces abundance of succulent and most nutritious foliage. It is to be found in every cottage garden in Switzerland and the north of France.

SUBSECT. 1. *Spinach.*—*Spinacia oleracea* L. (*Schk. Hand.* iii. t. 324.); *Diac. Hex. L.* and *Chenopodee*, B. P. *Espinard*, Fr.; *Spinat*, Ger.; *Spinagie*, Dutch; *Spinaci*, Ital.; and *Espinacea*, Span.

4170. The common *spinach* is an annual plant, cultivated in this country since 1568, and probably long before; but of what country it is a native is not certainly known; some refer it to Western Asia. The leaves are large, the stems hollow, branching, and, when allowed to produce flowers, rising from two to three feet high. The male and female flowers, as the name of the class imports, are produced on different plants; the former come in long terminal spikes; the latter in clusters, close to the stalk at every joint. It is almost the only dicocious plant cultivated for culinary purposes.

4171. *Use.* The leaves are used in soups; or boiled alone, and mashed and served up with gravies, butter, and hard-boiled eggs. The leaves may be obtained from sowings in the open ground at most seasons of the year, but chiefly in spring, when they are largest and most succulent.

4172. *Varieties.* These are—

The round leaved, smooth-seeded.
The almost triangular-leaved (prickly-seeded) or Bordenaux.

Flowers, or large-leaved. The leaves of this last species are very large, and it is now considered by far the best for

general, and especially for winter, cultivation. The seeds are smooth. (*See Gard. Mag.*, vol. ii. p. 425.)

4173. *Endive of sorts.* The first may be sown as a spring or summer spinach, and the prickly for winter; but the Flanders is so decidedly preferable for this purpose, that it ought always to be made choice of where its seeds can be obtained. Its lower leaves measure from twelve to fourteen inches in length, and from six to eight inches in breadth, and they are more succulent than those of any other variety.

4174. *Summer crop.* "Begin in January, if open weather, with sowing a moderate crop of the round-leaved. Sow a larger quantity in February; and more fully in March. The plants presently fly to seed in summer, especially if they stand crowded; it is therefore proper to sow about once in three weeks, from the beginning of March to the middle of April; then, every week till the middle of May; from which time, till the end of July, sow once a fortnight. Small crops, thus repeated, will keep a succession during the rest of summer and throughout autumn. A portion of the prickly seeded spinach may be sown, if thought proper, to come in among the successive summer crops; and if drilled between lines of other vegetables, will encroach less than the smooth-seeded, — a thing to be considered where the spare room is not of a liberal width."

4175. *Soil and situation.* "The soil which suits any of the general summer crops will do for spinach; that for the early crop should be lightest and driest. For a January sowing, allot a warm border, or the best-sheltered compartment. Afterwards, for all the supplies during summer, sow in an open compartment. Where it is necessary to make the utmost of the ground, the spring sowings, in February, March, and April, may be made in single drills between wide rows of young cabbages, beans, peas, or other infant crops of slow growth; or they may be made still better on spots intended to receive similar plants, including cauliflowers and horse-radish; and the spinach will be off before the slower-growing crops advance considerably; or spinach and a thin crop of radishes may be sown together; and the radishes will be drawn in time to give room for the spinach."

4176. *Seed, and process to sowing.* "When raised by itself, spinach is generally sown broadcast, and two ounces will sow a bed four feet and a half by thirty feet: but in drills one ounce will sow the same space. In drills, it is easier to weed and gather: let the drills be from nine to twelve inches apart. Beds four feet wide, with small alleys, are convenient of access. Let the ground be thoroughly dug. Whether broadcast or in drills, sow thinly; and rake or earth in about an inch deep."

4177. *Subsequent culture.* "When the plants are up, showing leaves about an inch broad, clear them from weeds, either by hand or small-hoeing; and thin the plants where crowded (especially the broadcast crops) to three inches apart; and when advanced in growth, every other may be cut out for use, increasing the distance to about six inches, that the remainder may grow stocky, with large spreading leaves. The plants of the early and succession crops attain proper growth for gathering in April, May, and June. When the leaves are from two to five inches in breadth, cut the plants clean out to the bottom, or sometimes cut only the larger leaves. But as soon as there is any appearance of their running to seed, they may be drawn out clean as wanted."

4178. *Winter crop.* "The Flanders, or large-leaved, is best calculated to stand a severe winter, and the quantity of seed should be rather less than that used for the spring sowings, as the plants of this variety have much larger leaves than the round-leaved variety. The main winter crop should be sown in the first or second week of August, and a secondary one towards the end of that month, to stand later in the spring, until the round spinach comes in. The plants of these sowings will acquire proper growth and strength, and will not run the same year, nor very early in the spring, which is apt to be the case with crops sown sooner."

4179. *Site.* "Allot a compartment of dry-lying mellow ground, with an open aspect to the winter's sun; and let it be dug regularly."

4180. *Process to sowing.* "In general, sow broadcast, treading the seed down, and raking it well into the ground. The bed may be one continued space; or the ground may be divided into beds three or four feet wide, with spade-wide alleys between them, which are convenient both in the culture and the gathering of the crop. A portion may be sown thinly in broad shallow drills, from twelve to eighteen inches asunder for the Flanders variety, and from six to twelve for the smaller sorts. When the plants are advancing, in September, they will require thinning and clearing from weeds; which may be done either by hand or by small-hoeing: thin the plants from three to nine inches' distance. If by October and November the plants are forward in growth, some leaves may be gathered occasionally; or, where most crowded, plants may be cut out to give the others room for a strong stocky growth, so as to be more able to endure the cold and wet in winter, and produce larger and thicker leaves. In this stage, clear out all weeds by hand, as any left in hoeing would grow again, especially in a moist season. During the winter, if the spinach advances in pretty free growth, some may be partially gathered as wanted, taking the larger outward leaves; the others will increase in succession. At the end of winter, thin the plants to seven inches by seven, ten by five, or twelve by four, for the smaller sorts; and to a foot apart every way, for the Flanders spinach. On a dry day, stir the surface of the mould, if it has been much battered by rough weather. The plants will reach full growth in February, March, and April, bearing, for frequent gathering, numerous clusters of large leaves. In April and May, the larger plants may be cut out fully for use, clean to the bottom, or drawn, if the ground be wanted; as they will then soon go to seed-stalks, past useful growth, and will be succeeded in May and June by the young spring-sown crops of round spinach."

4181. *To save seed.* "To obtain seed of the round-leaved, leave a sufficient quantity of established plants in April, May, or June, to run up in stalks; or transplant in autumn some of the spring-sown which have not run. To save seed of the triangular, or of the Flanders spinach, transplant in March some good strong plants of the winter crop. For large supplies, a portion may be sown in February, or the first fortnight of March, to stand wholly for seedling. Sow the sorts separately, and observe, that, as they are of the class *Dioica*, the male and female flowers grow separately, on two distinct plants. When the plants are flowering for seed, the cultivator should examine whether the male plants (distinguishable by the abundant farina upon the blossoms,) stand crowded or numerous to excess; in which case he should pull up the superfluous plants, leaving a competency for fertilising the female blossoms, which else would prove abortive. When the female blossoms are set, it is best to dispose of all the male plants, drawing them by hand; which will give more room to the females to grow and perfect their seed. The plants rejected may be profitably given to young pigs. The seed ripens in July and August." (*Abecrombie.*)

SUBJECT. 2. White Beet, and Sea Beet. — *Beta cicla* L., and *Beta maritima* L.; *Pent. Dig. L.* and *Chenopodea* B.P. *Bette*, or *Poirée*, Fr.; *Mangold Kraut*, Ger.; *Biet*, Dutch; *Bietola*, Ital.; and *Acelga*, Span.

4182. *The white beet* is a hardy biennial plant, with leaves larger than the red beet, and very thick and succulent. It is a native of the sea-coasts of Spain and Portugal, and was introduced in 1570, and cultivated by Gerrard and Parkinson. The sea beet is a native of the shores of Britain, but is not common.

4183. *Use.* The white beet is cultivated in gardens entirely for the leaves, which are boiled as spinach, or put into soups. Those of the great white or sweet beet are esteemed for the midribs and stalks, which are separated from the lamina of the leaf, and stewed, and eaten as asparagus, under the name of chard.

4184. *Varieties and species.* The principal are —

The common green-leaved small-rooted; the roots not thicker than a man's thumb.

The sea-beet, a perennial. The common white small-rooted; the leaves whiter, and with white ribs and veins.

The great white, or Swiss chard; large stalks, smaller erect leaves, with strong white ribs and veins; grown in many parts of the Continent for the chard, which in taste nearly equals asparagus. In France and Germany, where the

white beet is much cultivated for its chard, there are several other varieties. (See *Lippold's Tauschenbuch*, vol. I. p. 570., and *Le Bon Jardinier*, edit. 1835.)

4185. *Propagation and soil.* It is raised from seed; and, for a bed four feet and a half by twelve sown in drills, one ounce is requisite. The soil for the varieties to be used as pot-herbs may be considerably stronger and richer than for the red or yellow beets, and need not be quite so deep. The plants endure for two years, shooting the autumn of the second; but it is best not to depend on the shot or shoot leaves of the second year, but to sow at least annually. The sea-beet is perennial; and, in a good soil, will supply leaves for many years, from the middle of August till the plants begin to run, and through the whole summer and autumn, but cutting off the flowering stems as they arise. (*Gard. Mag.*, vol. ii. p. 436.)

4186. *Sowing.* The white beet is generally sown in gardens in the beginning of March, and sometimes also in September, to furnish a supply of tender leaves late in the season, and early next spring. Sow either broad-cast, and rake in the seeds; or in drills, six or eight inches apart for the smaller kinds, and ten or twelve for the larger. The common green beet, when sown three times a year, and treated like spinach, will afford a perpetual supply of an excellent substitute for that vegetable. (*Gard. Mag.*, vol. ii. p. 436.)

4187. *Culture.* When the plants have put out four leaves, they are hoed and thinned out to from four inches to a foot, according to the sort. A second thinning should take place a month afterwards, and the ground should be kept clear of weeds, and stirred once or twice during the season with a fork or pronged hoe. In cultivating the Swiss chard, the plants are frequently watered during summer, to promote the succulence of the stalks; and in winter they are protected by litter, and sometimes earthed up, partly for this purpose, and partly to blanch the stalks. Fresh chards are thus obtained from August to May. When the garden sorts of white beet are transplanted, the proper time is during moist weather in May or June. The distance from plant to plant may be from ten to fourteen inches, much of the advantage of transplanting depending on the room thus afforded the plants; together with the general disposition of transplanted annuals, with fusiform roots, as the turnip, carrot, &c., to throw out leaves and lateral radicles.

4188. *Gathering.* The most succulent and nearly full-grown leaves being gathered as wanted, others will be thrown out in succession. The root is too coarse for table use.

4189. *To save seed.* Proceed as in growing the seed of red beet.

SUBSECT. 3. *Orache, or Mountain Spinach.* — *Atriplex hortensis* L. (*Blackw.* t. 99.); *Polyg. Mona'c.* L. and *Chenopodæa* B. P. *Arroche*, Fr.; *Meldekraut*, Ger.; *Melde*, Dutch; *Atrepice*, Ital.; and *Armuelles*, Span.

4190. *The orache* is a hardy annual, a native of Tartary, and introduced in 1548. The stem rises three or four feet high; the leaves are oblong, variously shaped, and cut at the edges, thick, pale green, and glaucous, and of a slightly acid flavour. It produces flowers of the colour of the foliage in July and August. There are several varieties, but the two principal are the white or pale green, and the red or purple-leaved. (See *Gard. Mag.*, vol. iii. p. 178.)

4191. *Use.* The leaves are used as spinach, and sometimes also the tender stalks. The stalks are good only while the plant is young; but the larger leaves may be picked off in succession throughout the season, leaving the stalks and smaller leaves untouched, by which the latter will increase in size. The spinach thus procured is very tender, and much esteemed in France.

4192. *Culture.* The orache is raised from seeds, which may be sown early in spring, in drills two feet apart; the plants being afterwards thinned out till they are two feet distant in the rows. A second sowing, made about the middle of June, will ensure a succession of leaves; but the size and succulence of these will of course depend a good deal on the richness and moisture of the soil. (*Gard. Mag.*, vol. iii. p. 178.)

4193. *To save seed.* Leave a few plants of the most tender and succulent constitutions to blossom, and they will produce abundance of seeds in August.

SUBSECT. 4. *Wild Spinach.* — *Chenopodium Bónus Henriens* L. (*Eng. Bot.* 1033.); *Pent. Dig.* L. and *Chenopodæa* B. P. *Anserine*, Fr.; *Gänsefuss*, or *Meldenartige*, Ger.; *Ganzevoet*, Dutch; and *Anserino*, Ital.

4194. *The wild spinach* is an indigenous perennial, common by way-sides in loamy soils. The stem rises a foot and a half high, is round and smooth at the base, but upwards it becomes grooved and angular. The leaves are large, alternate, triangular, arrow-shaped, and entire on the edges. The whole plant, but especially the stalks, is covered with minute transparent powdery particles.

4195. *Use.* While young and tender, the leaves are used as a substitute for spinach, for which purpose, Curtis observes, it is cultivated in Lincolnshire, in preference to the garden sort. Withering states, that the young shoots, peeled and boiled, may be eaten as asparagus, which they resemble in flavour.

4196. *Culture.* The plant may be propagated by dividing the roots; or the seed may be "sown in March or April, in a small bed. In the course of the following September, in showery weather, the seedlings are transplanted into another bed which has been deeply dug, or rather trenched to the depth of a foot and a half, the roots being long and striking deep, while at the same time they are branched; so that each plant should have a foot or fifteen inches of space. Next season, the young shoots, with their leaves and tops, are cut for use as they spring up, leaving, perhaps, one head to each plant, to keep it in vigour. The bed continues productive in this way for many successive years. The first spring cutting may be got somewhat earlier, by taking the precaution of covering the bed with any sort of litter during the severity of winter." (*Neill*.)

SUBSECT. 5. *New Zealand Spinach.* — *Tetragonia expansea* (*Plant. grass.* 113.); *Icos. Di-Pentag.* L. and *Ficoides* J.

4197. *New Zealand spinach* is a half-hardy annual, with fleshy leaves, and numerous branches, round, succulent, pale green, thick, and strong, somewhat procumbent, but

elevating their terminations. The flowers are sessile in the axils of the leaves, small and green, and, except that they show their yellow anthers when they expand, they are very inconspicuous. The fruit when ripe has a dry pericarp of a rude shape, with four or five hornlike processes enclosing the seed, which is to be sown in its covering. It is a native of New Zealand, by the sides of woods in bushy sandy places; and though not used by the inhabitants, yet being considered by the naturalists who accompanied Captain Cook, as of the same nature as the *Chenopodium* (see *Foster, Plant. esculent., &c.*), it was served to the sailors, boiled, every day at breakfast and dinner. It was introduced into England by Sir Joseph Banks in 1772, and treated as a green-house plant; but has since been found to grow in the open garden as freely as the kidneybean or nasturtium. As a summer spinach it is as valuable as the orache, or perhaps more so. Every gardener knows the plague that attends the frequent sowing of common spinach through the warm season of the year; without that trouble it is impossible to have it good, and with the utmost care it cannot always be obtained exactly as it ought to be (particularly when the weather is hot and dry) from the rapidity with which the young plants run to seed. The New Zealand spinach, if watered, grows freely, and produces leaves of the greatest succulency in the hottest weather. Anderson, one of its earliest cultivators, had only nine plants, from which he says, "I have been enabled to send in a gathering for the kitchen every other day since the middle of June, so that I consider a bed with about twenty plants quite sufficient to give a daily supply, if required, for a large table."

4198. *Use.* It is dressed in the same manner as common spinach.

4199. *Culture.* The seed should be sown in the latter end of March, in a pot, which must be placed in a melon-frame; the seedling plants while small should be set out singly, in small pots, and kept under the shelter of a cold-frame, until about the 90th of May, when the mildness of the season will probably allow of their being planted out, without risk of being killed by frost. At that time a bed must be prepared for the reception of the plants, by forming a trench two feet wide, and one foot deep, which must be filled level to the surface with rotten dung from an old cucumber-bed; the dung must be covered with six inches of garden-mould, thus creating an elevated ridge in the middle of the bed, the sides of which must extend three feet from the centre. The plants must be put out three feet apart; I planted nine at only two feet distance from each other, but they were too near. In five or six weeks from the planting, their branches will have grown sufficiently to allow the gathering of the leaves for use. In dry seasons the plants will probably require a good supply of water. They put forth their branches vigorously as soon as they have taken to the ground, and extend before the end of the season three feet on each side from the centre of the bed.

4200. *In gathering for use,* the young leaves must be pinched off the branches, taking care to leave the leading shoot uninjured; this, with the smaller branches which subsequently arise from the axils of the leaves which have been gathered, will produce a supply until a late period in the year, for the plants are sufficiently hardy to withstand the frosts which kill nasturtiums, potatoes, and such tender vegetables. (*Anderson, in Hort. Trans., vol. iv. p. 492.*)

4201. *To save seed.* Place a plant or two in a poor soil, or train one up a wall, or stunt one or two in lime rubbish, or in pots sparingly watered. Or a few cuttings may be struck in autumn, and preserved through the winter in the green-house.

SUBSECT. 6. *Sorrel.* — *Rumex L.; Hex. Trig. L. and Polygones J. Oseille, Fr.; Sauerampfer, Ger.; Veldzuuring, Dutch; Acetosella, Ital.; and Acedera, Span.*

4202. *French sorrel, Roman sorrel, or round-leaved sorrel,* is the *R. scutellatus L.*; a perennial plant, a native of France and Italy, and cultivated in this country since 1596. The leaves are somewhat hastate, blunt, and entire; glaucous, smooth, soft, and fleshy. The trailing stems rise from a foot to a foot and a half high; and the flowers, of a greenish-white, appear in June and July.

4203. *Garden sorrel* is the *R. Acetosa L. (Eag. Bot. p. 137.)*, an indigenous perennial, common in meadows and moist situations. The root-leaves have long foot-stalks, are narrow-shaped, blunt, and marked with two or three large teeth at the base; the upper leaves are sessile and acute. There are several varieties of this species: the broad-leaved, esteemed the most succulent; the long-leaved; and the green mountain, which is considered the best of all, from the largeness and succulency of its leaves, and their superior degree of acidity. (*Gard. Mag., vol. ii. p. 437.*)

4204. *Use.* Both sorts are used in soups, sauces, and salads; and very generally by the French and Dutch, as a spinach; in the latter way it is often used along with herb-patience, to which it gives an excellent flavour, as well as to turnip-tops.

4205. *Culture and soil.* "The finer plants are propagated from seed, but good plants can be obtained by parting the roots, which is the most expeditious way. The native varieties flourish both in humid meadows and sandy pastures: their roots strike deep. The trailing round-leaved requires a dry soil."

4206. *By seed.* "Sow in any of the spring months, best in March. Drop the seed in small drills, six or eight inches asunder. When the plants are one or two inches high, thin them to three or four inches apart: when advanced to be a little stocky, in summer or autumn, transplant a quantity into another bed, from six to twelve inches apart, if of the first two sorts; leaving those in the seed-bed with the same intervals. But leave almost double that distance for the round-leaved creeping kind. They will come in for use the same year."

4207. *By offsets.* Part the roots in spring or autumn. Either detach a quantity of offsets, or divide full plants into rooted slips: plant them at a foot distance, and water them.

4208. *General treatment.* As these herbs, however originated, run up in stalks in summer, cut them down occasionally; and cover the stool with a little fresh mould, to encourage the production of large leaves on the new stem. Fork and clean the ground between the plants every autumn or spring; and keep it clear from weeds. If, in two or three years, they have dwindled in growth, bearing small leaves, let them be succeeded by a new plantation.

4209. *To save seed.* "Permit some old plants to run up in-stalks all the summer: they will ripen seed in autumn." (*Abercrombie.*)

SUBJECT. 7. *Herb-Patience*, or *Patience-Dock*. — *Rumex Paténtia* L. (*Blackb.* 349.); *Her. Dig.* L. and *Polygonæ* J. *Rhubarbe des Moines*, Fr.; *Engische*, or *Winter-Spinat*, Ger.; and *Romice*, Ital.

4210. The *herb-patience* is a hardy perennial plant, a native of Italy, introduced in 1573. The leaves are broad, long, and acute-pointed, on reddish foot-stalks; the stems, where allowed to spring up, rise to the height of four or five feet. It produces its whitish-green flowers in June and July.

4211. *Use*. "In old times, garden patience was much cultivated as a spinach. It is now very much neglected, partly perhaps on account of the proper mode of using it not being generally known. The leaves rise early in the spring; they are to be cut while tender, and about a fourth part of common sorrel is to be mixed with them. In this way patience-dock is much used in Sweden, and may be safely recommended as forming an excellent spinach dish." (*Neill*.) The Germans call it winter spinach. (See *Léopold's Taschenbuch*, p. 293.)

4212. *Culture*. Garden patience is easily raised from seeds, which may be sown in lines in the manner of common spinach, or white beet, and thinned out and treated afterwards like the latter plant. If the plants be regularly cut over two or three times in the season, they continue in a healthy productive state for several years.

SECT. V. *Alliaceous Plants.*

4213. The *alliaceous esculents* are of great antiquity and universal cultivation. No description of useful British garden is without the onion; and few in other parts of the world, without that bulb, or garlic. They require a rich, and rather strong soil, and warm climate, thriving better in Spain and France than in England. The onion and leek crops may occupy a twentieth of the open compartments in most kitchen-gardens; and a bed of five or seven square yards in those of the cottager.

SUBJECT. 1. *Onion*. — *Allium Cæpa* L.; *Hexándria Monogýnia* L. and *Asphodélea* J. *Oignon*, Fr.; *Zwiebel*, Ger.; *Uijen*, Dutch; *Cipolla*, Ital.; *Cebolla*, Span.; and *Alho*, Port.

4214. The common *bulbous onion* is a biennial plant, supposed to be a native of Spain; though, as *Neill* observes, "neither the native country, nor the date of its introduction into this island, are correctly known." It is distinguished from other alliaceous plants by its large fistular leaves, swelling stalk, coated bulbous root, and large globular head of flowers, which expand the second year in June and July.

4215. *Use*. The use of the onion, in its different stages of growth, when young, in salads, and when bulbous and mature, in soups and stews, is familiar to every class of society in Europe; and for these purposes has been held in high estimation from time immemorial.

4216. The varieties ascertained to be best deserving of culture are as follows:—

1. The *silver-skinned*; flat, middle-sized, and shining; chiefly used for pickling.
2. *Early silver-skinned*; a subvariety of the other, smaller, and excellent for pickling.
3. *Yellow*; small, globular, strong-flavoured, and good for pickling.
4. *Two-bladed*; flat, small, brownish-green, has few leaves, ripens early, and keeps well; one of the best for pickling.
5. *True Portugal onion* of the fruiters; large, flatly globular, mild; does not keep well.
6. *Spanish*, *Reading*, white *Portugal*, *Cambridge*, *Evenham*, or *sandy onion*; large, flat, white tinged with green, mild, but does not keep very well; good for a general crop, much cultivated round *Reading*.
7. *Strasbourg*, Dutch, or *Flanders onion*, the seed being generally procured from thence; or *Hexam onion*, when the seed is sown in that country; oval, large, and deep green tinged with green, hardy, keeps well, but of strong flavour; much the most generally cultivated in Britain.
8. *Dryfold onion*; middle-sized, globular; pale brown; a subvariety of the *Strasbourg*, and very generally cultivated.
9. *Globe*; large, globular, pale-brown, tinged with red, mild, and keeps well; very popular among gardeners.
10. *James's keeping*; large, pyramidal, brown, hardy, strong in flavour, and keeps well; originated some years ago by James, a market-gardener, in *Leameth Mannin*.
11. *Pale-red*; middle-sized, flattened, globe shape, pale red, strong flavour, keeps well.
12. *Blood-red*, Dutch *Blood-red*, St. Thomas's onion; middle-sized, flat, very hardy, deep red, strong flavour, and keeps particularly well; much grown in Wales and Scotland; in the London market it is esteemed for its diuretic qualities.
13. *Twisted*; the largest onion grown; oval, light-red, lined with green and brown, soft and mild, but does not keep long after it is taken up.
14. *Liebo*; large, globular, smooth, bright, white, and thin skin, tardy in ripening but hardy, much used for autumnal sowing; seed generally obtained from the south of France.
15. *Welsh onion*, or *cibola* (*Allium fistulosum* L.); a native of Siberia, hardy, strong in flavour, but does not bulb; sown in autumn for drawing in spring.
16. *Underground or potato onion*; multi-stalked leafy by the formation of young bulbs on the parent root, and produces an ample crop below the surface; ripens early, but does not keep beyond February; flavour strong.
17. *True or bulb-bearing onion* (*Allium Cæpa* var. *viviparum*), *Oignon d'Égypte*, Fr.; originally from Canada, where the climate being too cold for onions to flower and seed, when they are allowed to throw up flower-stalks, the flower becomes viviparous, and bears bulbs instead of flowers; here it retains the same habit. It is more an object of curiosity than use, though, in some parts of Wales, *Wife* infers us (*Hort. Trews.*, iii. 419.), the onion bulbs are planted, and produce ground-onions of a considerable size, while the stem supplies a succession of bulbs for next year's planting. It is considered stronger, and to go further as exceeding many other onions. (*Hort. Trews.*, iii. 509.)
18. *Sea-onion*; a term generally given to the strong green tops of onions in the spring which do not bulb, or to the shoots from bulbs of the preceding year. *Miller* mentions it as a distinct sort; some consider it the *Welsh onion*; and *Milne* thinks it may not improbably be the hollow leek, a species of *Allium* grown in *Pembrokeshire* and other parts of *South Wales*, with roots in clusters like those of shallots. (*Hort. Trews.*, iii. 416.)

4217. *Estimate of sorts*. The *Strasbourg* is most generally adopted for principal crops, and next the *Devford* and *Globe*. The *Portugal* and *Spanish* yield large crops for early use, and the *silver-skinned* and *two-bladed* are reckoned the best for pickling. The *potato onion* is planted in some places as an auxiliary crop, but is considered inferior to the others in flavour: the *Welsh onion* is sometimes sown in autumn for drawing early in the following spring.

4218. *Soil*. The onion, "to attain a good size, requires rich mellow ground on a dry sub-soil. If the soil be poor or exhausted, recruit it with a compost of fresh loam and well-consumed dung, avoiding to use stable-dung in a rank unrefined state. Turn in the manure to a moderate depth; and in digging the ground, let it be broken fine. Grow picklers in poor light ground, to keep them small." The market-gardener at *Hexham* sows their onion-seed on the same ground for twenty or more years in succession, but annually manure the soil. After digging and leveling the ground, in a very rotten state, is spread upon it, the onion-seed sown upon the manure, and covered with earth from their alleys, and the crops are abundant and excellent in quality. (*Hort. Trews.*, vol. i. p. 171.) This is an anomalous case with reference to the general principles of the rotation of crops, as laid down by *De Candolle* in his

Physiologic Vegetale. It is agreed on all hands that, to have large onions, the soil must be loamy, of considerable depth, and very rich. No manure suits the onion and the leek better than bullock's blood, previously prepared by mixture with compost of lime and earth for a year. Powdered bones and night soil are also excellent manures for the onion tribe.

4219. *Seed and times of sowing*. When onions are to be drawn young, two ounces of seed will be requisite for a bed four feet by twenty-four; but when to remain for bulbing, one ounce will suffice for a bed five feet by twenty-four feet.

4220. *The course of culture* recommended by Abercrombie for the summer, and what he calls winter-laid crops, is as follows:—"Allot an open compartment, and lay it out in beds from three to five feet in width. Sow broad-cast, equally over the rough surface, moderately thick, bed and bed separately, and rake in the seed along each bed, in a regular manner. When the plants are three or four inches high, in May and June, let them be cleared from weeds, and let the principal crop be thinned, either by hand, or with a small two-inch hoe; thinning the plants to intervals of from three to five inches in the main crops designed for full bulbing; or, some beds may remain moderately thick for drawing young, by successive thinnings, to the above distance. For the Spanish, from seed obtained immediately from Spain, the final distance should be six or seven inches. Keep the whole very clear from weeds, in their young and advancing state. The plants will begin bulbing a little in June; more fully in July; and be fully grown in August to large bulbs. In July or August, when the leaves begin to dry at the points and turn yellow, lay the stems down close to the ground, bending them about two inches up the neck, which promotes the ripening of the bulb, particularly in wet or backward seasons. The crop of full bulbs will be ready to take up towards the middle of August. When the necks shrink, and the leaves decay, pull them wholly up in due time: spread them on a compartment of dry ground, in the full sun, to dry and harden completely, turning them every two or three days; and in a week or fortnight they will be ready to house. Clear off the grossest part of the leaves, stalks, and fibres; then deposit the bulbs in some close dry apartment, in which sometimes turn them over, and pick out any that decay; and they will thus keep sound and good, all winter and spring, till May following."

4221. *The culture of onions in drills* is a very desirable practice where the object is to produce large bulbs. The drills should not be less than a foot or eighteen inches apart, and the plants should be thinned to six inches asunder in the row. Various examples of successful culture in this way, and of extraordinary produce in consequence, will be found in the *Gardener's Magazine*, vol. ii. p. 274, vol. iii. p. 175, and vol. ix. p. 78. The Spanish or Portuguese variety is the best for producing bulky crops.

4222. *Transplanting onions*. This practice was recommended by Worlidge in his *Systema Horticulturae*, published early in the 17th century, and has lately been revived by Knight, Warre, Macdonald, and others. It may be observed, that it has been practised, for an unknown period, in some of the market-gardens near London, known by the name of the "Gardens of the Nest's Houses." Knight observes, that every bulbous-rooted plant, and indeed every plant that lives longer than one year, generates in one season the sap or vegetable blood which composes the leaves and roots of the succeeding spring. "This reserved sap is deposited in, and composes, in a great measure, the bulb; and the quantity accumulated, as well as the period required for its accumulation, varies greatly in the same species of plant, under more or less favourable circumstances. Thus the onion, in the south of Europe, acquires a much larger size during the long and warm summers of Spain and Portugal, in a single season, than in the colder climate of England; but under the following mode of culture, which I have long practised, two summers in England produce nearly the effect of one in Spain or Portugal, and the onion assumes nearly the form and size of those thence imported. Seeds of the Spanish or Portugal onion are sown at the usual period in the spring, very thickly, and in poor soil; generally under the shade of a fruit-tree; and in such situations the bulbs, in the autumn, are rarely found much to exceed the size of a large pea. These are then taken from the ground, and preserved till the succeeding spring, when they are planted at equal distances from each other, and they afford plants which differ from those raised immediately from seed, only in possessing much greater strength and vigour, owing to the quantity of previously generated sap being much greater in the bulb than in the seed. The bulbs, thus raised, often exceed considerably five inches in diameter, and being more mature, they are, with more certainty, preserved in a state of perfect soundness through the winter, than those raised from seed in a single season."

4223. *West* has tried the above mode, and found it perfectly successful. (*Hort. Trans.*, vol. iv. p. 133.) Brown, of Perth, has practised transplanting onions for upwards of twenty years; all the difference of his mode and that of Knight and the Nest's House gardeners is, that, instead of sowing under the shade of trees, he picks out all the small onions, from the size of a pea to that of a fibert, from his general crop. If the sown crops fail, he can always trust to the transplanted crop as a reserve. (*Nell.*, in *Encyc. Brit.* art. *Hort.*)

4224. *James* transplants either autumn-sown onions, or such as are forwarded by a hotbed in spring, in drills which have been dunged, by which he considers a larger crop may be obtained with less dung than by the broad-cast mode of dunging. (*Hort. Trans.*, vol. iv. p. 130.)

4225. *Warre* states that the onion is also transplanted in Portugal, and the general practice is as follows:—"The seed is sown 'very thinly, in November or December, on a moderate hotbed, in a warm situation, with a few inches of rich light loam upon it, and the plants protected from frost by mats and hoops. In April or May, when they are about the size of a large swan's quill, they are transplanted on a rich light loam, well manured with old rotten dung. The mode of transplanting is particular. The plants are laid flat, about nine inches asunder, each way, in quincunx, the beard of the root, and part only of the plant, lightly covered with very rich mould, well mixed with two thirds of good old rotten dung. This compost is slightly pressed down on the plant; water is given when the weather is dry, until the plants have taken root. Subsequently, the earth is occasionally broken around them, by slight hoeing, in which operation care is taken not to wound the bulb. Weeding is diligently attended to, and the watering continued, according to the state of the weather. In Portugal, the means of irrigation are easy, the effects of which are particularly beneficial to the onion; for, by letting the water filter, or pass through small heaps of dung, placed in the alleys of the beds, a very rich liquid flows in upon the plants. The dung, as it is exhausted, or washed away, should be renewed; and the water must be checked in its current, so that it may gently spread over the surface." (*Hort. Trans.*, vol. iii. p. 63.)

4226. *Macdonald's* practice is noticed and approved of by Warre. "He sows in February, sometimes on a slight hotbed, or merely under a glass frame; and between the beginning of April and the middle of the month, according to the state of the weather, he transplants in drills about eight inches asunder, and at the distance of four or five inches from each other in the row. The bulbs, thus enjoying the great and well known advantages of having the surface-earth frequently stirred, swell to a much larger size than those not transplanted; while in firmness and flavour they are certainly not inferior to foreign onions." (*Calcd. Hort. Mem.*, vol. iii. p. 63.)

4227. *Forcing onions to produce bulbs in clusters at an early season* is thus effected by James Smith. "He sows the seed in April, thickly, in a bed, and does not afterwards thin the plants which come up; this causes them to remain small: a part of them are used for pickling; and the remainder, being about the size of walnuts, are planted in January or February, pressing each onion into the earth so deep as just to cover it. As soon as the seed-stalks appear, he breaks them off; and instead of making any effort to throw up new ones, the onions begin to form young bulbs round the old ones. By this process, onions may be obtained two or three inches in circumference, fit for the kitchen, early in spring, at a time when spring-sown onions are not larger than quills. Onions thus thrown into clusters will be full grown by the end of June, and fit to take up then, but they do not keep well." (*Gard. Mag.*, vol. i. p. 307.)

4228. *Whatever plan of transplanting spring-sown onions may be adopted*, care should be taken to keep

the incipient bulb above ground; and in the case of planting autumn-formed bulbs in spring, they should be covered as slightly and loosely as possible, otherwise, in neither case, will the bulbs attain a satisfactory magnitude.

4229. *Culture of a winter-standing crop to be drawn for use the succeeding spring.* "Allot a soil rather more light and sandy for the summer crop, on a sub-soil at least equally dry. The compartment, especially for any of the biennial kinds, should lie warm and sheltered. The beds may be three or four feet wide, running parallel to the best aspect. The medium time for the principal sowing falls about the 7th of August; and for a secondary crop, near the 25th. Sow the bulbous sorts and the Welsh perennial separately; distribute the seed pretty thickly. If the soil be dry and light, tread down the seed evenly along the surface of each bed, and then rake it in neatly. When the plants are come up, one, two, or three inches, carefully hand-weed in time, before any rising weeds spread; not thinning the plants, because they should remain thick, for their chance in winter, and to be by degrees drawn thinningly for use in salads and otherwise; but reserve a principal supply to remain till spring. Observe, the Welsh onion, in particular, commonly dies down to the ground about mid-winter; but the root-part, remaining wholly sound, sends up a new vigorous stem in February and March. At the opening of spring, let the whole of both sorts be well cleared from weeds; they will continue fit to draw young, during all the spring months, till May; then let some of the bulbous kinds be thinned, to remain for early bulbing in June and July; but as they will soon after shoot up in stalk, they are chiefly for present use, not being eligible as keeping-onions."

4230. *Gathering and preserving the general crop of onions.* This, according to Nicol, should not be delayed after the beginning or middle of September. When taken up, they are to be spread thin on the ground; "but if the weather be wet, they had better be removed to a gravel walk, or a space purposely covered with sand or gravel, in the full sun. Turn them over once or twice a-day, until they are thoroughly dried, and then store them in a well-aired loft, &c.; there still turn them occasionally, if they lie anywise thick; or they may be strung up by the tails, or hung in nets. If they are not intended to be strung, the tails and outer husks should be displaced before housing them, and the latter at all events, that is, just as much as comes easily off in rubbing. The manner of stringing them is this:—Take in your hand three or four by the tails; tie them hard with a new strand of matting, or a bit of peckthread; place on two or three more onions; wrap the thread once or twice round their tails; place more onions, which also wrap hard, and so on. In this manner may be made a string (as it is called), or bunch, of a yard in length, or more; which, when hung up in a dry well aired place, free from frost, is an excellent way of keeping onions." In Portugal, "when the onions are ripe," Warre observes, "they are drawn up out of the ground, and a twist is given to the top, so as to bend it down. They are left on the ground to season, before they are housed; then, immediately platted with dry straw into ropes or strings, of twenty-five each, and hung up to dry; they are not permitted to sweat in a heap. Their keeping well depends greatly upon the weather being dry and favourable when they are brought into the house, and also upon their being carefully handled, and not bruised. In this country, I have practised, with much success, searing the roots with a hot iron, for the purpose of preserving the onions, which checks their sprouting, and they should be kept in a dry airy place." In Holland, the gardeners apply heated iron for a few seconds to the base of the onion whence the roots proceed, which, by destroying vitality in that part enables them to keep onions till they come again. (*Gard. Mag.*, vol. viii. p. 55.)

4231. *To save seed.* "Select some of the largest, well housed, sound, firm bulbs, either in October the beginning of November, or in February. Draw drills three or four inches deep, either a single row, or two or three rows together, a foot asunder; in which plant the onions, six, ten, or twelve inches apart, and earth in about three inches. In planting double or treble rows, allow an interval of two feet between each bed of two or three rows, to admit of going in, both to place stakes and horizontal lines for the support of the seed-stems, and to cut down weeds. The plants will shoot up in stalks two or three feet high, producing each a large head of seed, which will ripen in August or September."

4232. *Culture of the potato onion.* This variety, erroneously supposed to have been brought from Egypt by the British army about 1805, was grown in Driver's nursery in 1796, and has been known in Devonshire for upwards of twenty years. It is thus cultivated at Arundel Castle, by Maher. Having thoroughly prepared the ground, and formed it into beds four feet wide, "I draw lines the whole length, three to each bed, and with the end of the rake handle make a mark (not a drill) on the surface; on this mark I place the onions, ten inches apart; I then cover them with leaf-mould, rotten dung, or any other light compost, just so that the crowns appear exposed. Nothing more is necessary to be done until they shoot up their tops; then, on a dry day, they are earthed up, like potatoes, and kept free from weeds until they are taken up. In the west of England, where this kind of onion is much cultivated, I understand that it is the practice to plant on the shortest day, and take up on the longest. The smallest onions used for planting swell, and become very fine and large, as well as yield offsets; the middle-sized and larger bulbs produce greater clusters." (*Hort. Trans.*, vol. iii. p. 305.) Dymond states (*Hort. Trans.*, vol. iii. p. 308), that in Devonshire it is planted in rows twelve inches apart, and six inches' distance in the row; that the plants are earthed up as they grow, and that the smaller bulbs yield a greater increase than the larger. A similar practice is adopted by some Scotch cultivators. (*Colled. Hort. Mem.*, vol. i. p. 343, and vol. iv. p. 216.) Wedgewood does not earth up, and finds his bulbs acquire a much larger size than when that practice is adopted. "When the onions have shot out their leaves to their full size, and when they begin to get a little brown at the top, he clears away all the soil from the bulb, down to the ring, from whence proceed the fibres of the roots, and thus forms a basin round each bulb, which catches the rain, and serves as a receptacle for the water from the watering-pot. The old bulbs then immediately begin to form new ones; and if they are kept properly moist, and the ground good, the clusters will be very large and numerous; besides, bulbs grown thus above ground are much sounder than those grown below, and will keep much better." (*Hort. Trans.*, vol. iii. p. 403.)

4233. *Insects and diseases.* These are various. There is a grub which is a very common enemy, but which experience has proved may be prevented by covering the surface of the ground after it is sown, with a thin stratum, say half an inch in thickness, of charcoal dust, such as is found in woods where charcoal has been burned and removed. (*Gard. Mag.*, vol. i. p. 293, and vol. vii. p. 91.) Deep trenching before sowing, by burying the eggs, or the young grubs, too deep to allow of their rising to the surface, has also been found effectual. (*Ibid.*, vol. iii. p. 174.) Campbell, a Scotch gardener, preserves onions from the maggot and rot, by watering the beds with lime water to such a degree as to leave the lime the eighth part of an inch on the beds. (*Ibid.*, vol. vii. p. 192.) Another gardener, the soil of whose garden was very light, and who used to dig this soil twice a year, viz. in autumn and spring, giving dung at both times, found that a very slight digging, half a spade deep, splying well-rotted cow-dung just before sowing, was an effectual preventative of the maggot. (*Ibid.*, vol. vii. p. 836.)

SUBJECT. 2. *Leek*. — *Allium Porrum* L. (*Blackw.* t. 421.); *Hexán. Monog.* L. and *Aphodélæa* B. P. *Porreau*, Fr.; *Look*, or *Prei*, Dutch; *Gemeiner Lauch*, or *Porro* Zweibel, Ger.; *Porro*, Ital.; *Puerro*, Span.; and *Alho Porro*, Port.

4234. *The leek* is a hardy biennial, a native of Switzerland: it is mentioned by Tusser, but was, no doubt, known in this country long before his time. Worlidge, speaking of Wales, says, "I have seen the greater part of a garden there stored with leeks, and a part of the remainder with onions and garlic."

4435. *Use.* The whole plant is used in soups and stews; but the blanched stem is most esteemed. Leeks formerly constituted an ingredient in the dish called porridge, which some suppose to be derived from the Latin *porrum*. They are very good boiled, and served up with toasted bread, and white sauce.

4436. *The varieties are*—1. *The London Flag*, and 2. *The common*.

4437. *Propagation.* From seed; and for a bed, four feet wide by eight in length, one ounce is requisite.

4438. *Soil and site.* The soil should be light and rich, lying on a dry sub-soil. A rank soil does not suit it, so that when manure is necessary, well-reduced dung, mixed with road-dirt, is better than dung alone. The situation should be open. Let the ground be dug in the previous autumn or winter ready for sowing in spring. For the principal crop, allot beds four or five feet wide. A small crop may be sown thinly with a main crop of onions, and when the latter are drawn off, the leeks will have room for full growth.

4439. *Times of sowing.* A small first crop, or the subordinate crop in the onion-bed, may be sown at the end of February, if the weather be mild and the ground in a dry state; but it is better not to sow the main supply till the course of March, or first week of April. It is eligible to sow a secondary crop at the end of April or beginning of May, for a late succession in winter and the following spring.

4440. *Course of culture.* When the plants are three or four inches high, in May or June, weed them clean, and thin where too crowded. Water well in dry hot weather, to bring the plants forward. The leek is much improved in size by transplanting; those designed for which will be fit to remove when from six to ten inches high, from June till August. For this purpose, thin out a quantity regularly from the seed-bed, either in showery weather, or after watering the ground: trim the long weak tops of the leaves and the root-fibres; and plant them, by dibble, in rows from nine to twelve inches sunder, by six or eight inches in the row; inserting them nearly down to the leaves, or with the neck-part mostly into the ground, to whiten it a proportionate length. Press the earth to the fibres with the dibber, but leave the stems as loose as possible, and as it were standing in the centre of a hollow cylinder. Give water, if the weather be dry. Those remaining in the seed-bed, thin to six or eight inches' distance. Keep the whole clear from weeds. In hoeing, loosen the ground about the plants, to promote their free vigorous growth. Some plant in hollow drills, and earth up as in celery-culture, which produces very large stems. Some form holes with a large dibble, drop the plant in, followed by as much loose earth as will just cover its fibrous roots, and afterwards water once a day, till it has taken sufficient hold of the soil. If the soil is very rich to a considerable depth, and on a dry bottom, the size of the stem by this mode of culture becomes enormous. The main crops of leeks will attain a mature useful size in September, October, and November; and continue in perfection all winter and the following spring. When frost is expected, a part may be taken up, and laid in sand. The late-sown crop will continue till May, without running to stalk.

4441. *To save seed.* Transplant some best full plants, in February or the beginning of March, into a sunny situation, or in a row near a south fence. They will shoot in summer, in single tall seed-stalks. Support them, as necessary, with stakes; and they will produce ripe seed in September. Cut the ripe heads with part of the stalk to each; tie two or three together, and hang up under cover, to dry and harden the seed thoroughly, when it may be rubbed out, cleaned, and put by for future service.

SUBSECT. 3. *Chive.*—*Allium Schanöprassum* L. (*Eng. Bot.* 2438.); *Her. Monog.* L. and *Asphodélea* B. P. *Civette*, or *Ciboulette*, Fr.; *Binsenlauch*, Ger.; *Bieslook*, or *Snypret*, Dutch; *Cipoletta*, Ital.; and *Cibollino de Inglaterra*, Span.

4242. *The chive, or cive*, is a hardy perennial plant, a native of Britain, and found in meadows and pastures, though but rarely. The leaves rise from many small bulbous roots connected in bunches; are awl-shaped, thread-like, and produced in tufts. The flowers are white, tinged with reddish purple, and appear on round stalks in June.

4243. *Use.* Chives, when gathered, are cut or shorn by the surface, and on this account are generally named in the plural. The foliage is employed as a salad ingredient in spring, being esteemed milder than onions or scallions. Occasionally the leaves and roots are taken together, slipped to the bottom singly in small separate cibola, in lieu of young onions in the spring for salads. They are also used as a seasoning to omelets, soups, &c.

4244. *Culture.* Chives may be planted in any common soil and situation. The plant is propagated by slips; or by dividing the roots in the spring or autumn. Plant them in any bed or border, from eight to twelve inches apart; they will soon increase into large bunches. In gathering the leaves for use, cut them close, and others will shoot up in succession. A bed lasts three or four years; after which period it must be renewed, by dividing the roots.

SUBSECT. 4. *Garlic.*—*Allium sativum* L. (*Moriz. s. 4. t. 15. f. 9.*) *Herándria Mo-nogýnia* L. and *Asphodélea* B. P. *Ail*, Fr.; *Knoblauch*, Ger.; *Knoflok*, Dutch; *Aghio*, Ital.; and *Ajo*, Span.

4245. *The garlic* is a hardy perennial bulbous-rooted plant, growing naturally in Sicily and the south of France. The leaves are linear, long, and narrow. The bulb is composed of a dozen or fifteen subordinate bulbs, called cloves. It flowers in June and July, and has been cultivated in this country since 1548.

4246. *Use.* It is cultivated for the sake of the bulb, which is used in various kinds of dishes, being in general introduced only for a short period into the dish while cooking, and withdrawn when a sufficient degree of flavour has been communicated. It is much more used in foreign, and especially in Italian, cookery than in ours. It is occasionally also prescribed in medicine.

4247. *Culture.* Garlic is propagated by planting the cloves or subdivisions of the bulb, and prefers "a light dry soil, rich, but not recently dunged. In February, March, or beginning of April, having some large full bulbs, divide them into separate cloves, and plant them singly in beds, in rows lengthwise. Set them from six to nine inches sunder, two or three inches deep, either in drills or in holes made with a blunt-ended dibble. In placing the cloves in drills, thrust the bottom a little into the ground, and earth them over the proper depth. The plants will soon come up: keep them clear from weeds. The bulbs will be full-grown in July or beginning of August."

4248. *Taking the crop.* "The maturity of the bulbs is discoverable by the leaves changing yellowish, in a decaying state; when they may be taken wholly up. Continue the stalky part of the leaves to each root: spread them in the sun to dry and harden, and then tie them in bunches by the stalks, and house them to keep for use, as wanted; they will remain good till next spring and summer. If, in their advancing growth, some are required for present use, before attaining maturity, a few of the early planting may be drawn in May or June; but permitting the general supply to attain full growth as above." (*Abercrombie*.)

SUBJECT. 5. Shallot. — *Allium ascalonicum* L. (*Mor. His.* s. 4. t. 14. f. 3.); *Herandria Monogynia* L. and *Asphodélea* B. P. *Echalote*, Fr.; *Schalotte*, Ger.; *Chalotte*, Dutch; *Scalogni*, Ital.; and *Escalonia*, or *Chalots*, Span.

4249. The shallot is a bulbous-rooted perennial, a native of Palestine, found, as the trivial name imports, near Ascalon. Some old authors denominate it the barren onion, from the circumstance of its seldom sending up a flower-stalk. The roots separate into cloves, like those of garlic; and the leaves rise in tufts like those of the chive, but larger. The flavour of the bruised plant is milder than any of the cultivated alliaceous tribe.

4250. *Use.* The cloves are used for culinary purposes, in the manner of garlic and onions. In a raw state, cut small, it is often used as sauce to steaks and chops; and sometimes a clove or two is put in winter salads. The roots become mature in July and August, and dried and laid in store, are in season till the following spring.

4251. *Culture.* The shallot is propagated by dividing the clustered root into separate offsets. These are to be planted in February, or early in March, or in October and November. Planting in autumn is generally preferred, as producing the best bulbs; but great care must be taken that much wet do not reach the roots in winter. Abercrombie directs to "lay out some light rich ground, in beds four feet wide; and in rows extending along these, to plant the offsets six inches apart, either in drills two inches deep, or inserted to that depth by the dibber, or with the finger and thumb." Nicol advises not to dung land intended for shallots, as rendering them liable to the attacks of maggots and insects: a very common complaint of gardeners.

4252. Mackenzey, at Errol (*Cal. Hort. Mem.*, vol. i. p. 275.), finds soot mixed with the manure given to shallot-beds effectual in preventing the appearance of maggots; while the roots were improved in size.

4253. Henderson, of Delvine (*Caled. Mem.*, vol. i. p. 199.), to prevent the maggot, picks out the very smallest shallot-roots for planting; manures the ground with well-rotted dung or house-ashes. He plants about the middle of October, as recommended by Marshall, and never has had the roots injured by the maggot in the smallest degree. "Autumn planting," he says, "is the whole secret." To prove this, he planted some roots in spring only seven feet distance from those planted in autumn; and while the latter were untouched, the former were destroyed by these insects. The smallness of the roots planted prevents them from growing mouldy. The most intense frost does not hurt them. From 204 cloves planted in October, 1810, he lifted, in August, 1811, above 5000 good clean roots, measuring in general about three and a half inches in circumference.

4254. Knight, to guard against the maggots in shallots, tried planting the bulb on the surface, instead of burying it two or three inches in the soil; and the experiment was attended with such perfect success, that he confidently recommends this mode of culture. He places a rich soil beneath the roots, and rakes the mould on each side to support them till they become firmly rooted. This mould is then removed by the hoe and water from the rose of a watering-pot, and the bulbs, in consequence, are placed wholly out of the ground. "The growth of those plants," he adds, "now so closely resembled that of the common onion, as not to be readily distinguished from it; till the irregularity of form, resulting from the numerous germs within each bulb, became conspicuous. The forms of the bulbs, however, remained permanently different from all I had ever seen of the same species, being much more broad and less long; and the crop was so much better in quality, as well as much more abundant, that I can confidently recommend the mode of culture adopted to every gardener." (*Hort. Trans.*, vol. ii. p. 98.)

4255. *Taking and preserving the crop.* When the leaves begin to decay, the bulbs are fit to be taken up, when they should be dried and housed, either on the floor of the root-loft, in nets hung from the roof, or in strings, as recommended for onions. Should any roots be wanted during the growth of the crop, a few may be taken up young in June and July for immediate consumption.

SUBJECT. 6. Rozeambolo. — *Allium Scorodiprasum* L. (*Plench. Ic.* t. 256.); *Herandria Monog.* L. and *Asphodélea* B. P. *Ail d'Espagne*, Fr.; *Rozenbollum*, Ger.; and *Scorodopraso*, Ital.

4256. The rozeambolo is a perennial plant, a native of Denmark, and mentioned by Gerrard as cultivated in 1596. It has compound bulbs, like garlic, but the cloves are smaller. These are produced at the roots, and also, though of a smaller size, on the stem, which rises two feet high, and produces the bulbs in the axillæ of the leaves in July and August.

4257. *Use.* The cloves, both of the stalk and roots, are used in the manner of garlic or shallot, and nearly for the same purposes. It is considered milder than garlic.

4258. *Culture.* It is propagated by planting the separated cloves of the root-bulb, or occasionally the cloves of the head, in February, March, or April. A small bed, or a few rows, will be sufficient for a family garden. Plant it either by dibble, or in drills, in rows six inches apart, and two inches deep. The plants shoot up, each in a slender stalk, contorted at top, and terminated by a small head of cloves, which, as well as the root, will acquire full growth in July or August, for immediate use; or to be taken up, and spread to dry, tied in bunches, and housed for future consumption.

SECT. VI. Asparaginous Plants.

4259. The asparaginous class of esculents may be considered as comparatively one of luxury. It occupies a large proportion of the gentleman's garden, often an eighth part; but enters sparingly into that of the cottager. A moist atmosphere is congenial to the chief of them, especially to asparagus and sea-kale, which are sea-shore plants, and are brought to greater perfection in our islands than any where else, except perhaps in Holland.

SUBJECT. 1. Asparagus. — *Asparagus officinalis* L. (*Eng. Bot.* t. 339.); *Her. Monog.* L. and *Asphodélea* B. P. *Asperge*, Fr.; *Spargel*, Ger.; *Aspergie*, Dutch; *Asparago*, or *Spargio*, Ital.; and *Esparrago*, Span.

4260. The asparagus is a perennial plant, found in stony or gravelly situations near the sea, but not very common. It grows near Bristol, in the Isle of Portland, and

sparingly in Seaton Links, near Edinburgh. The roots consist of many succulent round knobs, forming together a kind of tuber, from which numerous erect round stems arise with alternate branches, subdivided into alternate twigs, not unlike a larch fir-tree in miniature. The leaves are very small, linear, and bristle-shaped; the flowers nodding, of a yellowish green, and odorous, are produced from June to August; and the berries of a yellowish red: the whole plant has a very elegant appearance. Many of the steppes in the south of Russia and Poland are covered with this plant, which is there eaten by the horses and oxen as grass. It is cultivated to a great extent in the neighbourhood of Paris, and to a large size in the neighbourhood of Ulm, and Augsburg on the banks of the Danube, where the soil is a calcareous sand, three or four feet deep, and the sub-soil always saturated with water. In the neighbourhood of London it is cultivated to a greater extent than any where else in the world, and chiefly at Deptford and Mortlake. Some growers at these places, and especially the latter, have above 100 acres each. The most celebrated grower of the present day is Grayson of Mortlake, who produces shoots nearly half an inch in diameter. For instances, see *Gard. Mag.*, vol. v. p. 552., and vol. vii. p. 677. The flower-stalks of the *Ornithogalum pyrenaicum* are used as asparagus in some parts of Gloucestershire, and sold in the markets at Bath under the name of Prussian asparagus. (*Gard. Mag.*, vol. viii. p. 613.)

4261. *Use.* The esculent part is the early shoots or buds, when three or four inches high, and partially emerged from the ground in May and June. They are in great esteem in Britain, and on the continent; and this plant has, in consequence, been cultivated for an unknown period. In Paris it is much resorted to by the sedentary operative classes, when they are troubled with symptoms of gravel or stone; and there, as is now the case in this country, the buds are eaten in a much greener state than was the case in Britain a few years ago. In Berlin, green asparagus is preferred during winter, and blanched asparagus during spring. (*Gard. Mag.*, vol. viii. p. 450.)

4262. *Varieties.* There is, properly speaking, but one sort of cultivated asparagus, though in some gardening books, and seedsmen's lists, we find names given from the places where the seed has been saved, or from the grower, such as Gravesend, Battersea, Grayson, &c. It is, no doubt, always safe to procure seeds from the largest-sized or best-grown specimens; and, therefore, seeds saved by Mr. Grayson at Mortlake may be better than seeds procured at random from any kitchen-garden.

4263. *Propagation.* Asparagus is propagated only from seed, though the roots might be divided like those of the garden-ranunculus, if thought necessary. It is best, however, to raise the plant from seed; and it is of considerable importance to gather it from the strongest and most compact shoots; such seed, as might naturally be expected, yielding by far the best plants. Seed, as well as one and two year old plants, may be purchased from nurserymen and market-gardeners; and when a new garden is formed, the latter practice is generally adopted for the first plantation, in order to gain time.

4264. *Quantity of seed or roots.* If sown to transplant, for a bed four feet and a half wide by six feet in length, one quart of seed will be requisite. If sown to remain, for a bed four feet and a half wide by thirty feet in length, one pint is necessary. If plants a year old are wanted for a plantation, then, for a bed four feet and a half wide by thirty feet in length, to contain four rows of plants, nine inches distant in the row, one hundred and sixty plants will be requisite.

4265. *Sowing, and culture in seed-bed.* It is generally sown broadcast on a four-foot bed, in March, not very thickly, often with a thin sprinkling of onions or radishes. The seed being slightly trodden in, the bed is raked smooth, and after the plants make their appearance, they are to be kept as free from weeds as possible, and the ground stirred with a narrow hoe once or twice during the summer. In the end of October following, the roots are protected from the frost by spreading over the ground some rotten dung or litter, which remains till March or April, according to the season, when the plants are transplanted to a compartment prepared for their final culture.

4266. *Judd (Hort. Trans., vol. II.)* sows in drills eighteen inches apart, burying the seed two inches: the object is to admit of stirring between. He keeps the plants thin, and if the weather proves dry, waters once a week or fortnight.

4267. *Soil and preparation.* "Asparagus-ground should be light, yet rich; a sandy loam, well mixed with rotten dung or sea-weed, is accounted preferable to any. The soil should not be less than two feet and a half deep; and before planting a bed, it is considered good practice to trench it over to that depth, burying plenty of dung in the bottom, as no more can be applied there for eight or ten years. It can scarcely, therefore, be too well dunged; besides, although the plant naturally grows in poor sandy soil, it is found that the sweetness and tenderness of the shoots depend very much on the rapidity of the growth, and this is promoted by the richness of the soil. Damp ground, or a wet sub-soil, are not fit for asparagus: indeed, the French consider wetness as so prejudicial to this plant, that they raise their asparagus-beds about a foot above the alleys, in order to throw off the rain." (*New*.) Though a wet sub-soil is undoubtedly unfavourable to the growth of asparagus, yet it is certain that the power of sub-irrigation is highly favourable to it; as a proof of which, we have only to refer to the enormous size of the asparagus grown on the sandy or alluvial margins of rivers, where the sand or alluvion is not raised more than three or four feet above the level of the water. We were informed in 1829, by M. Oscar le Clerc, whom we consider one of the most scientific gardeners on the Continent, that the largest asparagus in France was grown in a small sandy island in the Oise, where the surface of the sand was not more than two feet above the level of the water. Forster, at Winchester, finds that his beds there are completely flooded to the depth of from six to twelve inches, and that this effect served as a kind of forcing as well as for improving the quality and quantity of the produce. Mr. Forster began to cut on the 4th of March, which is nearly a month sooner than is usually done on dry soils and under ordinary treatment. (*Gard. Mag.*, vol. iv. p. 235.) In the culture of asparagus in the Mauritius, irrigation is found essential; and the produce is nearly as abundant, and the stalks as thick, as those of Europe. For a full account of this practice, see *Gard. Mag.*, vol. vi. p. 454.

4268. *Abercrombie* says, "For planting asparagus, allot a plot of sound brownish loam, mixed with sand, in an open compartment, full to the sun. Having trenched it thirty inches deep, or as near that depth as the soil will allow, manure the bed with well reduced dung, six inches thick, or more, digging in the dung regularly one spadeful deep. Then lay out the ground in regular beds four feet and a half wide, with intervening alleys three feet wide. If the soil is naturally too light and poor, improve it with a little vegetable mould, or pulverised alluvial compost, after the bottom has been dunged."

4269. *Judd* (who laid before the Horticultural Society, in 1816, "a specimen of asparagus, pronounced, by those who saw it, to be the finest they had ever seen," says, "Prepare a piece of good land, unencumbered with trees, and that lies well for the sun; give it a good dressing of well reduced horse-dung from six to ten inches thick, all regularly spread over the surface; then proceed with the trenching (if the soil will admit) two feet deep; after this first trenching, it should lie about a fortnight, or three weeks, and then be turned back again, and then again in the same space of time; by this process, the dung and mould become well incorporated: it may then be laid in small ridges till the time of planting. This

work should all be performed in the best weather the winter will afford, that is, not while it rains, or snow is lying on the ground, as it would tend to make the land heavy and sour: all this is to be particularly attended to, as the preparation of the soil is of more consequence than all the management afterwards. At the time of planting, I always spread over the ground another thin coat of very rotten dung, and point it in half a spade deep, making my beds three feet wide only, with two feet of alleys; so that three rows of grass, one foot apart, are all I plant on each bed: I find this to be the best method, as by this plan there is not the least trouble in gathering, whereas you are obliged to set a foot on one of the wide beds, before you can get at all the grass, to the great injury of the bed and the buds under the surface.

4270. Dr. Macculloch gives the following mode of preparing an asparagus bed, as practised in France; and which, it is stated, has been adopted by a gentleman in Peebles-shire with success. "A pit, the size of the intended plantation, is dug five feet in depth, and the mould which is taken from it must be sifted, taking care to reject all stones, even as low in size as a filbert-nut: the best part of the mould must then be laid aside for making up the beds. The materials of the bed are then to be laid in the following proportions and order: six inches of common dunghill manure, eight inches of turf, six inches of dung as before, six inches of sifted earth, eight inches of turf, six inches of very rotten dung, eight inches of the best earth. The last layer of earth must then be well mixed with the last of dung. The compartment must now be divided into beds five feet wide, by paths constructed of turf, two feet in breadth, and one foot in thickness." (*Calcd. Hort. Mem.*, vol. II.)

4271. Dr. Forbes describes the Vienna mode of making an asparagus-bed to last 25 years. It is deeply trenched, and in the bottom is placed a layer of bone, horn, chips of wood, or branches of trees, a foot thick. Over this is placed good mould, cow-dung, and river mud, &c. (*Hort. Trans.*, vol. v. p. 385.) The Prussian practice resembles this, and will be found described at length in *Gard. Mag.*, vol. iv. p. 105.

4272. Removal and planting. Take up the plants carefully with a fork, to avoid cutting the roots, exposing them to the air as short a time as possible; and at the time of planting, place them among a little sand in a basket covered with a mat.

4273. Nicol says, "It is of very great importance for the ensuring of success in the planting of asparagus, to lift the roots carefully, and to expose them to the air as short time as possible. No plant feels a hurt in the root more keenly than asparagus; the fibrils are very brittle, and if broken, do not readily shoot again." (*Kal. p. 47.*)

4274. Smith has proved experimentally, that though the common season for planting is March and April, yet that it may also be successfully performed in June, without any extraordinary care. Judd, already mentioned, transmits what he observes the plants beginning to grow, which, he says, is "the best time for the plants to succeed. If moved earlier, they perhaps have to lie torpid for two or three weeks, which causes many of them to die, or, if not, they shoot up very weak." In France (according to Dr. Macculloch), they plant even as late as July, cutting off such young shoots as the plants have made before the operation. (*Calcd. Hort. Mem.*, vol. I.)

4275. The distance at which asparagus is commonly planted is nine inches in the row, and one foot between the rows; in general, between every fourth row so planted, a double distance is left for an alley. Many asparagus-farmers, however, consider it better to plant in single rows at two feet and a half or three feet distance, than to adopt the bed form. The crowns of the plants are generally covered two inches with soil. Dickson plants in rows three feet and a half apart, with the plants nine inches from each other in the row, and finds the produce greater than when the rows are nearer together. (*Gard. Mag.*, vol. II. p. 324.)

4276. Method of planting. "Stretch a line lengthwise the bed, nine inches from the edge, and with a spade cut out a small trench about six inches deep, perpendicular next to the line, turning the earth displaced along by the other side the trench; and, having the plants ready, set a row along the trench, nine inches apart, with the crown of the roots two inches below the surface, drawing some earth just to fix them as placed. Having planted one row, directly cover them in fully with the earth of the trench, raking it back regularly an equal depth over the crown of the plants. Proceed then to open another trench a foot from the first; plant it as above; and in the same manner plant four rows in each bed. Then lightly raking the beds lengthwise, draw off any stones and hard clods, and dress the surface neat and even. Then let the edges be lined out in exact order, allowing three feet for each alley. But sometimes, in planting large compartments of asparagus, a first trench having been made, and the roots planted as above, then a second trench is opened, of which the earth is turned into the first over the plants. So proceed in planting the whole; making allowance between every four rows for an alley four feet. In a dry spring or summer, wait the roots from time to time, till the plants are established." (*Abercrombie*.)

4277. Judd strains the line, and cuts down a trench, sloping in the usual way for planting box, and making choice of all the finest plants, puts them in one foot apart, and one inch and a half below the surface. This done, he lets the alleys and beds lie level till autumn, and then digs out the alleys deep enough to get from four to six inches of mould all over the bed; over this he lays a good coat of rotten dung, and fills in the alleys with long dung.

4278. In France, they plant in beds five feet wide, separated by paths constructed of turf, two feet in breadth, and one foot in thickness. The plants are placed eighteen inches asunder, spreading out the roots as wide as possible in the form of an umbrella, and keeping the crown one and a half inch under ground. A pin is put to each plant as a mark; and as soon as the earth is settled and dry, a spadeful of fine sand is thrown over each pin in the form of a mole-hill.

4279. Extent of the plantation. An asparagus-compartment should not contain less than a pole of ground, as it often needs this quantity to furnish a good dish at one time. For a large family, about sixteen rods are kept in a productive state, which are calculated to furnish, on an average, between two hundred and three hundred shoots every day in the height of the season. (*Nell.*) Abercrombie says, when the buds come to be fully productive, five square poles of ground, planted with 1600 plants, will yield from six to eight score heads daily.

4280. Progressive culture. Permit the entire crop the two first years, and the greater part of it the third year, to run up to stalks; keeping the beds free from weeds, and stirring the surface. It is a common practice to sow onions, lettuce, &c. the two first years over the beds; and to plant cauliflower in the alleys between them. The advantage of this practice is questionable; and, at all events, it should not be continued after the plants are in full bearing. Judd, having dug out the alleys the first season, instead of repeating that operation the next, lays on a coat of good dung three inches thick, and forks it evenly into the beds and alleys, and so on every season after. "never digging out the alleys any more, as it is known the asparagus plant forms a fresh crown every season; and sometimes it happens, that in a few years the crown will increase almost into the alley; so, that by digging out this, you must inevitably spoil that plant: if this is not the case, when the beds are in good condition, the roots will be sure to work out at the sides into the alleys, and by digging out the latter, these roots must be cut off, and you will often see them exposed all the winter before dung can be got to fill them up: rather than be treated in this way, they had better be without any thing all the winter, as asparagus does not suffer generally by frost. The first two years I have a very thin crop of celery plants or lettuce upon the beds, but nothing afterwards; nor do I plant any thing in the alleys after the same period, for I think the asparagus is injured thereby."

4281. Autumn dressing. The following is the usual practice, as described by Abercrombie:—"Towards the end of October or beginning of November, the stalks which have run up to seed, having done growing, or begun to decay, cut them down close, and carry them away; then hoe off all weeds from the beds into the alleys: this done, proceed with the line and spade to mark out the alleys the prescribed width

then dig each alley lengthwise, a moderate spade deep, and spread a good portion of the earth equally on each side over the adjoining beds; digging down the weeds as you advance, clean to the bottom of the alleys, under a proper depth of earth. Form the edges of the beds full and straight, and the alleys of an equal depth; and thus let them remain till spring." Some advise that the paths should never be dug, nor the surface of the beds stirred with a pronged fork; but in that case they require that all the soil which is put on above the crowns of the plants should be vegetable mould. It is certainly a very unreasonable practice to dig out the alleys, and yet expect that the rows adjoining them shall be equally strong with those in the centre of the bed. (See *Gard. Mag.*, vol. ii. p. 578, and vol. viii. p. 181.)

4292. *Judd*, on the above practice, observes: "rather than tread them in this way, they would be better without any thing." He fills up the alleys with litter or dung, to exclude the frost.

4293. *Nicot* recommends covering asparagus-beds with good dung, and not mere litter, as frequently is done, in the idea that the roots would otherwise perish. Fresh dung mixed with sea-weed he considers the very best manure for asparagus. (*Kal.* 129.)

4294. The French cover in autumn with six inches of dung and four of sand; and in performing this operation, as well as every other, great care is taken not to tread on the beds, so as to condense the earth. In planting and cutting, a plank is always used to tread on; and the turf-divisions of the beds, which are intended to prevent the condensation of the earth below, in consequence of walking among the beds, are removed every three years.

4295. *Nicot* mentions a very proper precaution before covering, which is, to stir the surface of the beds with a fork, in order that the holes of the manure washed down by the rains may be readily filled. He adds, that some cover the manure with a thin layer of earth from the alleys, which is called *landung up*. Grey recommends gardeners never to cut down the stalks in autumn till the sap has wholly left them, as it returns to the roots and strengthens the plants for the next season. (*Gard. Mag.*, vol. iv. p. 246.)

4296. *Spring dressing*. About the end of March or towards the middle of April, before the buds begin to advance below, proceed, with a short three-tined fork, to loosen the surface of the beds; introducing the fork slanting two or three inches under the mould, turn up the top earth near the crown of the roots with care not to wound them. Then rake the surface lengthwise the bed, neatly level, drawing off the rough earth and hard clods into the alleys; also, trim the edges of the beds and surface of the alleys regularly even. Thus to loosen the bed, enables the shoots to rise in free growth, admits the air, rains, and sunshine, into the ground, and encourages the roots to produce buds of a handsome full size. (*Abercrombie*.)

4297. *Time of coming to a bearing state*. In general, transplanted asparagus comes up but slender the first year; it is larger the second; and the third year some shoots may be fit for gathering: in the fourth year, the crop will be in good perfection. (*Abercrombie*.) *Judd* begins to cut the third season, but not generally. By the French method before mentioned, "in three years the largest plants will be fit to cut for use."

4298. *Blanching*. No attempt at blanching the tops is made in this country otherwise than by having abundance of loose earth on the surface through which they spring; but *Lasteyrie* informs us (*Col. de Machines*, &c.) that joints of cane are placed separately over each stalk in Spain; and *Bauman* of Vienna, in a communication to the Horticultural Society on the culture of asparagus in Austria, says, "so give asparagus shoots growing in the open air as much length and tenderness as possible, there is inserted over stems destined to be gathered, as soon as it shoots above ground, a wooden tube or pipe eighteen inches high, and one inch in diameter." (*Hort. Trans.*, vol. v. p. 334.) Dr. *Forbes*, on the same subject, says, "in order to preserve the whiteness of the asparagus shoots, they should be covered with a wooden or earthen pipe of twelve or fifteen inches in height, with a hole in the top." (*Hort. Trans.*, vol. v. p. 335.)

4299. *Cutting and gathering*. "In new plantations, be careful not to begin cutting till the stools are advanced to mature age, having been planted three or four years, and become of competent strength for producing full-sized shoots. Likewise observe, both in new and old beds, to gather all the produce in a regular successive order within the proper limits of the season specified above. As the rising shoots project two, three, four, or five inches at most above ground, while the top bud remains close and plump, they are in the best condition for gathering. Cut them off within the ground, with a narrow sharp-pointed knife, or small saw, nine inches long; thrusting the knife, or saw, down straight, close to each shoot separately, cut it off slantingly, about two inches below the surface, with care not to wound the younger buds advancing below. Observe, in a new plantation, in the first year's gathering, if the shoots come up of irregular sizes, to cut only some of the larger for a fortnight, or three or four weeks, and then permit the whole to run; but otherwise, when in strong production, gather all as they come, two or three times a week, or as required, during the season, till the 31st of June; then, at farthest, terminate the cutting, and permit the after-shoots to run up in stalk till October. If from a particular inducement you cut later than the 31st of June, be careful to leave two or more shoots to each stool, in order to draw nourishment to it; for the stools left without growing shoots will perish, and by negligence in this respect many vacuities or unproductive spots are left in beds." (*Abercrombie*.)

4300. *Nicot* says, the best method of cutting is to scrape away an inch or two of the earth from the shoot you would cut, and then slip the asparagus knife (see *Instruments*, &c.) down another inch or two, taking care not to wound the crown, or any adjoining shoot. Shoots two inches under the ground, and three or four above it, make the handsomest dishes.

4301. *Nicot* observes, "after the beds are in full bearing, all the shoots are gathered as they advance, till the end of June or beginning of July; a common rule being to 'let asparagus spin (grow up), when green peas come in.' Dr. *Macculloch* states that the same practice is pursued in France.

4302. *Judd* says, "I never make a practice of cutting very much after the first week in June: I then begin to let it run; in fact, I never cut the very small grass at all. Asparagus being so valuable a vegetable, some persons continue to cut indiscriminately till the latter end of June, but this practice is of very great injury to the next year's produce." (*Hort. Trans.*, vol. ii. p. 237.) *Lindley* cuts with a sharp smooth-edged asparagus knife, in preference to one having a blade like a saw, commences towards the latter end of April, and never continues beyond midsummer. (*Guide*, &c., p. 695.)

4303. *Duration of the plantation*. *Abercrombie* says, "A plantation of asparagus, under good culture, will mostly continue for ten or twelve years to produce good crops; after which, the stools usually decline in fertility, and the shoots in quality; so that to provide a permanent annual supply, some fresh beds should be planted a sufficient time beforehand, allowing four years for their advancing to a productive state."

4304. Dr. *Macculloch* says, the French beds which he describes "will generally last thirty years; but, if they be planted in such abundance as to require cutting once in two years, half the bed being always in a state of reservation, it will last a century or more." (*Caled. Hort. Mem.*, vol. ii. p. 250.)

4305. *To save asparagus seed*. "Select some of the finest and earliest heads as they make their appearance in the spring; tie them to stakes during summer, taking care not to drive the stake through the crown of the plant. In autumn, when the berries are ripe, wash out the seeds, if for the market, or to be sent to a distance; but, for home sowing, keep them in the berry till the time of sowing, the pulp being a great nourishment to the seed, which ought to be kept in a dry place during the winter." (*Judd* in *Hort. Trans.*, vol. ii. p. 234.)

4306. *Forcing asparagus*. *Meager*, writing in the middle of the seventeenth century, mentions that the London market was, at that period, supplied with forced asparagus early in the year. "Some having old beds of asparagus, which they are minded to destroy, and having convenience of new or warm dung,

lay their old plants in order on the dung, and the heat doth force forward a farewell crop " (*English Gardener*, p. 168.) Where much asparagus is forced, it becomes necessary to form plantations on purpose for an annual supply. The plants are raised from seed in the usual way; but when transplanted, as they are not intended to remain longer than three years in the bed or plantation, they need not be planted wider than seven or nine inches. When of three years' standing in the bed, they are eligible for removal to the forcing pit or frame, or to be excited by a superstratum of tan and warm dung, in the manner of sea-kale or rhubarb. As some guide to proportion the forcing plantations to the demand, 600 plants are required for an ordinary-sized three-light frame, which, Nicol says, will yield a dish every day for about three weeks.

4297. *Ludsgaard*, the gardener to the King of Denmark, forces asparagus in the open air, by deepening to three feet, and a half the alleys which are two feet wide, the beds being four feet wide. The earth taken out serves to raise the beds, which are covered with litter, and the trenches filled with hot dung. By this means, the first gathering is made every year on the King of Denmark's birthday, January 8th. A similar practice is now frequent in England, and it has long been general in every part of the continent. (See *Gard. Mag.*, vol. i. p. 173.) This plan has been tried in the Horticultural Society's garden, and the produce found to have a superior flavour to that forced in hotbeds. (*Ibid.*, vol. ii. p. 356.) The beds for forcing in this manner are in some cases faced with pigeon-hole brickwork to the depth of two feet, the trenches between being two feet wide, with a gutter formed of draining tiles along the middle, and with wooden or iron copings to the brickwork; or, in lieu of these copings, two courses of the top may be built without pigeonholes, and set in Roman cement. The beds may either be covered with litter, or boarded frames, or both. It is evident, that the same mode of forcing is equally well adapted for sea-kale, rhubarb, pecherie, and a variety of articles; and one great advantage of it is, in addition to that of a great saving of labour, that the same plants, by being forced every year, acquire a habit of early vegetation. (See the details at length in the *Gardener's Magazine*, vol. iv. p. 360.)

4298. For the details of forcing asparagus, see the preceding chapter, sect. ix.

SUBJECT. 2. *Sea-kale*.—*Crambe maritima* L. (*Eng. Bot.* 924.); *Tetrad. Siliq.* L. and *Crucifera* J. *Chou marin*, Fr.; *Meerkohl*, Ger.; *Zeekool*, Dutch; *Crambe marina*, Ital.; and *Col marina*, Span.

4299. The sea-kale is a hardy perennial, found in various parts of our shores. The common people on the western shores of England have, from time immemorial, been in the practice of watching when the shoots begin to push up the sand or gravel, in March and April; when they cut off the young shoots and leaf-stalks, then blanched and tender, and boil them as greens. The precise period of its introduction to the garden is unknown. Parkinson and Bryant state, that the radical leaves are cut by the inhabitants where the plant grows wild, and boiled as cabbage; and Jones, of Chelsea, assured the late Curtis, that he saw bundles of it, in a cultivated state, exposed for sale in Chichester market in 1753. Maher states (*Hort. Trans.*, vol. i.), that the *Crambe maritima* was known and sent from this kingdom to the continent more than two hundred years ago, by Lobel and Turner; but Miller, in 1731, was the first who wrote upon it professionally. About the year 1767, it was cultivated by Dr. Lettsom, at Grove Hill, and by him brought into general notice in the neighbourhood of London. It is wild on the shores about Dublin, and has been cultivated in the gardens there, at least since 1764. (*Gard. Mag.*, vol. vi. p. 26.) In the *Gardener's Dictionary*, published in 1774, by Gordon, at Fountain-bridge, near Edinburgh, directions are given for the cultivation of this vegetable, and for blanching it, by covering the beds four inches deep with sand or gravel. Professor Martyn has printed some valuable instruction for its cultivation, from the MS. of the Rev. M. Laurent; and the late Curtis, by a pamphlet on its culture, has done more to recommend it, and diffuse the knowledge of it, than any of his predecessors. Sea-kale is now a common vegetable in the British markets; and it is also found in some of those on the continent of Europe, and in America.

4300. *Use*. The young spring shoots, and the stalks of the unfolding leaves, blanched by rising through the natural ground in a wild state, or by earthing up in gardens, are the parts used; and when boiled, and dressed like asparagus, are not inferior to that vegetable. They form also an excellent ingredient in soups. Sometimes the ribs of the large leaves are peeled and dressed as asparagus, after the plant has ceased to send up young growth. By forcing, sea-kale may be had in perfection from November till May, a period including all the dead months of the year. It is remarked by Nicol, that vegetables are seldom improved by forcing, but that sea-kale forms an exception, the forced shoots produced at mid-winter being more crisp and delicate in flavour than those procured in the natural way in April or May. Sir George Mackenzie (*Caled. Hort. Mem.*, vol. i. p. 313.) observes, that sea-kale cannot easily be overdone in cooking, and that after being well boiled, it should be thoroughly drained, and then suffered to remain a few minutes before the fire, that a farther portion of moisture may be exhaled.

4301. *Propagation*. Sea-kale is generally and best raised from seed; of which, if sown to transplant, for a seed-bed four feet by nine, sown in drills a foot apart by eight inches in the row, two ounces will suffice; if sown to remain, then the same quantity will serve for a plot five feet by fifteen feet, sown in drills two feet apart. Plantations may also be formed by detaching rooted offset shoots from established plants, or by cuttings of the roots, leaving about two eyes to each cutting; or without eyes, provided the upper part be putted uppermost, or the cutting be laid on its side in a shallow drill. (See Mr. Kean's practice, in *Gard. Mag.*, vol. ii. p. 365.) The last fortnight of March and the first of April comprises the best time for putting in seed, or cuttings, and removing plants.

4302. *Soil*. The native soil of sea-kale is deep sand, sometimes covered or partially interlaminated with alluvial matter from the sea. "Hence," says Abercrombie, "a light, dry, moderately rich mould, of a loose texture, suits it best. A fit soil for it," he adds, "may be composed of one half drift sand, two sixths rich loam, and one third small gravel, road-stuff, or sea-coal ashes. If the loam be not rich, add a little rotten dung." Barton (*Caled. Hort. Mem.*, vol. ii. p. 98.) cultivates sea-kale in "a pretty strong loam, on a loose clay bottom, which he previously prepared by trenching, and mixing with it a good portion of vegetable mould from decayed leaves, adding a quantity of river sand."

4303. *Culture*. Maher pursues the following mode:—"Prepare the ground in December or January, by trenching it two feet and a half deep; if not that depth naturally, and light, it must be made so artificially by adding a due proportion of fine white sand, and very rotten vegetable mould; if your ground is wet in winter, it must be effectually drained, so that no water may stand within a foot at least of the bottom; for the strength of your plants depends on the dryness of the bottom, and richness of your soil. Then divide the ground into beds four feet wide, with alleys of eighteen inches, after which, at the distance of

every two feet each way, sow five or six seeds two inches deep, in a circle of about four inches in diameter; this operation must be performed with strict care and regularity, as the plants are afterwards to be covered with blanching-pots, and both the health and beauty of the crop depend upon their standing at equal distances. In the months of May and June, if the seeds are sound, the young plants will appear. When they have made three or four leaves, take away all but three of the best plants from each circle, planting out those you pull up (which by a careful hand may be drawn with all their tap-root,) in a spare bed, for extra forcing, or to repair accidents. The turnip-fly and wire-worm are great enemies to the whole class of *Tetradymia* plants. I know no remedy for the latter, but picking them out of the ground by hand; the former may be prevented from doing much damage, by a circle of quicklime strewed round the young plants. If the months of June and July prove dry, water the whole beds plentifully. In the following November, as soon as the leaves are decayed, clear them away, and cover the beds an inch thick with fresh light earth and sand, that has lain in a heap and been turned over at least three times the preceding summer; this, and indeed all compost, should be kept scrupulously free from weeds, many of which nourish insects, and the compost is too often filled with their eggs and grubs. Upon this dressing of sandy loam, throw about six inches in depth of light stable-litter, which finishes every thing to be done the first year. In the spring of the second year, when the plants are beginning to push, rake off the stable-litter, digging a little of the most rotten into the alleys, and add another inch in depth of fresh loam and sand. Abstain from cutting this year, though some of the plants will probably rise very strong, treating the beds the succeeding winter exactly as before. The third season, a little before the plants begin to stir, rake off the winter covering, laying on now an inch in depth of pure dry sand or fine gravel. Then cover each parcel with one of the blanching-pots, pressing it very firmly into the ground, so as to exclude all light and air; for the colour and flavour of the sea-kale are greatly injured by being exposed to either."

4304. *Barton*, in the autumn, covers all the sea-kale beds, excepting the roots intended to be taken up for forcing, with straw, as they are raked up from the pleasure-grounds; covering each bed in thickness according to the strength and age of the roots, giving the greatest covering to the oldest, upon an average from five inches to a foot when first laid on: over this, I place a slight covering of long dung, just sufficient to keep the leaves from being blown about. The covering is suffered to remain on the beds until the whole is cut for use the following spring; after which the dung and leaves may be removed, and the ground dug regularly over. By this treatment, the heads will be found free and well blanched, and, from the sweetness of the leaves, free from any unpleasant flavour. As the heads become ready for use, they will raise the covering, by which means they will be easily perceived, without removing any more of the covering than the part where those heads are that are intended to be cut. Those beds which have had the thickest covering of leaves in autumn come first into use, and the others in rotation; so that the last cutting is from what was sown the spring before. Aware that cutting from one-year-old plants is generally disapproved of, *Barton* defends the practice from his experience of its not proving injurious, and because the sea-kale season is prolonged, as the one-year-old plants "come in much later in spring than the old-established roots." (*Caled. Hort. Mem.*)

4305. *The practice of the London market-gardeners* is to plant the sea-kale in rows from four to six feet apart, and every autumn, after the leaves have died down to the surface, to dig a trench between the rows, and cover the plants to the depth of a foot. As the crop is gathered, the ridges so formed are levelled down, and a crop planted between. The great advantage of this mode is, that the whole produce of the plant for the season is gathered at once, every part being perfectly blanched and tender. (*Gard. Mag.* vol. ix.)

4306. *Taking the crop.* Cut the young stems, when about three inches above ground, carefully, so as not to injure any of the remaining buds below, some of which will immediately begin to swell. A succession of gatherings may be continued for the space of six weeks, after which period the plants should be uncovered, and their leaves suffered to grow, that they may acquire and return nutriment to the root for the next year's buds. The flowers, when seeds are not wanted, ought to be nipped off with the finger and thumb, as long as they appear. (*Hort. Trans.* vol. I.)

4307. *Forcing sea-kale.* No vegetable is more easily or more cheaply forced than sea-kale, whether the operation be performed in beds or drills in the open air, or in hotbed frames or flued pits.

4308. *Abercrombie, Nicol, and Maher* recommend forcing in beds in the open air. "Seven weeks," the former observes, "before the time at which you wish to cut shoots for the table, begin to prepare the plants for forcing, and to ferment a sufficient quantity of fresh stable-dung. Having trimmed the leaves from the plants, carefully point the surface of the ground; and over the tops of the roots spread fresh light earth, mixed with drift-sand or coal-ashes, two or three inches in depth. When the dung is well prepared, which will be in about three weeks, proceed to the forcing. If you mix tree-leaves with the dung, begin to ferment them a week or a fortnight sooner. Cover each of the plants, either with a regular blanching-pot, or with a garden-pot of the largest size. When the latter is employed, stop the hole with a cork, and cement it with clay, to keep out both the weather and the rank steam from the lining. Then lay a portion of prepared dung alone or mixed with tree-leaves, about and over each pot, pressing it down firm, extending it eight or ten inches all round, and raising the bank six or eight inches above the pot. It will be necessary to examine the plants frequently, and to measure the heat within the covers now and then, lest, by some inadvertency, the quantity of litter should not have been well apportioned, or rightly prepared. If the heat be under 50°, there is not enough heat to excite the plants; and if above 60°, it is too fiery and may injure them. In about three weeks or a month after being covered up, the first shoots will be from six to ten inches long, and fit for the table. If the plant send up a flower-stalk, cut it away; and successive supplies of shoots will be produced, till perhaps the end of the third month from beginning to force."

4309. *Maher* observes, that the only thing necessary in forcing sea-kale, is to be very particular in guarding against too much heat, using trial-sticks, and never, if possible, exceeding 55°. So much mischief ensues when the heat is violent, that it is far better to begin time enough, and force slowly, rather than quickly. Like *Abercrombie*, *Maher* covers with dry sea-coal ashes sifted, neither very small nor very large. These are the best remedies against worms, which, after forcing is commenced, often spring up on the surface, and spoil the delicacy of the young shoots. Salt, he adds, also effectually destroys worms, and will not injure the sea-kale.

4310. *Abercrombie* says, unless the weather be unusually rigorous, it will not be necessary to renew the linings of hot litter oftener than once in seven or eight weeks. Take away the exhausted part, and mix the remainder with fresh dung and leaves. *Maher* says, after the sea-kale is gathered, the dung will be found in the finest possible state for spring hotbeds. When the stools will produce no more shoots, remove the litter and the covers, and dress the ground, in order, as observed by *Maher*, that their leaves may be suffered to grow, and acquire and return nutriment to the root, for the next year's buds.

4311. *Nicol* says, he knows an instance of a row of sea-kale having been forced in the above way every season for seven years, in which the plants are as vigorous and healthy as others in the same compartments that are forced only every second year.

4312. *Barton* forces sea-kale on dung beds, under frames, exactly in the manner generally adopted for asparagus. The advantages he considers to be the certainty of having the latter vegetable fit for use at any particular time, and the saving of dung and labour. The latter saving, he says, "must appear obvious to every practical gardener, when he considers the difficulty attending the keeping up a proper and regular degree of heat, by covering with dung over pots and other similar methods (as generally practised), at so inclement a season of the year; requiring three times the quantity of dung to produce an equal number of heads, to what will be necessary when the roots are placed in a frame; for a common

melon-frame will contain as many heads as are capable of being produced in two drills of twenty yards each, by covering with hot dung. He finds two frames, of three lights each, quite sufficient for a large family; the first prepared about the beginning of November, and the second about the last week in December; and by the time the second frame is exhausted, sea-kale will be ready for use in the open ground." (*Caled. Hort. Mem.*)

4313. *W. Gibbs*, of Inverness (*Caled. Hort. Mem.*, vol. i. p. 388.), also forces in frames, blanching by keeping the bed covered with mats. Economy and certainty he considers to be the advantages attending this mode. As the plants are no longer of use after being forced, a succession is kept up by annual sowings, and the plants are allowed to attain three years' growth before taking up for forcing.

4314. *Baldwin* forces sea-kale where it stands in the open garden in the following manner:—"On each side of a three-foot bed, in which the sea-kale has been planted, trenches are formed two feet deep, and eighteen inches wide at bottom; the side of the trench next the bed is perpendicular, and the other side is sloped, so as to make the top of the trench, at the surface level, two feet and a half wide: this trench is filled with linings of hot dung, on the inner edges of which, garden-lights are placed, and the glass kept covered with mats until the kale is fit to cut. The same plan," he adds, "is applicable to asparagus, and also to rhubarb, or any other perennial vegetable intended to be excited where it stands, and a covering of boards, canvass, or mats, might be substituted for the glass lights." (*Hort. Trans.*, vol. iv. p. 63.)

4315. *Melrose*, of Ardgowan, forces sea-kale in ainery. He plants "along the back of the due where no vine-roots are, places covers on the plants, and in two weeks, when the heat for forcing vines is kept up," he has "as fine sea-kale as could be desired. When a dish is cut, he lifts the roots, and supplies their places by others from the open ground. He considers this a very easy and certain method, especially in a wet climate." (*Caled. Hort. Mem.*, vol. iv. p. 164.)

4316. *Spirer* recommends forcing the sea-kale in the same manner as already described by him, and quoted for the asparagus in the preceding chapter, sect. ix. (*Gard. Mag.*, vol. iv. p. 104.)

4317. *Cartwright*, at the end of October, takes full-grown plants of sea-kale, places them closely together in boxes of common earth, and sets them in a dark cellar out of the reach of frost. In six or eight weeks shoots will be ready to gather; and if three or four boxes follow in succession at intervals of a month, there will be a regular supply through the winter. (*Gard. Mag.*, vol. vii. p. 560.)

4318. *Gathering*. Remove a part of the earth, leaves, or whatever is employed in blanching; cut off the heads or shoots, and slip off the stalks of the leaves.

4319. *Produce*. From four to six heads, according to the size, tied together like asparagus, make a dish; and, *Maher* says, a blanching-pot which contains three plants, will afford a dish twice in a season. Hence, from sixty to a hundred pots will suffice for forcing sea-kale for a large family. From the above data, it is easy to form an estimate of the breadth of ground requisite for plantations of this plant to come in naturally.

4320. *To save seed*. Let a stool which has not been cut, run in spring; and seed will be produced on every stem.

SUBJECT. 3. *Artichoke*.—*Cynara Scolymus* L. (*Blackw.* t. 458.); *Syn. Polyp. Æqu.* L. and *Cynarocephala* J. *Artichaut*, Fr.; *Artichoke*, Ger.; *Artisjok*, Dutch; *Carciofo*, Ital.; and *Cinawco*, Span. and Port.

4321. *The artichoke* is a perennial, with numerous large pinnatifid leaves, three or four feet long, covered with an ash-coloured down; the mid-rib deeply channelled and furrowed. The time of flowering is August and September. It is a native of the south of Europe, and was introduced in England in 1548.

4322. *Use*. The flower-heads in an immature state contain the part used, which is the fleshy receptacle, commonly called the bottom, freed from the bristles and seed down, vulgarly called the *choke*, and the *anas* or lower part of the leaves of the calyx. In France, the bottoms are very commonly fried in paste, and they form a desirable ingredient in ragouts. They are occasionally used for pickling; and sometimes they are slowly dried and kept in bags for winter use. In France, the bottoms of young artichokes are frequently used in the raw state as a salad; thin slices are cut from the bottom with a scale or calyx leaf attached, by which the slice is lifted, and dipped in oil and vinegar before using. The *cœur* of artichokes, or the tender central leaf-stalk blanched, is by some thought preferable to that of the cardoon. The flowers possess the quality of coagulating milk, and have sometimes been used in the place of rennet.

4323. *Varieties*. There are three varieties cultivated:—

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| 1. <i>Conical</i> , French, or oval artichoke, with green head. The head is oval, the scales open, and not turned in at the top as in the globe sort. | 2. <i>Globe</i> , or largest, with dusky purplish head. The scales are turned in at top, and the receptacle more succulent than the other. | 3. <i>The dwarfed globe</i> ; a prolific variety, and valuable as occupying little room with its head. |
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4324. *Estimate of sorts*. The globe sort is generally preferred for the main crop; but the conical, or French, is generally considered as possessing more flavour, as the flower-heads are cut off for use when in an immature state; both sorts continue producing them from July to November.

4325. *Propagation*. This esculent is propagated by rooted suckers or young shoots, "rising in the spring from the roots of the old plants; these are fit to slip off for planting in March and April, when from five to ten inches high. Opening the ground to the old stool, slip them off clean to the root, leaving the three strongest on each mother-plant to advance for summer production. Those slipped off, prepare for planting, by pulling away some of the under and decayed or broken leaves, and by pruning any straggling long tops of the leaves remaining; also cut off casually hard or ragged parts at the bottom of the root. Then, having an open compartment, with a light rich soil of good depth, well dunged and dug, plant the sets by dibble, in rows four feet asunder, and two feet apart in each row. Give each plant some water: repeat this once or twice, if very dry weather, till they have taken root."

4326. *Subsequent culture*. "All spring and summer keep them clear from weeds by occasional hoeing between the plants: this, with regular waterings in the dry weather of summer, is all the culture which they require, till the season of production is terminated. They will produce some tolerable heads the same year, in August, and thence till November: next year they will head sooner, in full perfection. By having fresh stools planted every year or two, the old and new plantations together furnish a production of heads from June or July till November. Besides the main head, several smaller lateral heads generally spring from the sides of the stem in succession; but, in order to encourage the principal head to attain the full size, most of the side suckers should be detached in young growth, when their heads are the size of a large egg, which in that state are also prepared for some tables. As to the continuing main heads, permit them to have full growth till the scales begin to diverge considerably, but gather them before the flowers appear, cutting to each head part of the stalk. When the entire crop on a stem is taken, cut off the stem close to the ground, to give the plant more strength for new shoots" (*Abercrombie*). "To encourage the production of large main heads, some detach all the lateral heads in a young state. These are commonly in a fit state for eating raw, having attained about one third of their proper size; and they are for this purpose frequently sold in Covent Garden market, chiefly to foreigners. Another thing practised with the same view is the shortening the ends of the large leaves." (*Nell*, in *Ed. Encyc.*)

4327. *Nicot* mentions, that the strongest crops he ever saw, grew in rather a mossy earth that had been

trrenched fully a yard in depth, and had been well enriched with dung, and limed; and that the plants were generally covered before winter with a mixture of stable-litter and sea-weed. This last article, we believe, is one of the very best manures for artichokes. In no place is the plant to be seen in greater perfection than in gardens in the Orkney Islands; and we know that the luxuriance of the plants in these is to be ascribed to the liberal supply of sea-weed dug into the ground every autumn. It was long ago remarked by a horticultural writer, that "water drawn from ashes, or improved by any fixed salt, is very good for artichokes." (*Systeme Agricoltura*, 1688.)

4329. *Winter dressing.* Abercrombie says, "First cut down all the large leaves, but without hurting the small central ones, or the new shoots. Then dig the ground between and along each row; raising it gradually from both sides, sideways over the roots, and close about the plants. In rigorous frosty weather, cover also in the litter, a foot thick, and close about each plant."

4330. *Spring dressing.* In spring, the litter and earth being removed in March or April, according to the kind of season, the stocks are examined; and two or three of the strongest or best shoots being selected for growing, the rest are removed by pressure with the thumb, or by a knife, or wooden chisel. Those shoots or suckers are used for new plantations. Dig the whole ground level, loosening it close up to the crown of the roots of every plant.

4331. *Duration of the plants.* "Artichoke-plants continue productive for several years; but, every season, some well-rotted dung or fresh sea-weed should be delved into the ground at the winter dressing. It is certain, however, that after a few years, the plants begin to degenerate, the heads becoming smaller and less succulent. It is therefore a general rule not to keep an artichoke plantation beyond four or at most six years. Scarcely any kind of grub or wire-worm ever touches the roots of artichokes: they form, therefore, an excellent preparative for a crop of onions, shallots, or garlic. In many gardens, a small new plantation is formed every year; and in this way the artichoke season, which begins in June, is prolonged till November; those from the old stocks continuing till August, when those from the new stocks come in. If the last gathered be cut with the stems at full length, and if these be stuck among moist sand, the heads may be preserved a month longer."

4332. *Culture for producing the chard.* "When the artichoke compartment is to be shifted, and the old stocks are at any rate to be destroyed, the plants may be prepared, after midsummer, when the best crop of heads is over, for yielding chards against winter. The leaves are to be cut over within half a foot of the ground; the stems as low as possible. In September or October, when the new shoots or leaves are about two feet high, they are bound close with a wreath of hay or straw, and earth or litter is drawn round the stems of the plants. The blanching is perfected in a month or six weeks. If the chards are wished late in winter, the old plants may be dug up before frost sets in, and laid in sand in their blanched state; in this way they may be kept for several weeks."

4333. *Seed.* The heads, when suffered to remain ten days or a fortnight after the season of cutting, expand the calyx leaves, and display an aggregation of jagged purple florets, producing a fine appearance. When ripe seed is wanted, those heads in flower are to be bent down and retained in that position, so that the calyx may throw off the autumnal rains. In general, however, the seed is not perfected in our climate.

SUBJECT. 4. *Cardoon, or Chardon.* — *Cynara Cardunculus* L.; *Syn. Polyg. Æqu. L.* and *Cynarocéphala* J. *Cardon*, Fr. and Ital.; and *Kardonen*, Ger.

4334. *The cardoon* is a hardy perennial plant, a native of Candia, and introduced into England in 1658. It greatly resembles the artichoke, but is much taller; and becomes a truly gigantic herbaceous vegetable of four or five feet in height. It produces flowers like those of the artichoke in August and September.

4335. *Use.* The tender stalks of the inner leaves of the cardoon, rendered white and tender by earthing up, are used for stewing, and for soups and salads, in autumn and winter. When the plants are large, the inner leaves and stalks are rendered, by blanching, white, crisp, and tender, to the extent of two or three feet. The plant is not in much request, and is only cultivated in some particular family-gardens, and a few market-grounds. On the continent, it is in considerable repute, as indeed are many salad and potherbs, which are comparatively neglected in this country. In France, the flowers of the cardoon are gathered, and dried in the shade, and used instead of rennet to coagulate milk. (*Gerd. Mag.*, vol. iii. p. 47.)

4336. *Varieties.* These are —

1. *The common, Cardon plain inermis.*
2. *Spanish.*

3. *Cardoon of Tours, Cardon piquant.*
4. *Red cardoon, Cardon à côtes rouges.*

4337. *Estimate of sorts.* The Spanish cardoon is generally considered the best, from the size, succulence, and solidity of the midribs of its leaves. (*Lindley's Guide*, &c., p. 535.)

4338. *Propagation.* Though a perennial, it often dies in the winter, and therefore requires to be raised from seed almost every year; and for a bed four feet wide by eight feet, two ounces are sufficient. Formerly the plants were raised on hotbeds, and transplanted in May and June, but now the seed is generally sown where the plants are to remain, which is found to be far preferable. (*Ibid.*)

4339. *Soil.* The best soil for the cardoon is one that is light, deep, and not over rich.

4340. *Time of sowing.* The chief sowings are made in the spring; for a small early crop, in the last fortnight of March; and for the main crop, in the first or second week of April. Further, for a late full crop, you may sow towards the close of June.

4341. *Sowing for transplanting.* Sow in a bed of common light earth, moderately thin; and rake in the seed evenly. When the plants have risen, thin them to three or four inches' distance, to give them room to acquire stocky growth for transplanting. When they have been raised about eight weeks, transplant them; allotting an open compartment of well dug ground, and taking an opportunity of rain falling. Having lifted the plants, trim any long straggling tops of the leaves and fibres of the roots. Plant them either in the level ground, or in drills, or form a hollow patch for each plant; in all cases at four feet and a half distance. Thus you will have ample scope for their growth, and considerable space of ground to land them up. Give water at planting, and occasionally till they take root. In their advancing growth, hoe and loosen the ground about the plants, cutting down all weeds.

4342. *Sowing to remain.* A crop may be raised by sowing where the crops are to remain, not to have any check by removal. Sow in small hollow patches, at the distance specified above, two or three seeds in each. Thin the plants to one strongest in each patch.

4343. *Landing up.* When the plants are advanced in large growth, two or three feet high or more, in August, September, and October, proceed to land them up for blanching. First tie the leaves of each plant together with hay or straw bands; then digging and breaking the ground, earth up round each plant a foot or more high or two thirds of the stem. As the stems rise higher, tie and earth them up accordingly, giving them a final earthing in October.

4344. *Watering in autumn.* Regular waterings in the dry weather of August and September will prevent the plants from seedling.

4345. *Taking the crop.* When they are blanched a foot and a half or two feet in length, or more, they may be dug up as wanted, in September, October, and throughout winter.

4345. *Occasional shelter.* Protect the plants in severe frost with long litter, either as they stand, or turned down on one side.

4346. *To save seed.* Leave some full-grown plants in the spring, to shoot up in stalk. (*Abercrombie.*)

SUBSECT. 5. Rampion. — *Campánula Rapunculus* L. (*Eng. Bot.* 283.); *Pentándria Monog.* L. and *Campanulácea* B. P. *Raisonce*, Fr.; *Rapunzel*, Ger.; and *Rapenronzo*, Ital.

4347. The rampion is a biennial plant, a native of England, but rare. The root is long, white, and spindle-shaped; the lower leaves oval-lanceolate, and waved; the flower-stalk is about two feet high, and furnished with a panicle of blue flowers in July and August. The whole plant abounds with a milky juice.

4348. *Use.* The root is eaten raw like a radish, and has a pleasant nutty flavour; it is also sometimes cut into winter salads, and then the leaves as well as the root are used.

4349. *Culture.* The seed should be sown in the latter end of May, on a shady border of rich earth, not over stiff, the mould being made as firm as possible: it is better not to rake in the seed, which, being so very fine, may, by that operation, be buried too deep. If the sowing is earlier than May, the plants will sometimes run to flower in the autumn, and so become useless. Moderate waterings must be given as they come up, through a fine rose of a watering-pot, and it is necessary that they be kept, at all times, tolerably moist. When the plants are of sufficient size, they must be thinned out to the distance of three or four inches apart; those drawn will bear transplanting well, if put into a border similar to the seed-bed, but care must be taken to insert the roots straight into the earth, and not to press the mould too close; the roots which become forked are not so good as the straight ones. In November, the plants will be fit for use, and will continue so until April. (*Dickson*, in *Hort. Trans.*)

4350. *To save seed.* Leave or transplant some of the best plants in spring, and they will produce flowers and abundance of seed in autumn.

SUBSECT. 6. Hop. — *Humulus Lupulus* L. (*Eng. Bot.* 427.); *Dia'cia Pentánd.* L. and *Urticæa* J. *Houblon*, Fr.; *Hopfen*, Ger.; *Hoppe*, Dutch; *Lupolo*, Ital. and Port.; and *Hombrecillo*, Span.

4351. The hop is a perennial plant, a native of Britain, and well known as being cultivated for its flowers, which are used in preserving beer. It rises with a rough shoot, and rough tripartite leaves, the former climbing round whatever comes in its way to a considerable height, and producing flowers of a peculiar odour in July.

4352. *Use in cookery.* The young shoots, when they have risen three or four inches from the root, were formerly gathered and boiled like asparagus, to which they are very little inferior; these shoots are still occasionally to be found in the market, under the name of hop-tops. A pillow filled with hop-flowers is said to induce sleep, unattended with the bad effects of soporifics which require to be taken internally. In Worcestershire, beds are sometimes filled with them. (*See Encyc. of Cottage Arch.*, § 663.) In the Belgian markets, throughout the month of April, every vegetable stall contains hop-tops, perfectly white, like blanched chicory, or asparagus. They appear to be blanched by earthing up with sand. (*Gard. Mag.*, vol. II. p. 461.)

4353. *Culture.* The hop is propagated by dividing the roots in autumn or spring. It requires a deep rich soil, which should be frequently stirred, and kept quite free of weeds, and the plantation should be renewed every seven or ten years according to circumstances. In field culture, it is planted in hills or in groups of three or four plants, at six or eight feet centre from centre; but in growing a few for hop-tops, they may be planted in single rows at three feet distance, and one foot asunder in the row. In some seasons, the hops are terribly injured by a small jumping beetle called the flea; it appears at the same time as that infesting the turnip, and may be destroyed by the same means: the aphid or green fly frequently occasions incalculable damage, and its progress can only be checked by powdered lime applied with any good lime-duster.

SUBSECT. 7. Alisander, or Alexanders. (*fig.* 737.) — *Smýrniun Olusátrum* L. (*Eng. Bot.* 230.); *Pent. Dig.* L. and *Umbellifera*, J. *Maceron*, Fr.; *Smyrnerkrant*, Ger.; and *Macerone*, Ital.

4354. The alisander is a biennial plant, rising about two feet high, and flowering in May and June; the leaves are of a pale green colour, and the flowers yellowish. It grows naturally near the sea in several places, and may often be observed naturalized near old buildings.



ounce will be requisite. When the plants are well advanced in growth, earth them up several inches on each side the rows, to blanch the lower parts white, for use in summer, autumn, &c. You may likewise sow a moderate portion in August, to stand over the winter for a supply in spring and the early part of the summer, till the spring-sown plants come in.

4367. *To save seed.* The alisander produces nothing fit for the table after the second year; and as it ripens plenty of seed in autumn, it is proper to save some every year for sowing as above. (*Abercrombie.*)

SUBJECT. 8. Bladder-Campion. — *Silene inflata* H. K. (*Eng. Bot.* t. 164.), *Cucibabes* Bèhen L.; *Dec. Trig.* L. and *Caryophyllus* J.

4358. *The bladder-campion* is a perennial, growing naturally by the sides of corn-fields and pastures; and also on the sea-shore. The stems are smooth and erect, rising from a foot to eighteen inches high. The leaves are smooth, glaucous, and the flowers in nodding panicles.

4359. *Use.* Our kitchen-gardens, Bryant observes, scarcely afford a better-flavoured vegetable than the young shoots of this plant when boiled. They ought to be gathered when not above two inches long. The sprouts are to be nipped off when of a proper size, and the plants will produce a succession of fresh ones for at least two months.

4360. *Culture.* A similar culture to that given to the asparagus, or sea-kale, would answer, and probably highly improve this plant. Bryant says, its culture would well reward the gardener's trouble. Seeds may either be procured from wild plants; or the roots, which run very deep, may be transplanted into deep light soil.

SUBJECT. 9. Thistle. — *Cirsium* and *Onopordum* L. and *Cynarocephala* J.

4361. *There are two sorts of thistle*, which are, or were formerly, used as asparagus plants, viz. the *milk-thistle* and *cotton-thistle*. The milk-thistle, or our lady's thistle, is the *Cirsium Mariassus* L. (*Eng. Bot.* t. 976.) It is a biennial plant, a native of Britain, and found in churchyards and near ruined buildings. The plant rises from four to six feet high, furnished with large leaves, covered with an irregular network of beautiful milky veins.

4362. *Use.* When very young, the leaves are used as a spring salad; and blanched, are used in winter salads; stripped of their spines, they are sometimes boiled and used as greens; and the young stalks peeled, and soaked in water to extract a part of their bitterness, are said to be excellent. Early in the spring of the second year, the root is prepared like safford or skirret; the receptacle of the flower is pulpy, and eats like that of the artichoke.

4363. *Culture.* The seeds are sown in a good dry soil, early in February; and when the plants come up, they are thinned out to one foot and a half distance from one another. The intervals are to be kept free of weeds, and stirred occasionally during the summer; and in autumn the leaves are to be tied up like those of endive, and the earth drawn round to blanch them. The blanched herb being cut off for use during winter, the roots remain to be used in spring.

4364. *To save seed.* Leave one or two plants untied up the first season, and in the second they will produce flowers in July, and seed in August.

4365. *The cotton-thistle* is the *Onopordum Acanthium* L. (*Eng. Bot.* t. 977.) It is a biennial plant, indigenous in various parts of Britain, and remarkable for its large downy leaves and lofty stem, often rising ten feet high, and covering a circle of six or eight feet diameter.

4366. *Use and culture.* It was formerly used like the artichoke and cardoon; the receptacle and the tender blanched stalks, peeled and boiled, being the parts used. Its culture is the same as that of the cardoon.

SECT. VII. Acetarious Plants.

4367. *The acetarious vegetables* are a numerous class, of various culture, habits, and use, and of which but little that is general can be here observed, excepting that they are all articles of comparative luxury, or condiments, rather than food; and consequently, that though they occupy a moderate portion, perhaps, a fortieth of the kitchen-garden, yet, excepting a few of the sorts, as the lettuce, radish, cress, &c., they are seldom found in those of the cottager.

SUBJECT. 1. Lettuce. — *Lactuca sativa* L.; *Syng. Polyg. Equ.* L. and *Cichoraceæ* J. *Laitue*, Fr.; *Gartensalat*, Ger.; *Laten*, Dutch; *Lattuga*, Ital.; *Lechuga*, Span.; and *Alface*, Port.

4368. *The lettuce* is a hardy annual, introduced or cultivated in 1562, but from what country is unknown. Some authors consider it as merely a variety of one of the three native species; one of which, the *L. virôsa*, seems very likely to be the parent plant. The leaves are large, milky, frequently wrinkled, usually pale green, but varying much in form and colour in the different varieties. Though of but a few months' duration in the same individual, yet, in gardens, by successive sowings in spring, summer, and autumn, it is obtained most part of the year.

4369. *Use.* The use of lettuce as a cooling and agreeable salad is well known; it is also a useful ingredient in soups. It contains, like the other species of this genus, a quantity of opium juice, of a milky nature, from which, of late years, a medicine has been prepared by Dr. Duncan, senior, of Edinburgh, under the title of *Lactucarium*, and which he finds can be administered with effect in cases where opium is inadmissible. (*Caled. Hort. Mem.*, vol. i. p. 160. 259, vol. ii. p. 314, and vol. iv. p. 153.)

4370. *Varieties.* These are very numerous; and, from the names, many of them appear to have come to us from the Greek islands and the coast of the Levant. The best are —

Cabbage Lettuce. *Laitue romaine*, Fr.; *Kopfsalat*, Ger.; and *Kropfsalat*, Dutch.

1. *Touche Bell*, Capucine, Green ball, Ball, or Britton.

2. *Hardy Hammermill*, Hardy green, Early frame, Green Dutch, Grand admirable, Roman cabbage, Prussian.

3. *Large white cabbage*, Saxony, Union. (*Gardener's Magazine*, vol. ii. p. 436.)

4. *Brown Dutch*, with yellow seed.

5. *Brown Dutch*, with white seed.

6. *Steeles*, *Laitue de Malthe*, White Marseilles, Drumhead, i.e. lettuce of the United States. (*Gard. Mag.*, vol. ii. p. 106.)

7. *Brown Sicilian*.

Coe Lettuce. *Laitue Romaine*, Fr.; and *Romaine Salad*, Ger.

8. *Green*, Egyptian.

9. *Dwarf*, *Seeling*, Dwarf Netherland, Hardy black.

10. *Red*, *Laitue Romaine rouge d'Ivry*

11. *Spotted*, Aleppo, Bloody.

12. *Brown*, Bath, Hamburg.

13. *Florence*, Margarine, Golden.

14. *Paris*, Cove, Kensington, Large Brighton.

4571. *Estimate of sorts.* In their general growth, all the Cos lettuces are more or less upright, of an oblong shape. The cabbage lettuces are round-leaved, growing in a compact full head of squat form, close to the ground. Both have white, close, firm heads when in perfection; the varieties reach maturity from June till September. Meanwhile they are occasionally used in young open growth. In a very young state, the cabbage lettuces have a milder, more agreeable taste than the Cos; but when both classes are full grown, the flavour of the Cos is preferred for salads, while the cabbage kinds are more used for soups. The varieties of lettuce in cultivation are continually changing; hence those in fashion now (1833) are either different, or bear quite different names, to those which were most in demand when this *Encyclopædia* was first composed in 1830.

4572. *Propagation.* From seed; of which, for a seed-bed four feet wide by ten feet in length, a quarter of an ounce is sufficient, and will produce upwards of four hundred plants.

4573. *Soil and situation.* "All the sorts grow freely on any rich mellow soil, where the sub-soil is dry. For the most part, raise this vegetable as a principal crop, on beds set apart for it; and keep the varieties separate; but to multiply the supplies throughout summer, portions may be sown, thinly intermixed with principal crops of leeks, onions, carrot, and spinach, which will come off before the lettuces are full grown; also, with any young perennials which stand at wide intervals."

4574. *Times of sowing.* "To obtain a constant supply of good lettuces, it is advisable to sow every month, from February to July, for the main summer and autumn crops; and to sow distinct sorts in August and September, to produce late autumn and winter plants, of which a reserve is to stand for spring and early summer heading lettuces in the following year. For the first early crops, you may begin to sow at the end of January or beginning of February, if mild dry weather; or, more generally, later in February, or in the first week of March, on a sheltered south border. Some choice kinds may be sown in a frame, and forwarded by forcing. But for the main summer crops, sow in March and April, in any open situation. Follow with secondary sowings twice or oftener every month, from May till about the 7th of August; to provide for a succession through the summer, till October; as the plants sown early in the year, after heading fully, soon fly up to seed-stalks. The sowing in the midst of summer should be on shady borders. For a crop to come in during winter, stand over partially till spring, make two late sowings, in the third week of August and last fortnight of September."

4575. *Process in sowing.* "The ground should have been broken in the previous digging. Sow broadcast, moderately thin; rake in lightly, and very even."

4576. *Management of the summer crops.* "In the successive crops raised from the opening of spring till the close of summer, when the plants reach about two, three, or four inches' growth, they should be thinned; of those removed let a requisite number be planted out, from a foot to fifteen inches asunder, to remain for cabbaging. Such as continue in the seed-beds may be either gathered thinningly, in progressive stages, till the final reserve advance in close heading; or, as they increase in size, be planted out at the square distance specified above, especially those designed to stand till of stocky growth. In dry weather, water well at transplanting. Also weed and hoe the beds thinned, and water them, if necessary. In the first heading crop of Cos lettuces, when about three parts grown, and beginning to close the inner leaves, a number may be forwarded in cabbaging, by tying the leaves together, moderately close, with strings of bast; the remainder will head and whiten, in due time, without this assistance. Under the above culture, the successive crops will advance freely to a stocky growth; the earliest will cabbage moderately in May, but more fully in June, and in perfection in July and August."

4577. *Crop raised on heat.* "For an accelerated crop, some may be sown in the beginning or middle of February on a gentle hotbed. When the plants are one or two inches high, in March or April, prick a portion either into a warm border, if a mild season, and let them be shielded with mats, during nights and bad weather; or into a frame or slender hotbed, to bring them more forward. According to their progress, in April or May, transplant them into the open garden, from six to twelve inches asunder, to remain for heading."

4578. *Winter-standing crop.* "To have lettuces for drawing in minor growth for use, during winter, and to stand over in part for return in a mature state at spring and the beginning of summer, sow in the third week of August and in the first fortnight of September, the suitable hardy sorts. You may further, towards the close of September, sow a smaller portion on a warm border or sloping terrace; the plants to remain and take the chances of the weather: if these survive, they will be acceptable in the spring; some to thin out for use young, and the remainder to transplant for larger growth, early in summer, without running. The plants of the August and September sowing will soon appear, and will be ready to transplant the same season. Some may remain where sown, and a good portion may be transplanted to warm borders; a quantity of the choice Cos may be planted in beds of light dry earth, under frames or hand-lights, or under awnings, to have the protection of mats in cold nights, and partially on inclement days. Accordingly, about the middle or end of September, and in October, when the plants are two or three inches high, prick out a quantity (taking first those of the August sowing), from the seed-beds into prepared warming ground, in rows six inches by four apart. From such as remain in the seed-beds, you may conveniently thin out some young plants, for occasional use in the winter, but so as to leave a competency to remain for spring. As October advances, let some considerable quantity of choice lettuces of the September sowing be pricked out from the seed-bed into dry sheltered south borders, three or four inches asunder, wholly to continue for spring and early summer lettuces. Through October to the beginning of November, it is advisable to prick a quantity of the Cos kinds thickly, in frames or under hand-lights, to have protection during the night, and in all bad winter weather; or, if deficient in frames and glasses, you may transplant a part into a south border, to be arched over with hoops, and covered occasionally with mats; or, as the young plants are tender in winter, protection, afforded in some of these ways, will preserve them more effectually in rigorous weather. During the winter, let those in frames, and the others under occasional shelter, have the free air on all mild dry days; but let them be defended always at night with the glass, and with mats or other additional covering in intense frost or very rigorous weather: in the day-time, protect them from heavy rain, snow, and frost, but so as to admit the light; also, in a severe season, you may cover the choicer plants in the open borders with mats, light straw-litter, or fern; or occasionally with reed panels, or wattled hurdles, placed slantingly over to the wall. These coverings should be continued only in rigorous frosts, and removed when the weather is open. Then in the spring, about March or April, the plants in open borders, which have survived the winter, should be thinned, so as to stand from six to twelve inches apart; and those thinned out may be planted in another compartment at the same distance. At the same period, all the lettuces which have wintered under frames, hand-glasses, or mats, should be transplanted into the open garden. In their final stations, the whole will advance to useful sizes in the course of April, or will reach full growth with stocky hearts about May; thus the table may be supplied till the early crops of spring succeed. The plants first sown in the current year come to have good heads in June and July. Winter and early spring lettuce may be further accelerated by transplanting some of the strongest autumn-raised plants, immediately protected, as above, by frames or glasses, into hotbeds, or the borders of forcing-stoves: transplant the lettuces to be thus forced, with balls of earth about the roots, in December, January, and February. Those excited by heat in December, will have cabbaged hearts by the beginning of March."

4579. *Lettuces of different kinds* are sown by the French in drills, and out over when in the third or fourth leaf, as we do cresses and mustard. There are several varieties sold in the French seed-shops for this purpose, under the name of laitue épinard, laitue chiconnée, and laitue à couper; but it is evident any kind will do, and it is more than probable that the French sell any kind under these names. (*Gard Mag.*, vol. ii. p. 437.)

4380. *Excellent cabbage lettuce* is produced by the Dutch gardeners throughout the whole winter; the higher classes in Holland having it on their tables every day in the year. The following account of the practice is given by M. Lindegaard in the *Gardener's Magazine*.—A hotbed facing the south, which has done bearing, is chosen; the mould is well stirred, or turned over, and, if too heavy, about half the quantity is taken away, and good leaf-mould put in its place, the whole being well mixed together. Some gardeners take all the mould off the bed, and loosen the surface of the dung, to make the moisture in winter pass through it freely; in this case, when wanted for use, leaf-mould only is put on the bed, or in the frames; and as in Holland this kind of mould is generally much incorporated with sand, particularly round Haarlem, it is found very suitable for the growth of cabbage lettuces. The sort of cabbage lettuce in use when M. Lindegaard was in Holland, was termed *klein groen* (small green), with black seed; but of late years another more palatable sort, *klein geel* (small white), with white seed, has been thought preferable. The seed is sown very thin, in the first days of September, on a melon-bed which has done bearing; and watering it with a fine syringe, if the weather continue dry, must not be neglected. When the plants have produced the fourth leaf, they are fit for transplanting; the bed, having been previously prepared by digging and raking, is now marked so that one plant will be placed under every frame or square of glass in the sash. To plant a reserve, or superfluous row, at top and bottom, is very advisable, lest any of the main plants should be eaten by the wire-worm, which is often the case. After planting, the lights are immediately put on, and no air given during the first two days; as the plants begin to grow, air is admitted into the frames, as well at the bottom as at the top (about three inches), by putting two bricks under each corner of every sash; and in this manner, the frames may remain open day and night for some time. At this period it will be necessary to search the beds every morning, if the wire-worms have made their appearance; and where the plant is eaten, you will be pretty sure to find a worm under the root, or near it in the soil, sometimes an inch deep or so: this is to be continued early in the morning every day till the insects disappear. In October, when the air grows cold, and the heads of the cabbage lettuce begin to get close or hard, air is no longer given, and the lights are entirely closed, but the leaves must be prevented from touching the glass, as if they do, the least unexpected frost will hurt their edges, and the consequence will be that the plants will rot. In this case, the frame will have to be lifted every now and then. When the nightly frosts commence, generally in October, great attention must be paid to covering the beds with a single layer of best mats; yet too much covering is to be avoided before the plants are grown to perfect heads. Watering is quite out of the question, and even very hurtful; care, indeed, should be taken to prevent moisture as much as possible. Cover more or less according to the severity of the weather, and keep the lights uncovered in the day, whenever and as much as the weather will permit. By this treatment the Dutch gardeners produce cabbage lettuces during the whole winter, till the month of April, when they are succeeded by the early forced. M. Lindegaard had followed this method for forty-five successive years in the royal gardens at Rosenburgh, when he wrote the above paper in 1829. (See *Gard. Mag.*, vol. vi. p. 391.) The same mode of growing lettuces through the winter was practised for many years at Longleat, by the late Mr. Rutger, who was thirty years gardener there. Mr. Rutger had been taught the practice in the neighbourhood of Amsterdam, where he spent five years in acquiring a knowledge of Dutch gardening, and especially of their mode of forcing in frames and pits. A very distinct account of Mr. Rutger's practice at Longleat, well deserving the attention of all who intend to grow lettuce in this way in Britain, is given by his son, Mr. T. Rutger, in the *Gardener's Magazine*, vol. viii. p. 174. The same method of procuring winter lettuces is now practised at Hyland, in Essex; and a brief account of it, which we drew up in 1837, will be found in the *Gard. Mag.*, vol. xii. p. 368. The three accounts agree in every essential particular. We are informed by Mr. Main, that the Dutch practice in the culture of winter lettuce was successfully carried on about the commencement of the present century in the gardens of Bulstrode Park.

4381. *To save seed.* "Leave or transplant either some of the early winter-standing plants, in March or April, or of the forward spring sown crops, in May or beginning of June, fifteen inches asunder. They will produce ripe seed in August and September." (*Abricrombie*) In Germany they do not wait till the spike of flowers has ripened all the seeds, but cut it over on the first appearance of maturity, and lay it on the ground, after which all the forets ripen their seeds about the same time. This is the case with most syngenesious plants. (*Gard. Mag.*, vol. i. p. 81.)

SUSCEPT. 2. Endive.—*Cichorium Endivia* L.; *Syng. Polyg. Ægu. L.* and *Cichoridees* J. *Chicorée des Jardins*, Fr.; *Endivie*, Ger. and Dutch; *Endivia*, Ital.; and *Endibia*, Span.

4382. *The endive* is a hardy annual, a native of China and Japan, and introduced in 1548. The root-leaves are numerous, large, sinuate, toothed, and smooth; the stem rises about two feet high, is branched, and produces pale blue flowers in July and August.

4383. *Use.* It is cultivated for the stocky head of leaves, which, after being blanched to take away the bitter taste, are used in salads and stews in autumn, winter, and spring. It is in great repute in England, and still more so on the continent.

4384. *The varieties* are included in two classes: the Batavian or broad-leaved, *scarolois*, Fr.; *bretschitziger endivie*, Ger.; and the curled-leaved, *chicorée*, Fr.; *endivie-cichorie*, Ger. There are five distinct varieties in the first division, and twelve in the second, but only one or two of them are to be had in English seed-shops. (See *London Horticultural Transactions*, vol. vi. p. 153, or *Gardener's Magazine*, vol. i. p. 418.)

4385. *Estimate of sorts.* "All the sorts are eligible for culture; but allot, principally, the green curled for the main crops of autumn and winter endive; this being of the most stocky full growth, and hardest to stand severe weather. As to the others, allot a smaller portion of the white curled for early summer and autumn use: of the broad-leaved kind, provide a moderate crop for autumn, till November or December; being by some esteemed preferable for stews and soups, though not much used in salads." According to Matthews, the best broad-leaved endive is the small Batavian, and the best curled, the small green. (*Gard. Mag.*, vol. i. p. 118.)

4386. *Propagation.* All the varieties are raised from seed, of which, for a seed-bed four feet wide by ten in length, half an ounce is sufficient.

4387. *Time of sowing.* The proper seasons are, May for a smaller early crop; and principally June and July to the beginning of August, for full and succession crops, all autumn and winter, till the following spring. For, if sown earlier than the middle of May or beginning of June, they will mostly run to stalk the same season, before attaining mature useful growth. If any are required for early young summer endive, sow only a small portion of the white curled in April or May, as the plants will soon run to seed. In the middle or towards the end of May, you may begin sowing moderately of the different sorts; but do not sow fully till nearly the middle of June, that the plants may stand without running the same year. About the 15th and 25th of that month, also at the beginning and middle of July, sow the main and succession crops for autumn and winter; and a finer smaller sowing about the beginning of August, for late supplies in the end of winter and following spring.

4388. *Culture of the seed-bed.* Sow each sort separately in beds of rich mellow earth, in an open situation; scattering the seeds thinly, and rake in the seed. When the plants are up an inch or two in growth, thin them moderately where in clusters, that they may have room to grow stronger and stocky

for transplanting. But if a portion are sown in soil of sufficient depth, and thinned to the distances mentioned under transplanting, instead of being moved, they may be expected to yield heads of the finest kind, under the same culture as is given to the others.

4393. *Transplanting.* As the plants attain a sufficient growth, being from four to six inches high, or in a month or five weeks from the time of sowing, proceed to transplant the successive crops. The ground should be light and rich on a dry sub-soil. Dig it a full spit deep; set in shallow trenches, or drills the depth of a hoe, endive blanches with less trouble than if inserted on a level surface. The lines may be fifteen inches asunder; the plants ten or twelve inches distant in the line. Drawing the strongest first, plant out portions from June till October; but the principal removals will fall in August, in which months three different plantings may be made for succession; also for a general winter crop, at the beginning of September. While the plants are in hand, trim the extremities of the leaves, and shorten the top roots a little. Water at planting; and moderately afterwards once in two days, if the weather be dry, till the plants take root. At the end of September, and in October, likewise plant some in a warm dry border, to stand the winter more effectually. Also, in the last fortnight of October or beginning of November, it would be proper to insert some stout plants thickly on a bank of dry light soil, raised a foot or two behind, sloping to the south. Thus they will remain drier in winter, and will be preserved more securely from rotting in that season. The bed might be also defended in severe weather with frames and glasses, or with an occasional awning of mats or sail-cloth.

4390. *Grassage*, of Kingsland, transplants in October, on sloping banks, at the base of hedges or walls; or if these are not to be had, he forms banks with a slope of 45° facing the south. The width of the face of the bank measures five feet; along it he places four rows of panicles stuck more than half way into the earth, with the convex side to the sun. A plant of endive is thus placed opposite the concave side of each tile, the latter serving to keep its leaves dry. In winter these banks are covered with dippings of hedges or straw to keep them dry, and to exclude the frost.

4391. *Blanching.* As the transplanted crops advance to full growth, stocky and full in the heart, some should have the leaves tied up every week or fortnight, to blanch or whiten, and to render them tender, crisp, and mild-tasted. Perform this in dry days; and in winter, when the weather is dry without frost. Using strings of fresh bast, or small osier twigs, tie the leaves regularly together a little above the middle, moderately close. If the soil be light and dry, earth them up half way; but if moist, merely tie them. The two curled sorts, if neatly earthed up, will branch pretty well without being tied. The Batavian, from its loftier, looser growth, in every case hearts and blanches better with a bandage. The blanching will be completed sometimes in a week, when the weather is hot and dry; at others, it may take a fortnight or three weeks; after which the endive should be taken up for use, or it will soon rot in six days or less, especially if much rain fall. To save the trouble of tying, this excellent is also occasionally blanched by setting up flat tiles or boards on each side of the plants, which, resting against others in an angular form, and confined with earth, exclude the light. Further, endive may be blanched under garden-pots, or blanching-pots, in the manner of sea-kale. In the heat of summer and autumn, tying up is best; but in wet or cold weather, to cover the plants preserves while it blanches them.

4392. *Occasional shelter.* At the approach of severe frost, cover some thickly with straw-litter. Also plunge a portion into a raised bank of light dry earth, under a glass case, or covered shed, open to the south. Protect with litter in rigorous weather; but uncover, and give plenty of air on mild days.

4393. *To save seed.* "Allot some of the strongest old plants in February or March, if any remain; otherwise, sow seed in March or April, and transplant or thin the plants to twelve or fifteen inches' distance. They will shoot, and the seed ripen in autumn."

SUBJECT. 3. Succory, or Wild Endive. — *Cichorium Intybus* L. (*Eng. Bot.* 539.); *Syn-genea Polygãmia Equidlis* L. and *Cichoraceæ* J. *Chicorée* Sauvage, Fr.; *Gemeine Chicorie*, Ger.; *Suikeret*, Dutch; *Cicoria*, Ital.; and *Achicoria*, Span.

4394. *The succory, or chicory*, is a hardy perennial not uncommon in calcareous wastes and by road sides. The whole plant greatly resembles the common broad-leaved endive; it is but little cultivated in gardens in this country, though it is in much repute on the continent, and especially in Italy. It has been grown in the fields, in France and England, as a fodder for cattle, when coming into flower; and is at present much cultivated in Holland and Flanders, for the roots, which are dried, and ground, and used on almost every part of the continent, partly along with, and partly as a substitute for coffee, by those who cannot afford to use that article genuine; but Miller and other English authors on horticulture do not notice it as an article for the garden.

4395. *Use.* The leaves are blanched and used as those of endive, or during winter forced in the dark, and so blanched. In this state it is the *Barbe de Capucin* of the French. It is also sown thick in frames, and in the open air, and when it has produced three or four rough leaves, is cut as a small salad. When lettuce or garden-endive is scarce, chicory can always be commanded as salading by those who possess any of the most ordinary means of forcing. The roots cut in pieces, dried and ground, afford a powder, which Dr. Howison (*Caled. Hort. Mem.*, vol. iv. p. 132.) thinks preferable to that of coffee; and Dr. Duncan (*Disc. to Caled. H. S.* 1850.) is of opinion that the plant might be cultivated with great national advantages, as a substitute for that exotic berry. About Bruges, the roots are scraped and boiled, and eaten along with potatoes, or with a sauce of butter and vinegar. The market at Brussels is supplied with blanched chicory from the latter end of March till lettuce comes in from the open garden.

4396. *Varieties.* The French have the *common large-leaved*, the *chicorée à navet*, or *cafi-chicorée*, with large white fleshy roots, and the *variegated* chicory.

4397. *Culture.* Isaac Oldacre, an excellent practical gardener, who experienced the advantages of cultivating this plant in the Imperial gardens near Petersburg, gives the following directions—"It should be sown in the end of June or beginning of July, on a rich piece of ground, broad-cast, in the same manner as endive; when the leaves begin to cover the ground, thin out the plants, leaving those that remain on the beds from three to four inches apart; those pulled out may be planted into other beds, at the same distance as those which are left to remain; keep them clear from weeds, and if the leaves grow very strong, and shade the roots much, cut them off within one inch of the ground. The end of September or beginning of October is the proper time to shift the roots; the leaves should be first cut off with care, so as not to destroy the hearts of the plants; then dig up the roots, shorten them, and plant them in pots or portable boxes, with a dibble, very close together, in rich mould; give them water when dry, and shelter them in severe frosts by a light covering of litter. After they are well rooted, the pots or boxes, as wanted, are to be removed into the mushroom house or cellar, where they must be entirely excluded from light, in order to blanch the leaves, which will be effected in six or seven days. Succory will thrive in a heat of 60°, but it is best to keep it in a lower temperature. If the roots are strong, each pot or box will bear cutting twice, after which they should be removed, and changed for the succession, as the leaves of the future growth become bitter. (*Hort. Trans.*, vol. iii. p. 139.)

4398. *Crop in cellars.* On the continent, the roots are taken up on the approach of winter, and stacked in cellars in alternate layers of sand, so as to form ridges with the crowns of the plants on the surface of the ridge. Here, if the frost be excluded, they soon send out leaves in such abundance as to afford a

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supply of salad during winter. If light is excluded, the leaves are perfectly blanched, and in this state are known under the name of *Herbs de Capucins*. On ship-board it is customary to use a barrel of sand with numerous holes (fig. 738.), or a hamper, for the same purpose.

4399. *Early spring crop in the Netherlands.* Great quantities of the blanched leaves of chicory (*Cichorium Intybus*), are sold in the markets at the Netherlands very early in the spring, and supply a grateful salad long before lettuces are to be had. The roots (which are of the same shape and size as a carrot, and are extensively employed, when dried, as a substitute for coffee) are taken up in autumn and placed in a bed, almost as closely as they can stand together, with merely a little earth to fill up the vacuities; experience having seemingly taught the Belgian gardener the important fact theoretically pointed out by Mr. Knight, that the new annual supply of leaves of plants of this description is derived from the stock of sap elaborated in the preceding year, and requires nothing from the soil but moisture. Upon the bed of roots, thus closely packed together and defended from frost in winter, a slight hotbed of manure is laid in spring, with six or eight inches of earth interposed. Into this earth the leaves shoot, struggling for light and air; they thus become perfectly blanched and crisp, and lose most of their natural bitterness. The adoption of this plan of cultivating chicory, the large perennial root of which so peculiarly fits it for this purpose, might be recommended to the gardeners in many great towns in the north of England, where any thing in the shape of a salad is rarely seen until the end of April, and then only tough green lettuces, far more bitter than this luxuriantly white chicory. In the Netherlands, it is in profusion from the latter end of March. An acre of chicory might be grown on cheap land, five or ten miles distant from the place of consumption, the roots brought by waggons in autumn, and planted in a few hundred square feet of the market gardener's more valuable ground, which they would occupy only from October to April, at which time it is not otherwise wanted; and it might thus be profitably cultivated so as to be sold, as in the Netherlands, at twopence for a bundle sufficient to fill a salad bowl, and be within the reach of the poorest individual. (*Gard. Mag.*, vol. ii. p. 460.)

4400. *To save seed.* Proceed as directed for endive.

SUBJECT. 4. Dandelion. — *Leontodon Taraxacum* L. (*Eng. Bot.*); *Syngen. Polygãmia Equ. L.* and *Cichorãceæ J.* *Dents de Lion*, or *Pisse-en-lit*, Fr.; *Lowenzahn*, Ger.; *Paardbloem*, Dutch; *Piscia in letto*, Ital.; and *Amargon*, Span.

4401. *The dandelion* is a hardy perennial, a native of Britain, well known among gardeners as a troublesome weed, but which may also be used as a salad, and as a substitute for coffee.

4402. *Use.* The leaves in early spring, when just unfolding, afford a very good ingredient in salads. The French sometimes eat the young roots, and the etiolated leaves, with thin slices of bread and butter. When blanched, the leaves considerably resemble those of endive in taste. The root is considered an equally good substitute for coffee as chicory, and may, like that plant, be stored in cellars, barrels, or beds as above (4398.), for producing winter salad. (*Caled. Hort. Mem.*, vol. iv. p. 138.)

4403. *Culture.* Though regularly produced in the London market, it is seldom or never cultivated, being generally to be found in sufficient luxuriance by the sides of hedges and dry ditches. It might easily be propagated either by seeds or roots; and, if introduced as a garden-plant, should have a rich deep soil, and be carefully tied up, and earthed round, to blanch it effectually. Cut off all the flowers as they appear, to prevent the dispersion of the seed, and the weakening of the plant. When lettuce and endive are scarce, the dandelion might be dug up from road sides or pastures, in winter, and forced in pots, like succory.

SUBJECT. 5. Celery. — *Apium graveolens* L. (*Eng. Bot.* 1210.); *Pentând. Dig. L.* and *Umbelliferae J.* *Celeri*, Fr.; *Sellerie*, Ger.; *Sellery*, Dutch; *Appio*, Ital.; and *Apio hortense*, Span.

4404. *The celery* is a hardy biennial plant, a native of Britain, and known in its wild state by the name of smallage. It is frequent by the sides of ditches, and near the sea, where it rises with wedge-shaped leaves, and a furrowed stalk producing greenish flowers in August. The whole plant has a rank coarse taste, and the effects of cultivation in producing from it the mild sweet stalks of celery are not a little remarkable. A head of celery, we are informed (*Caled. Hort. Mem.*, vol. ii. p. 297.), was dug up on the 4th of October, 1815, at Longford, near Manchester, which weighed 9 lbs. when washed, with the roots and leaves still attached to it, and measured four feet six inches in height. It was of a red sort, perfectly solid, crisp, and firm, and remarkably well flavoured.

4405. *Use.* The blanched leaf-stalks are used raw, as a salad, from August till March; they are also stewed, and put in soups. In Italy, the unblanched leaves are used for soups; and when neither the blunched nor the green leaves can be had, the seeds, bruised, form a good substitute. The root only of the variety called the celeriac is used, chiefly in soup. A cheap and elegant mode of dressing the celeriac as a dish, is described, *Gard. Mag.*, vol. v. p. 364.

4406. *Varieties.* These are —

1. *The early red solid.*
2. *The white solid.*
3. *North's upright*, or Italian; decidedly the best variety in cultivation. (See *Gard. Mag.*, vol. ix.)

4. *The turnip-rooted*, or celeriac, the celeri-rare of the French, and the *Asmet-cellerie* of the Germans. This is harder than the other kinds, and will continue longer in spring. It is

grown to a large size in the neighbourhood of Hamburg, and sometimes imported for the London market.

4407. *Estimate of sorts.* The first two sorts are preferable for general culture. The red variety is rather coarse for salads, but it is hardy to stand the winter, and well adapted for soups and stews. The turnip-rooted is cultivated on account of its root, which is fit for use in September and October, and may be preserved in sand through the winter.

4408. *Propagation.* All the sorts are raised from seed; and half an ounce is reckoned sufficient for a seed-bed four feet and a half wide by ten feet in length, of the upright sorts; but for celeriac, a quarter of an ounce will be enough for a bed four feet square.

4408. *Soil.* Celery delights in a soil rather moist, rich in vegetable mould, but not rank from raw unrotted dung.

4410. *Times of sowing.* The most forward crop is slightly forced; any of the varieties may be sown in the spring, in the open garden, at two or three different times, from the 21st of March till the first week in May; but the principal sowing should be made in the first fortnight of April.

4411. *Early crop.* "For early summer and autumn celery, sow a small portion towards the end of February, in a moderate hotbed. When the young plants are about two inches high, prick out some into a warm border, two or three inches apart, or rather into a second slight hotbed, if before the 21st of March, as well to protect the plants as to expedite their growth for final planting. As soon as the leaves are six inches high, in May or June, transplant them into trenches for blanching, as directed below for the main crops, but as these early sown plants will not continue long in full growth, before many of them will pipe or run, you should plant only a moderate crop, for a temporary supply: when they are advanced in the trenches from eight to twelve inches in growth, begin to earth them up several inches on both sides each row: continue earthing up by degrees as they rise higher, till they are whitened from six to twelve inches in length; when they may be dugged up as wanted."

4412. *Main crops.* "To raise the main crops for summer, autumn, and winter, make a considerable sowing at the commencement of April. Sow in beds of light mellow earth, and rake in the seed lightly and regularly. In very dry weather, give moderate watering both before and after the plants come up. When they are two, three, or four inches high, thin the seed-bed, and prick out a quantity at successive times into intermediate beds, three or four inches asunder. Water those removed, and till they have struck."

4413. *Judd* sows about the middle of January in a warm situation, on very rich ground, protecting it by mats at night. When the plants are from two to three inches high, he pricks out into a nursery-bed, thinning the plants, as he draws them, in water, so as they may remain moist while out of ground. The plants remain in the nursery-bed till they become "very strong." (*Hort. Trans.*, vol. ii.)

4414. *Walker*, of Longford, near Manchester, grows the red celery; sows for the early crop about the 1st of March, and for the late crop about the 1st of April. "The seed-bed is formed of fresh, dark, loamy soil, mixed with old rotten dung, half and half, and placed on a hotbed. The nursery or transplanting bed is formed with old hotbed dung, very well broken, laid six or seven inches thick, on a piece of ground which has lain some time undisturbed, or has been made hard by compression. The situation should be sunny. The plants are set six inches apart in the dung, without soil, and covered with hand-glasses. They are watered well when planted, and frequently afterwards. By hardening the soil under the dung in which the plants are set, the root is formed into a brush of fibres; and by thus preventing the pushing of a tap-root, the plant never runs to seed before the following spring." (*Caled. Hort. Mem.*, vol. ii.)

4415. *Transferring into trenches.* "When either the plants left in the seed-bed, or those removed, are from six to twelve inches high, or when the latter have acquired a stocky growth by four or five weeks' nurture in the intermediate bed, transplant them into trenches for blanching. For this purpose allot an open compartment. Mark out the trenches a foot wide, and from three feet to three and a half distance; dig out each trench lengthwise, a spade in width, and a light spit deep, that is, six or eight inches. Lay the excavated earth smoothly in the intervals, making the edges of the trenches equally full and straight; also loosen the bottom moderately, in a level order, to receive the plants. Before inserting them, it would essentially strengthen the soil to apply some good rotten dung in each trench two or three inches thick, and let it be dug in at the bottom regularly, a moderate depth. Then, having lifted the plants, just trim any long straggling tops of the leaves and fibres of the roots; also clip off side shoots; plant a single row along the bottom of each trench, four or five inches apart. Give a good watering directly; and occasionally after, if the weather be dry, till the plants take root, and show a renewed growth. Continue planting out a monthly succession in June, July, August, and September; thus providing for a supply from July and August of the present summer throughout the course of autumn and winter, till May in the following spring."

4416. *Anderson* grows his celery in trenches six feet wide and one foot deep, inserting the plants in rows across the trenches. This method is generally practised by market-gardeners in the neighbourhood of Edinburgh, because it enables them to grow a number of plants in a small space, and when the soil is sufficiently rich, they attain an average degree of size and succulency. (*Gard. Mag.*, vol. i. p. 170.)

4417. *Gladston* grows his celery in trenches, the bottom and sides of which are made water-tight, and which are filled with a puddle of clayey loam, common earth, and rotten dung, to the height of two feet. Above this a stratum of rich garden soil is placed, in which the plants are inserted, and earthed up in the usual manner. In fifteen or twenty days after planting the roots of the celery will have reached to the watery puddle, when their growth will be accelerated in an extraordinary degree, and the hue of the leaves changed to a deep, dark green, almost black. The plants being earthed up in the usual manner, the edible part is as completely blanched as in the ordinary mode of growing. The details of this manner of cultivating celery are well worth attention. (See *Gard. Mag.*, vol. ii. p. 157.) Doubts have been thrown as to the wholesomeness of celery so grown, in *Gard. Mag.*, vol. vi. p. 232, and vol. vii. p. 594.

4418. *Roger* plants potatoes at a greater distance than usual, and, when they are earthed up for the last time, the hollow formed between the rows is used as a trench for the celery plants. The advantages of this plan, which Mr. Roger has practised in his garden near Kilmarnock for several years, are as follows: 1. No ground is lost by the celery crop; 2. No labour is required in making the trench; 3. The celery plants thrive better at first, by being partly shaded by the potatoes; and, 4. The celery can be partly earthed up when digging the potatoes, without any additional labour. (*Gard. Mag.*, vol. vi. p. 654.)

4419. *Judd* prepares his ground for transplanting, by trenching it two spades deep, mixing with it in the operation a good dressing of well-reduced dung from the old forcing-beds. He says, "I give it a second trenching, that the dung may be the better incorporated with the mould, and then leave it in as rough a state as possible, till my plants are ready to be put out. In the ground thus prepared, I form trenches twenty inches wide, and six inches deep, at six feet distance from each other, measuring from the centre of each trench. Before planting, I reduce the depth of the trenches to three inches, by digging in sufficient dung to fill them so much up. At the time of planting, if the weather be dry, the trenches are well watered in the morning, and the plants are put in, six inches apart, in the row, in the evening, care being taken by the mode above mentioned, to keep the fibres quite wet whilst out of ground; as they are drawn from the nursery-bed, the plants are dressed for planting, and then laid regularly in the garden-pans. The trenches in which my rows of celery are planted, being so very shallow, the roots of the plants grow nearly on a level with the surface of the ground: this I consider particularly advantageous, for as considerable cavities are necessarily formed on each side when the moulding takes place, all injury from stagnant water or excess of moisture is prevented. The trenches, when planted, are watered as may be required." He adds, "that he prepares his ground for celery during the winter, and avoids putting much of a crop in the space between the trenches, especially one that grows tall, as he finds celery does best, when it grows as open as possible."

4420. *Walker* makes his trenches at four feet distance, and eighteen inches wide, twelve deep, and filled nine inches with a compost of fresh strong soil, and well-rotted dung; three fourths dung, and one fourth soil. Old hotbed dung is the best. The plants should be taken up with as much dung as will conveniently adhere to the roots, and the side shoots are removed from the stems; they are then set with the hand at nine or ten inches apart in the centre of each trench; it is necessary to water well until they are ready to be earthed up, but not afterwards.

4421. *Landing up.* As the plants in the trenches rise from ten to fifteen inches high, Abercrombie

begins to land up for blanching, observing "to trim in the earth gently, when first raised to the stems, with a hoe or spade, but mostly the latter. When the plants are of more advanced growth, earth them up equally on both sides each row, three, four, or five inches, according to the strength and height of the different crops. Repeat this once a week or fortnight, till by degrees they are landed up from twelve inches to two feet, in order to blanch them of some considerable length. Continue thus landing up the different crops from July till February. As the autumnal and main winter crops attain full growth, give them a final landing up near the tops, which will increase the length of the blanching part, and also protect the latter crops more effectually during the winter."

4492. *Judd*, in landing up celery, does "not think it well to load the plants with too much mould at first; the two first mouldings, therefore, are done very sparingly, and only with the common draw-hoe, forming a ridge on each side of the row, and leaving the plants in a hollow, to receive the full benefit of the rain and waterings. When the plants are strong enough to bear six inches' height of mould, the moulding is done with the spade, taking care to leave basis enough to support the mass of mould which will ultimately be used in the ridge, and still keeping for some time the plants in a hollow, as before directed. The process of moulding is continued through the autumn, gradually diminishing the breadth of the top, until at last it is drawn to as sharp a ridge as possible to stand the winter. In the operation of moulding it is necessary, in order to prevent the earth from falling into the heart of the plant, to keep the outer leaves as close together as possible; for this purpose, before I begin the moulding, I take long strands of bast matting, tied together till of sufficient length to answer for an entire row; and I fasten this string to the first plant in the row, then pass it to the next plant, giving it one twist round the leaves, and so on, till I reach the other end, where it is again fastened; when the moulding is finished, the string is easily unravelled, by beginning to untwist it at the end where it was last fastened."

4493. *Walker* "having removed the lateral shoots, the leaves of each plant being held together with one hand, draws the pulverized soil round with the other, taking care not to earth up too high at once, nor too close. The heart should always be left quite free. This may be repeated about once a fortnight, until the plants are ready for use."

4494. *Late crop*. "For late spring celery, to stand till the end of May in the returning spring, without running considerably, it is expedient to make a small late sowing at the commencement of May. The plants when six weeks old may be pricked on intermediate beds in rows, six inches by three asunder, to remain till September or October; then transplant them into moderate trenches; as they advance in growth, earth them up a little in winter; and, finally, in the spring, in February or March." Some allow the plants to remain in the spring seed-bed, till they are wanted for the late plantation, and find that they do nearly as well as a second sowing. (See *Gard. Mag.*, vol. iii. p. 174.)

4495. *Occasional shelter*. "On the approach of frost, take up a part of the crop, and lay it by under dry sand for winter use. To preserve the plants left in the bed, lay some long dry litter over the tops; which remove in every interval of mild weather." It is a common complaint that very fine-looking celery is often found to be rotten at the base of the leaf-stalks; the fact being, that when celery is full grown, and the blanching completed, it begins to decay, and will not keep good in the ground for more than a month at most. Some, therefore, take up and preserve in dry sand; but in that situation it soon becomes tough and dry. The best mode seems to be that of forming successive plantations."

4496. *Taking the crop*. "It is best to begin at one end of a row, and dig clean down to the roots, which then loosen with a spade, that they may be drawn up entire without breaking the stalks."

4497. *Cultivation of celeriac*. "Celeriac," Mr. Ellis, a first-rate gardener, observes, "is cultivated with greater ease and at less expense than the common celery, and it may be used in the kitchen for seven or eight months in succession." (*Gard. Mag.*, vol. v. p. 364.) The times of sowing are the same as for the other sorts. Celeriac requires a rich well-manured soil, and, according to an account communicated by Lord Stanhope (*Hort. Trazas*, vol. iii.), the plants are raised on a hotbed under glass, and transplanted when two or three inches high to another hotbed, and set one inch and a half apart. "In the beginning or middle of June they are transplanted into a flat bed in the open air, at the distance of fifteen inches from each other, and not in trenches like other celery. They must be abundantly watered as soon as they are set out, and the watering must be repeated every other day, or, if the weather should be warm, every day. As they increase in size, they will require a greater quantity of water, and they must be occasionally hoed. The roots will be fit for use in September or October." This variety of celery has a continual tendency to revert from the knob-rooted form to that which is natural to it, and hence, like the turnips and other knob-rooted plants of culture, it will not attain any large size if much earthed up. Still, the celery, to be eatable, requires to be blanched, and therefore must be earthed up to a certain extent, but the less the better. (See *Gard. Mag.*, vol. ii. p. 415.)

4498. *To save seed*. "Either leave some established plants in the spring where growing; or in February or March dig up a competent number, cut down the top leaves, and set the plants in the ground, full two feet asunder. They will produce seed in autumn." Walker grows only red celery; and in preparing plants for seed, chooses the most solid, of the reddest colour, and the smallest size. When taken out of the transplanting bed, the lateral shoots being removed, they should be planted in a dry warm situation, where the seed will ripen well.

4499. *Diseases, insects, &c.* Celery is liable to be eaten by a maggot which breeds in the leaves, but of what insect appears to be unknown. (*Gard. Mag.*, vol. iv. p. 189, and vol. v. p. 238.) It is also liable to the attacks of the parasitical fungus, *Puccinia Heraclei*. When either of these evils occur, there seems nothing left for the gardener to do but to destroy the plants, or to remove them altogether from the garden, and make a new plantation in a fresh soil. Possibly tobacco water might check the maggot; and at all events, if it has not gone too far before it is discovered, it may be removed by hand. (*Ibid.*, vol. v. p. 107, and vol. ix. p. 328.)

SUBSECT. 6. *Mustard*. — *Sinapis* L.; *Tetradymia Siliquosa* L. and *Crucifera* J. *Montarde*, Fr.; *Senf*, Ger.; *Mosterd*, Dutch; *Senapa*, Ital.; and *Mostaza*, Span.

4430. *Of mustard* there are two species in cultivation, the black and the white; annuals, and natives of Britain. The white mustard is the *Sinapis alba* L. (*Eng. Bot.* t. 1677.) It grows naturally in corn-fields, and flowers in June and July. The leaves are pinnatifid; the pod round and rough, and abruptly terminated. The seed is yellow, and, as well as the flowers, is larger than those of the black species.

4431. *Use*. This species is cultivated chiefly as a small salad, and is used like cresses while in the seed:

when these are newly expanded, they are mild and tender; but when the plants have advanced into the rough leaves, they eat rank and disagreeable.

4432. *Culture.* For spring and summer consumption, sow once a week, or fortnight, in dry warm situations, in February and March; and afterwards in any other compartment. "In summer, sow in shady borders, if it be hot sunny weather; or have the bed shaded. Generally sow in shallow flat drills, from three to six inches apart; scatter the seed thick and regular, and cover it thinly with the earth, about a quarter of an inch. To furnish gatherings in winter, or early in spring, sow in frames or under hand-glasses; and when the weather is frosty or very cold, in hotbeds and stores, as directed for cress."

4433. *To save seed.* Either sow a portion in March or April, to stand for that purpose; or, for small supplies, leave some rows of the spring sowing, grown too large for salads; they will ripen seed in autumn.

4434. *The black mustard* is the *S. nigra* L. (*Eng. Bot.* 969.), the *sénévé* of the French. It is frequent in corn-fields. It is altogether a larger plant than the white, with much darker leaves, and their divisions blunter. The flowers are small, the pods smooth, and lying close to the stem.

4435. *Use.* Black mustard is chiefly cultivated in fields for the mill, and for medicinal purposes. It is, sometimes, however, sown in gunns, and the tender leaves used as greens early in spring. The seed-leaves, in common with those of the cress, radish, rape, &c., are sometimes used as a salad ingredient; but the grand purpose for which the plant is cultivated is for seeds, which, ground, produce the well-known condiment. If the seeds, Dr. Cullen observes, be taken fresh from the plant, and ground, the powder has little pungency, but is very bitter; by steeping in vinegar, however, the essential oil is evolved, and the powder becomes extremely pungent. In moistening mustard-powder for the table, it may be remarked, that it makes the best appearance when rich milk is used; but the mixture in this case does not keep good for more than two days. The seeds of both the black and white mustard are often used as an entire state medicinally.

4436. *Culture for the mill.* "To raise seed for flower of mustard, &c., sow either in March or April, generally the black sort, or occasionally the white, in any open compartment: or make large sowings in fields, where designed for public supply. Sow moderately thick, either in drills from six to twelve inches asunder, or broad-cast, and rake or harrow in the seed. When the plants are two or three inches in the growth, hoe, or thin them moderately, where too thick, and clear them from weeds. They will soon run up in stalks; and in July or August return a crop of seed, ripe for gathering." (*Abercrombie.*) See *Encyc. of Agr.*, § 6103.

SUMMER. 7. *Rape.* — *Brassica Napus* L. var. *oleifera* Dec. (*Eng. Bot.* t. 2146.); *Tetrad. Silic.* L. and *Crucifera* J. *Navette*, Fr.; *Repschohl*, Ger.; and *Napo salvatico*, Ital.

4437. *The rape* is a biennial plant, a native of Britain, and distinguished by its glaucous root-leaves, and yellow flowers, which appear in April.

4438. *Use.* Rape is cultivated in gardens as a small salad herb, to be gathered young in the seed-leaves, and used in cresses and mustard. Like these, it has a warm flavour, and is recommended as a stomachic. The plant is also much used in agriculture.

4439. *Culture for small salading.* Sow at the same time with cresses, mustard, &c. in winter and spring; or at any season when small salading is required. Sow in drills or beds, and follow the culture directed for *White Mustard*.

4440. *To save seed.* Transplant two or three plants any time during the summer, and they will flower and seed the second year abundantly.

SUMMER. 8. *Corn-Salad*, or *Lamb-Lettuce*. — *Fedia olitoria* Willd. (*Eng. Bot.* 811.); *Tyridaria Monogyn.* L. and *Dipsacae* J. *Mâche*, Fr.; *Achersalut*, Ger.; and *Valerianello*, Ital.

4441. *The corn-salad* is a diminutive annual plant, common in corn-fields or sandy soils. When cultivated in rich soil, it rises a foot high, and flowers in March. Gerrard tells us, that foreigners using it while in England, led to its being cultivated in our gardens. The Italian corn-salad, *Valerianella eriocarpa*, is milder in flavour, and comes earlier into use, than the common corn-salad; it is also good, dressed in early spring, as a spinach. (*Gard. Mag.*, vol. ii. p. 437.)

4442. *Use.* It is used in salads through winter and early spring, both as a substitute for common lettuce in those seasons, and to increase the variety of small salads. For these purposes it has long been a favourite plant in France, under the denomination of *mâche*, *doucette*, *salade de chanoine*, and *pouls grasse*.

4443. *Propagation.* It is raised from seed, of which a quarter of an ounce is sufficient for a bed four feet by five.

4444. *Times of sowing.* "To answer the common demand, two or at most three sowings will be sufficient, viz. a principal sowing at the beginning or towards the middle of August; a secondary sowing early in September, to furnish together crops in winter and early spring; and a smaller sowing in spring, the close of February or course of March, if the plants are required in continuance throughout that season, though they are apt to get rank-tasted in warm dry weather. If wanted throughout summer, sow once a month, and cut the crop quite young."

4445. *Culture.* "Sow in any bed of common mellow earth, broad cast, and rake in the seed. When the plants are up, thin them two or three inches asunder, that they may have room to acquire some small stocky growth for gathering."

4446. *To save seed.* "Leave some plants in spring; they will produce seed in July or August." (*Abercrombie.*)

SUMMER. 9. *Garden Cress.* — *Lepidium sativum* L. (*Zorn. Ic.* 16.); *Tetrad. Silic.* L. and *Crucifera* J. *Cresson Alénois*, Fr.; *Gemeine Garten Kresse*, Ger.; *Twinkers*, Dutch; *Creacione*, Ital.; *Mastuerzo*, Span.; and *Mastingo*, Port.

4447. *The garden cress* is a hardy annual plant, cultivated since 1548; but its native country is unknown. The whole plant partakes strongly of the pungent smell and acrid taste which distinguish the Cruciferae.

4448. *Use.* It is cultivated in gardens for the young leaves, which are used in salads, and have a peculiarly warm and grateful relish. It ranks among gardeners as the principal of the small salads.

4443. *Varities*. These are—

1. *The common plain-leaved*; principally cultivated.
2. *Curled-leaved*; equally good as a salad, and preferable as a garnish.
3. *Broad-leaved*; less cultivated for salading, but grown for raising turkeys, &c.
4. *Normandy curled cross*; very hardy, and forming a beautiful garnish throughout the winter; preferred by Mr. M'Intosh, a first-rate gardener, to every other cross, and especially to water-cresses. (*Gard. Mag.*, vol. vii. p. 38.)
5. *Broad-leaved Normandy*; equally hardy with the former, and very productive. (*Ibid. Gard. Mag.*, vol. vii. p. 346.)
6. *Golden cross*; slower in growth, and of a yellower green than the common cross.

4450. *Propagation*. All the varieties are raised from seed, of which one ounce or one eighth of a pint will suffice for a bed four feet by four feet.

4451. *Times of sowing and site of the crop*. "Cress should be raised three or four times every month, as it may be in demand, to have crops delicately young in constant succession. For culture in the open garden, begin in the first, second, or third week in March, as a forward spring may bring mild weather or otherwise: allot some warm situation for the early spring sowings; and if the weather take a cold turn, either put on a spare frame, or cover with matting between sunset and sunrise. When spring is confirmed, sow in any open compartment. At the beginning of summer, the same; but, in hot dry weather, either sow in a shady border, or, if the situation be open, shade with mats in the middle of the day. For autumn sowings, when cold weather is approaching, allot some warm border, and give occasional protection. When crops are in demand throughout winter, either sow in a moderate hotbed, or in cradles to be placed in a stove; pans filled with rotten tan are to be preferred to pots or boxes with mould. From the last fortnight of October till the first of March, it will be mostly fruitless to sow in the open garden; but a terrace, sloping south under a frame, may be used at the decline of the year and most early part of spring, as the intermediate step between the open garden and hotbed, if more within the means at command. During this interval, some market-gardeners sow it just within the glasses which cover larger plants." The cress is often raised on porous earthenware or porous stone vessels, of a conical form, having small horizontal gutters on the sides, for retaining the seeds. These are called cones, are somewhat ornamental in winter, and afford repeated gatherings. Mr. M'Intosh sows the Normandy cress in September and October, for winter and spring supply; and in March, April, and May, for summer use. He sows no other sort of cress, and from four sowings had a constant supply, summer and winter, for nearly two years. (*Gard. Mag.*, vol. vii. p. 38.)

4452. *Process in sowing and subsequent culture*. "Having allotted a fine mellow soil to receive the seed, dig the surface, and rake it finally preparatory to sowing, which mostly perform in small, flat, shallow drills, four, five, or six inches asunder. Sow the seed very thick, and earth over very lightly, or but just thinly cover. Give occasional waterings in warm dry seasons."

4453. *Taking the crop*. "To gather cress in perfection, cut them while moderately young, either clean to the root, or only the tops of advanced plants. They will shoot again for future gathering, but the leaves will be hotter, and not so mild and tender as those of younger plants."

4454. *To save seed*. "Either sow a portion in the spring for that purpose; or leave some rows of any overgrown old crop in April and May. The plants will yield seed in autumn."

SUBJECT. 10. *American Cress*.—*Barbarea præcox* D. C. (*Eng. Bot.* t. 1129.); *Tetradymia Siligodea* L. and *Crucifera* J. *Cresson d'Amérique*, Fr.; and *Amerikanischer Kresse*, Ger.

4455. *The American cress* is a native of Britain, and is found in watery places; it is biennial, while the common winter cress (*B. vulgaris*) is perennial. It has smaller leaves, more frequently sinuated; the lower are lyre-shaped, and those on the stalk pinatifid. It is often called black American cress, and sometimes French cress.

4456. *Use*. It is generally liked as a winter cress and early spring salad, resembling in flavour the common winter cress, but rather more bitter. It is in demand in some families throughout the year.

4457. *Culture*. It is raised from seed, which is sold by weight, and for every ten feet of drill, a quarter of an ounce will be requisite. "Sow in a bed of light dry earth, rather in drills nine inches apart, than broadcast. For winter and spring use, make a sowing in the last fortnight of August, or beginning of September, on a warm sheltered border. If wanted throughout summer, sow every six weeks from March to August, giving a sunny or shady situation according to the advancement of the season. Water occasionally in dry hot weather. At the approach of winter, shelter the plants, by laying a few light twigs among them so as not to interfere with their growth; and upon these, a covering of fern, reeds, or dry litter. The plants being cut, or the outside leaves stripped off, shoot again for another gathering."

4458. *To save seed*. "Let a few choice plants, raised in spring, run; and they will ripen seed before the decline of summer." (*Abercrombie*.)

SUBJECT. 11. *Winter Cress*.—*Barbarea vulgaris* H. K. (*Eng. Bot.* t. 443.), *Ergisium Barbarea* L. and Smith; *Tetrad. Silig.* L. and *Crucifera* J. *Cresson de Terre*, Fr.; *Winter Kresse*, Ger.; *Winterkress*, Dutch; *Erba di Santa Barbarea*, Ital.; and *Hierba de Santa Barbara*, Span.

4459. *The winter cress* is a well-known perennial plant, common in moist shady situations. The lower leaves are lyre-shaped, and the upper obovate and indented. The flower-stalk rises about a foot high, and produces yellow flowers from April to August. The whole plant is bitter and somewhat aromatic. A double variety of *Barbarea* is well known in the flower-border as the yellow rocket of gardeners.

4460. *Use and culture*. The same as the *American cress*.

SUBJECT. 12. *Water-Cress*.—*Nasturtium officinale* H. K. (*Eng. Bot.* t. 855.) *Sisymbrium Nasturtium* L.; *Tetrad. Silig.* L. and *Crucifera* J. *Cresson de Fontaine*, Fr.; *Brünnenkresse*, Ger.; *Waterkress*, Dutch; *Cressione di Sorgenti*, Ital.; *Berro*, Span.; and *Agriab*, Port.

4461. *Water-cress* is a creeping amphibious perennial, growing in wet ditches and slow running streams. The plant, when growing in a rapid current, has its leaves lengthened; and in this state, Martyn remarks, is sometimes mistaken for the water-parsnep (*Stum nodiflorum* L.), which commonly grows with it, and is deleterious. The water-cress, Mr. Main informs us, is cultivated in Hindostan under sheds erected for the purpose. In Europe it appears to have been first cultivated at Erfurth, about the middle of the sixteenth century (§ 709.), and in England in 1808, by Bradbury, at Northfleet

Spring-Head, near Gravesend. Water-creases are now cultivated extensively at West Hyde, near Rickmansworth, and at Hackney, Uxbridge, and other places. Water-creases are also cultivated near Paris.

4462. *Use.* It forms an excellent spring salad, either alone or with brook-lime or scurvy-grass. It is a popular favourite in spring in most places; and is eaten fasting, or with bread and butter, by those who have faith in its antiscorbutic virtues. The juice is decocted with that of scurvy-grass and Seville oranges, and forms the popular remedy called spring juice.

4463. *Varieties.* Bradbury considers that there are three, the green-leaved, the small brown-leaved, and the large brown-leaved. The green-leaved is the easiest cultivated, the small brown-leaved the hardest, and the large brown the best for cultivation in deep water, and that preferred by this cultivator.

4464. *Culture.* The most suitable description of water is a clear stream, and not more than an inch and a half deep, running over sand or gravel; the least favourable, deep still water on a muddy bottom. It is highly advantageous to make the plantations in newly risen spring-water, as the plants not only thrive better in it, but, in consequence of its being rarely frozen, they generally continue in vegetation, and in a good state for gathering through the whole winter season. The plants are disposed in rows parallel with the course of the stream. In shallow water, the distance between the rows is not more than eighteen inches, but in deep water it is as much as from five to seven feet. When the plants begin to grow in water one inch and a half deep, they soon check the current so as to raise the water to the height of three inches about the plants, which is considered the most favourable circumstance in which they can be placed. Where the plants are not in rows, the water is impeded in its course, and the plants are choked up with weeds and the different matters which float down the stream; and when the cress is grown in deep water, the roots are easily drawn out of the soil in gathering. The cress will not grow freely in a muddy bottom, nor will it taste well when there is mud about the roots; which should be carefully removed, and replaced by gravel or chalk. It is absolutely necessary to have a constant current, as, where there is any obstruction to the stream or flow of water, the plants cease to thrive. After the plants have been cut about three times, they begin to stock, and then the oftener they are cut the better; in summer it is necessary to keep them very closely cropped, and in water of proper depth, and with a good soil, each bed supplies a gathering once a week. In winter the water should be rather deeper than in summer (four or five inches): to obtain this, the plants are left with more head, that the water may thus be impeded.

4465. *Replanting.* The most expensive part of the cultivation is the necessity of cleaning out and replanting the beds twice a year; as the mud quickly collects about the roots, and the duckweed and other plants become intermixed with and choke up the cress; it is almost impossible to pick it in a fit state for market after the plantation has been made five or six months. The mode of replanting is to remove all the roots of plants, beginning at the stream head, and then clear the bed of the stream from mud and rubbish, which, however, it should be remarked, make excellent garden manure. From the crop of plants thus taken out, the youngest, and those with most roots, are selected; these are placed on the gravel in rows at the requisite distance, with a stone on each plant, to keep it in its place. The times of renewing the beds are in May and June, and from September to November. The planting is done in succession, so that the crops may come regularly into cutting. Those planted in May are fit to cut in August, and those planted in November are ready to gather in the spring.

4466. *Culture in water-beds.* Some market-gardeners who can command a small stream of water, grow the water-cress in beds sunk about a foot in a retentive soil, with a very gentle slope from one end to the other. Along the bottom of this bed, which may be of any convenient breadth and length, chalk or gravel is deposited, and the plants are inserted about six inches' distance every way. Then, according to the slope and length of the bed, dams are made six inches high across it, at intervals; so that, when these dams are full, the water may rise not less than three inches on all the plants included in each. The water being turned on will circulate from dam to dam; and the plants, if not allowed to run to flower, will afford abundance of young tops in all but the winter months. A stream of water, no larger than what will fill a pipe of one inch bore, will, if not absorbed by the soil, suffice to irrigate in this way an eighth of an acre. As some of the plants are apt to rot off in winter, the plantation should be laid dry two or three times a year, and all weeds and decayed parts removed, and vacancies filled up. Cress grown in this way, however, is far inferior to that grown in a living stream flowing over gravel or chalk.

4467. *Thinning the crop.* The shoots are cut for market, not broken off, which is the usual mode of gathering the wild cress, and which latter practice is found to be very injurious to the plants in the beds. (*Hort. Trans.* vol. iv. p. 540; and *Gard. Mag.*, vol. i. p. 151.)

SUBJECT. 13. *Brook-lime.* — *Verónica Beccabunga* L. (*Eng. Bot.* 655.); *Diándria Monogynia* L. and *Scrophularina* B. P. *Beccabongue*, Fr.; *Bachbunge*, Ger.; and *Beccabungia*, Ital.

4468. The brook-lime is a perennial plant, a native of Britain, and common in rivulets and wet ditches. It has a trailing or procumbent stem, furnished with smooth, dark-green, elliptical leaves, from the axillæ of which proceed bunches of blue flowers in July.

4469. *Use.* The young tops and leaves are used as a salad, like the water-cress, with which it is often mixed, being milder, more succulent, and only slightly bitterish in taste. In Scotland the sprigs of brook-lime are brought to market under the name of *water-purple*, and sold along with *wall-creases* (well or water creases).

4470. *Culture.* The same as for the water-cress.

SUBJECT. 14. *Garden Rocket.* — *Brásica Eruca* L. (*Schk. Hand.* 2. t. 186.), *Eruca sativa* D.; and *Tetrad. Siliq.* L. and *Crucifera* J. *Roquette cultivée*, Fr.; *Raukette*, Ger.; and *Ruca*, Ital.

4471. The garden rocket is an annual plant, a native of Austria, and known in this country in 1573. The stem rises two feet high, is upright and branchy, and furnished with smooth, pulpy, cut and toothed leaves. When in flower in July, it has a strong peculiar smell, almost fetid. This plant is now neglected in Britain, but is still in use in several places on the Continent.

4472. *Use.* The leaves and tender stalks are used as salad ingredients, and form an agreeable addition to cresses and mustard early in spring.

4473. *Culture.* Sow in a warm border early in February, and again in March and April for successive crops. Thin the plants after they have produced the first rough leaf to three or four inches asunder, and keep them clear of weeds. If a supply is desired throughout the year, monthly sowings may be made; and in autumn, under frames.

4474. *To save seed.* Allow a few of the strongest plants of the spring sowing to come into flower; they will produce abundance of seeds in August.

SUBJECT. 15. Scurvy Grass. — *Cochlearia officinalis* L. (*Eng. Bot.* 550.); *Tetradymia Sibicoides* L. and *Crucifera* J. *Cranston officinalis*, Fr.; *Loffelkrout*, Ger.; and *Cochlearia*, Ital.

4475. *The scurvy grass* is a biennial plant, indigenous to most of our sea-shores, and, like the sea-pink (*Stâctice*), growing also on inland mountains. The root-leaves are round; those of the stem sinuated; the whole plant is low and spreading, seldom rising above a foot. The flowers are white, and appear in April and May.

4476. *Use.* The smaller leaves are occasionally used like the water-cress, and sometimes eaten between slices of bread and butter. The plant is also occasionally used medicinally.

4477. *Varieties.* A thick-leaved variety, called the Dutch scurvy-grass, is cultivated in some gardens.

4478. *Culture.* The plant may either be propagated from seed, or by dividing the roots. It delights in a sandy soil and a moist atmosphere, which it finds alike by the sea shore and on lofty mountains. It will grow, however, almost any where, and is often found firmly established on old walls and ruins, sowing itself, and thus remaining many years. When to be raised from seed, sow about July. Plants from a spring sowing seldom prosper. Abercrombie says, "Sow in drills eight inches apart; and when the plants are up, thin them to six inches' distance; these, thinned out, may be transplanted into new beds. In the following spring, the succulent leaves will be fit for use."

4479. *To save seed.* Leave some plants in flower in May, and they will ripen abundance of seed in July.

SUBJECT. 16. Burnet. — *Potridium Sanguisorba* L. (*Eng. Bot.* 860.); *Monac's Polyta*. L. and *Roudcea* J. *Petite Pimpernelle*, Fr.; *Pimpernelle*, Ger.; and *Pimpinella*, Ital.

4480. *The burnet* is a hardy perennial plant, indigenous in Britain, and found in dry upland calcareous soils. The leaves are pinnated, and form a tuft next to the root; but alternate on the stem: the leaflets are partly round-shaped, partly pointed, and much serrated on the edges. The stem rises fifteen inches high, and the flowers form small greenish heads tinged with purple in July.

4481. *Use.* Burnet leaves are sometimes put into salads, and occasionally into soups, and they form a favourite herb for cool tankards. When slightly bruised, they smell like cucumber, and they have a somewhat warm taste. They continue green through the winter, when many other salad-plants are cut off, or in a state unfit for use. Burnet was formerly in much greater repute than at present.

4482. *Propagation and culture.* The plant may be raised from seed; of which half an ounce will suffice for a bed three feet by four. It may either be sown in spring or early in autumn. It may also be very readily propagated by parting the roots early in spring. When the plants are of two or three inches growth, transplant into rows, or a bed, at six inches plant from plant. Cut down all flower-stalks not intended for seed.

SUBJECT. 17. Wood Sorrel. — *Oxalis Acetosella* L. (*Eng. Bot.* 762.); *Decoln. Pentag.* L. and *Geraniacea* J. *Oseille*, Fr.; *Sauerampfer*, Ger.; and *Acetosella*, Ital.

4483. *The wood sorrel* is an indigenous perennial plant, found in woods, and by hedge-sides, and in moist, shady situations. It has a scaly, bulbous, articulate root, and ternate, obcordate, hairy leaves. The flowers rise from the root singly, are of a pale flesh colour, and appear in April and May.

4484. *Use.* The leaves form a very grateful addition to salading, and communicate an agreeable relish to dishes of mashed greens.

4485. *Culture.* The plant is readily propagated by dividing the roots, and may be planted in a moist shady situation in bog earth. Here, by preventing the plants from coming into flower, and cropping the herb of a part of the plantation two or three times in the season, a supply of fresh young leaves may be obtained from April to October.

SUBJECT. 18. Small Salads.

4486. *By small salads* gardeners and cooks understand the small herbs, or very young plants, which are used in the seed-leaves; such as cress, mustard, radish, and rape; also the lamb-lettuce. Others, such as sorrel, are either potherbs or salad-herbs. Sometimes the white cabbage, lettuce, endive, and succory, are also sown, to be cut in the seed-leaf. The small salads are occasionally used by themselves, when there is a deficiency of the greater salad-plants, the lettuce, endive, celery, &c. But when both kinds can be had, they are in general combined. In France and Italy the *Picridium vulgare*, *Compositæ Cichoracæ*, a little, low, thistle or dandelion looking plant, is sown like salad lettuce, and used both in salads and as greens. The *Bon Jardinier* (edit. 1833, p. 972.) says it tastes a little like mutton. In Turkey, and also in France, the flowers of the Judas tree are mixed with small salads; they have an agreeable acid flavour. (*Gard. Mag.*, vol. i. p. 293.)

4487. *Culture.* Sow very thick in drills, or on beds of very finely pulverised soil, watering in dry weather, to accelerate germination and the succulency of the plants. Early in spring sow under glass, or in a warm sheltered situation, and in winter in pots and boxes to be placed in some of the forcing-houses, or in the stove; or sow in the borders of the forcing-houses, or in hot-beds or pits, &c. Observe, that a supply is wanted in most families throughout the year.

4488. *Gathering.* Cut off the seed-leaves, and about half their foot-stalks, as soon as the former are expanded: some prefer letting small salading grow till one or two of the proper leaves appear, in which case it is of a stronger flavour.

SECT. VIII. *Potherbs and Garnishings.*

4489. *Potherbs and garnishings* require but a very small portion of the kitchen-garden, perhaps not above two or three poles, even in the largest; and, with the exception of parsley, marigold, and Indian cress, they are rarely found in those of the cottager.

SUBSECT. 1. *Parsley*. — *Aptium Petroselinum* L.; *Pent. Trig.* L. and *Umbelliferae* J. *Persil*, Fr.; *Petersilie*, Ger.; *Peterselie*, Dutch; *Petroselino*, Ital.; and *Perejil*, Span.

4490. *The parsley* is a hardy biennial, a native of Sardinia, and introduced in 1548. It is so common as to be naturalised in several places both of England and Scotland. "It may be right to notice, that the poisonous plant called fool's parsley (*Æthusa Cynapium*), a common weed in rich garden-soils, has sometimes been mistaken for common parsley. They are very easily distinguished: the leaves of fool's parsley are of a darker green, of a different shape, and, instead of the peculiar parsley smell, have, when bruised, a disagreeable odour. When the flower-stem of the fool's parsley appears, the plant is at once distinguished by what is vulgarly called its beard, three long pendent leaflets of the involucreum. The timid may shun all risk of mistake by cultivating only the curled variety. This last, it may be remarked, makes the prettiest garnish." (*Neill*, in *Ed. Encyc.*)

4491. *Use*. The leaves of the first two varieties mentioned below are used as potherbs at all seasons of the year; and as a garnish. The third kind is esteemed for its large white carrot-shaped root, drawn in autumn and winter, like parsnips, for the table, and occasionally to be used in medicine, being considered a remedy for the gravel.

4492. *Varieties*. These are—

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| 1. The common plain-leaved; stalks cultivated. | dieler, edit. for 1833, p. 971.), most esteemed. | 4. <i>Naples parsley</i> , or <i>Celery parsley</i> ; a variety which produces a plant something between parsley and celery; and the leaves of which are used as celery. (<i>Ibid.</i> p. 272.) |
| 2. The curled-leaved; Persil main tête fine, of which a beautiful variety is cultivated by M. Vilmorin (<i>des Jars</i> . | 3. The broad-leaved, or large-rooted Hamburg; cultivated for its carrot-shaped root. | |

4493. *Culture of the first two, or potherb, kinds*. "One sowing in spring will mostly furnish young leaves all the year; though, to answer a constant demand, many persons make successive sowings from February to May. Some also sow early in autumn for young parsley in winter and spring; but such a supply is better provided by cutting down established plants. Sow in a single drill, along the edge of any compartment, or occasionally in rows nine or twelve inches asunder. Draw small drills, something less than an inch deep; in which drop the seed moderately thick, and cover a little above half an inch. The plants will come up in three or four weeks, and when two or three inches high, may be gathered as wanted, all the summer, winter, and following spring, till May, when they will go to seed. Have always a young crop sown timely in the spring, to succeed the declining old plants. In gathering potherb parsley, cut close and regular. In summer, when the plants grow rank, yielding more leaves than can be used, cut them in close to the bottom, and they will shoot up stocky in a regular close growth. Observe also to do the same in autumn, about the end of September, that the plants may form heads of fresh young leaves before winter. On the approach of frosty weather, protect them with straw or reed panels, laid upon branches of birch or other light supports.

4494. *Culture of Hamburg parsley*. "To obtain large roots, allot a compartment where the soil is deep, and has been well dug. Any common mould will suit, if dry and not too rich. Sow in February, March, or early in April, in one or more beds; either in drills nine inches asunder, or broad-cast, and rake in. The plants should be thinned to nine inches' distance, to give room for proper growth in the roots; for use in August, September, October, and thence till the following spring. On the approach of frost, take up some roots, and preserve them in sand. A sowing may be made in the third week of June, where young roots are wanted in winter." The culture of Naples parsley is the same as that of common celery.

4495. *To save seed*. "Permit some old plants to run to stalks in May; they will produce plenty of seed, ripening in July or August." (*Abercrombie*.)

SUBSECT. 2. *Parslane*. — *Portulaca oleracea* L. (*Plant. grass.* 129.); *Dodec. Monog.* L. and *Portulacæa* J. *Pourpier*, Fr.; *Portulak*, Ger.; and *Porcellana*, Ital.

4496. *The parslane* is an annual plant, a native of South America, and introduced in 1652. It has a round, smooth, rather procumbent stem, and diffused branches; the leaves somewhat wedge-shaped and fleshy; the flowers, yellow and sessile, appear in June and July.

4497. *Use*. The young shoots and succulent leaves are esteemed cooling, and are used in spring and summer as an ingredient in salads, and as potherbs and pickles. The plant was formerly much more in request than at present.

4498. *Varieties*. There are two varieties of the *P. oleracea* cultivated, the green and the golden. The latter is by some considered as a distinct species (*P. sativa*). It has rather larger leaves, and is less succulent than the *P. oleracea*.

4499. *Culture*. Both sorts are raised from seed, and for a bed four feet by four feet, sown either broad-cast or in drills, nine inches apart, one eighth of an ounce will suffice. "Each variety is somewhat tender; the green, which is usually preferred, is perhaps rather the hardiest. An early crop may be sown in February or March, on a moderate hotbed: the plants will require the aid of a gentle heat till the middle of May; when the seed may be sown in a warm border. If a continued succession is required, sow every month during summer, till August, or while the plant can be raised; generally in small drills, from three to six inches asunder. The plants will soon come up: they should remain where sown. In very dry hot weather, water thrice a week. The shoots may be gathered for use when they are from two to five inches in height, and are well furnished with leaves. Cut them off low, and the bottom part will soon sprout out again."

4500. *To save seed*. "Leave some of the first open-border plants to run; they will give ripe seed in autumn." (*Abercrombie*.)

SUBJECT. 3. Tarragon. — *Artemisia Dracunculus* L. (*Blackw.* t. 116.); *Synq. Polyg. Super. L.* and *Compósita J. L'Estragon*, Fr.; *Dragun*, Ger.; and *Dragoncello*, Ital.

4501. *The tarragon* is a perennial plant, a native of Siberia, but cultivated in our gardens from the time of Gerarde, in 1548. Its branched stem rises a foot and a half high, and has narrow leaves, green on both sides. The smell of the plant is fragrant, and its taste aromatic.

4502. *Use.* The leaves and tender tips are used as an ingredient in pickles. A simple infusion of the plant in vinegar makes a pleasant fish sauce. In France it is employed, on account of its agreeable pungency, to correct the coldness of salad herbs; it is also put in soups, and other compositions.

4503. *Culture.* "Avoid planting tarragon in a wet tenacious soil; as in that case the root is apt to perish in a severe winter. This herb may be propagated in the spring by seed; or, more expeditiously, by offset bottom slips, or sections of the root and top, planted in spring or autumn: also plentifully in summer, from June to August, by slips or cuttings of the spring stalks or branch shoots. The germs are to be planted in beds or borders from six to nine inches apart, and properly watered. They will quickly increase in a branchy head, for use the same year, to gather green, as wanted; and a portion may be dried and housed for winter. When the stems are running up for flower, if seed is not wanted to be saved, cut them down; which will force up fresh young shoots. It would be proper, towards the end of autumn, to transplant some full plants close under a south fence, to preserve them more effectually in winter, and cause an earlier production of young tops in spring."

4504. *To obtain green tarragon in winter.* "Plant some stocky roots in a hotbed, or in pots placed in a hot-house." (*Abercrombie*.)

SUBJECT. 4. Fennel. — *Anethum Paniculum* L. (*Eng. Bot.* t. 1208.); *Pent. Trig. L.* and *Umbellifera, J. L'Aneth*, Fr.; *Dillkraut*, Ger.; *Dille*, Dutch; *Aneto*, Ital.; and *Eneudo*, Span.

4505. *The fennel* is a perennial plant, naturalised in England, and found in chalky soils. The whole plant is aromatic, and has long been an inmate of the garden.

4506. *Use.* The tender stalks of common fennel are used in salads; the leaves, boiled, enter into many fish sauces; and, raw, are garnishes for several dishes. The blanched stalks of the variety called *fianchio* are eaten with oil, vinegar, and pepper, as a cold salad, and they are likewise sometimes put into soups.

4507. *The varieties are —*

1. Common, or Sweet.	| characterized by a tendency in the stalk to swell to a considerable thickness. This thickened part is blanched	| by earthing up, and is then very tender. It is a good deal cultivated in Italy; see § 327.
2. Dark-green-leaved.		
3. Dwarf, or Fianchio.		

4508. *Propagation.* They are all raised from seed, of which half an ounce is sufficient for a seed-bed four feet by six. Sometimes, also, they are raised from offsets from the old plants, where only a few are wanted.

Sow in the spring in light earth, either in drills from six to twelve inches apart, or broadcast and raked in. When the plants are three or four inches high, thin or transplant a quantity fifteen inches asunder. As the roots of old plants divide into side offsets, these may be slipped off in spring, summer, or autumn, and planted a foot apart. They will produce immediate leaves for present supply, and in continuance; or for an immediate larger supply of leaves, you may procure some established full roots, and plant as above; let them be well watered."

4509. *Subsequent culture.* "The same plants remain several years by the root: but as fennel sends up strong stems for seed in summer, these, or a part of them, should be cut down, to encourage a production of young leaves below, in succession. It is apt to spread more than is desirable, if suffered to seed. The swelling stems of the *fianchio* variety, when of some tolerable substance, should be earthed up on each side five or six inches to blanch them white and tender. This will be effected in ten days or a fortnight; and by successive sowings, or cutting down plants during summer, successive crops of blanched stalks may be had from June to December."

4510. *To save seed.* Permit some of the best stalks to shoot; they will produce large umbels of seed in autumn. (*Abercrombie*.)

SUBJECT. 5. Dill. — *Anethum graveolens* L. (*Blackw.* t. 545.); *Pent. Trig. L.* and *Umbellifera J. L'Aneth*, Fr.; *Dill*, Ger.; and *Aneto*, Ital.

4511. *The dill* is a hardy biennial plant, a native of Spain, and introduced in 1570. The plant is of upright growth, somewhat similar to fennel, but smaller. It has finely divided leaves, and a slender single stem, bearing an umbel of flowers at top, which appear in June and July. The whole plant is powerfully aromatic.

4512. *Use.* The leaves are used to heighten the relish of some vegetable pickles, particularly cucumbers; and also occasionally in soups and sauces. The whole herb is also used in medical preparations.

4513. *Culture.* It is raised from seed, of which half an ounce is sufficient for a bed three feet by four feet. "Sow annually in February, March, or April, or occasionally in autumn, as soon as the seed is ripe, to come up stronger in the spring, in any open compartment; either in drills, six or twelve inches apart; or broadcast thinly, and raked in evenly. The plants should remain where raised; and may be thinned moderately, should they rise too thick. They will shoot up in stalks, with leaves and seed-umbels in summer and autumn, for use in proper season."

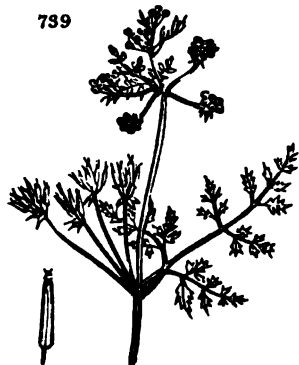
4514. *To save seed.* "Leave some plants where raised: they will furnish plenty of seed in autumn. Or, from self-sown seeds, many plants rise spontaneously in the spring." (*Abercrombie*.)

SUBJECT. 6. Chervil. — *Scandix Cerefolium* L., *Charophyllum sativum* of Persoon's *Synopsis Plantarum* (*Eng. Bot.* 1268.); *Pentand. Dig. L.* and *Umbellifera J. Cerfeuil*, Fr.; *Gartenkerbel*, Ger.; and *Cerfoglio*, Ital. (*f. 739.*)

4515. *The chervil* is an annual plant, a native of various parts of the continent of Europe, and sometimes observed naturalised in our gardens in England. The plant rises from a foot to near two feet high; the leaves are of a very delicate texture, three times divided, and the flowers, of a whitish colour, appear in June. There is a variety (*cerfeuil frisé*) cultivated in the Paris gardens with beautifully frizzled leaves.

4516. *Use.* The tender leaves are used in soups and salads; and those of the curled variety also in garnishing.

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4517. *Culture.* It is propagated from seed; and for a bed four feet by four, a quarter of an ounce is sufficient. "Sow a bed or two in August and September, as well to come to use at the end of the same autumn, as to stand for winter and spring. If a continued succession be required in spring and summer, begin to sow again in the last fortnight of February, and sow a portion every month till August, or twice a month in the midst of summer; as the plants of the spring and summer sowings soon run up for seed. Sow the seed in shallow drills, from six to nine inches apart, and earth in lightly; or sow occasionally broadcast, and rake in evenly, just covering the seed. The plants are to remain where sown. When the leaves are two, three, or four inches in growth, they are proper for gathering. Cut them off close, they will shoot up again, and may be gathered in succession, though the plants of the spring and summer sowing soon spindle up into seed-stalks, ceasing to produce young leaves, which are the useful parts." In order to allow the curled sorts to produce fully grown leaves for garnishing, sow thinly, and thin out. (*Lindley's Guide*, &c., p. 541.)

4518. *To save seed.* "Leave some plants in the spring: they will shoot to stalks, and give ripe seed in July and August." (*Abercrombie*.) To keep the curled sort true, Mr. Lindley recommends the most perfectly curled plants

to be taken up carefully and transplanted into a bed to run up for seed. (*Ibid.*)

SUBSECT. 7. Horseradish. — *Cochledria Armordæa* L. (*Eng. Bot.* 2223.); *Tetrad. Siliic. L.* and *Crucifera J. Cranson*, or *Le Grand Raifort*, Fr.; *Merrattig*, Ger.; *Lüseelkraut*, Dutch; *Ramolaccio*, Ital.; and *Rabano*, Span.

4519. *The horseradish* is a perennial plant, growing naturally in marshy places, and by the sides of ditches, in some parts of England. It has been long cultivated in gardens, and forms one of the most profitable articles raised by the market-gardener.

4520. *Use.* The root scraped into shreds is a well-known accompaniment of English roast beef. It is also used in winter salads, in sauces, and sometimes eaten raw.

4521. *Propagation and culture.* The following excellent instructions are by Knight: — "Horseradish thrives best in deep, soft, sandy loam, that is not very dry in summer, nor inundated in winter; the situation must be open. During winter, trench the ground three feet deep, and in the following February procure your sets, in the choice of which take the strongest crowns or leading buds from old plants, cutting them about two inches long. Mark out the ground in four-foot beds and one-foot alleys; then take from the first bed nine inches of the top soil, laying it upon the adjoining bed; after which take out an opening at one end of the bed, in the common way of trenching, fifteen inches deep from the present surface; then level the bottom, upon which plant a row of sets across the bed, at nine inches apart each way, with their crowns upright; afterwards dig the next trench the same width and depth, turning the earth into the first trench over the row of sets: thus proceeding trench after trench, to the end. Where more than the produce of one bed is required for the supply of the family for twelve months, the third bed is next to be planted, which treat as directed for the first, only observing to lay the earth on the fourth, and so on for any number of beds. Upon every alternate bed, which is not planted, a dwarf annual crop may be grown. The plants must be kept clear from weeds during summer: and as soon as the leaves decay in autumn, let them be carefully raked off with a wooden-toothed rake; in the following February, eighteen inches of the earth of the unplanted bed must be laid as light as possible, and equally over the beds that are planted; then trench and plant the vacant beds exactly in the same manner as before directed. The following autumn, the first planted horseradish may be taken up, by opening a trench at one end of the bed to the bottom of the roots, so that the sticks or roots of horseradish may be taken up entire and sound, which for size and quality will be such as have not generally been seen. The following February the one-year-old crop will require additional earth, as before directed, which must, of course, be taken from those beds which are now vacant, which when done, if the ground appears poor, or unlikely to produce another vigorous crop, they must have a crop of manure." (*Hort. Trans.*, vol. i. p. 207.)

4522. Judd has also written on the culture of horseradish (*Hort. Trans.*, vol. v. p. 302); and his practice, very different from Knight's, is also excellent, and perhaps preferable. Knight takes strong buds from old plants, while Judd takes about three inches of the top part of each stick or root and then cuts clean off about a quarter of an inch of this piece under the crown, so as to leave no appearance of a green bud. Judd trenches only two feet deep, and if he applies manure, puts it in the very bottom of the trench; "for, if not so done, the horseradish, which always puts out some side roots, would send out such large side roots from the main root, in search of the dung lying contiguous, as materially to injure the crop. In planting, holes are made eighteen inches apart every way, and sixteen or eighteen inches deep. The root-cuttings are let down to the bottom of the holes, which are afterwards filled up with fine sifted cinder-dust, and the surface of the bed is then raked over. The season of planting is the middle of March."

4523. *Petersen* raises his plants from the small side roots, from nine to twelve inches in length. These are inserted horizontally into the sides of elevated beds. Every year the small side fibres are cut off these roots, those at the extremity being found sufficient to nourish it. At the end of the third year, the roots will be found to have attained a large size. The advantage of this plan of treating the root like a stem is, that, when it is wanted for use, it is easily taken out of the ground without breaking. The roots also attain a very large size, more especially if the side fibres are taken off about the end of June, before the return of the sap, and thus retain that in the main stem which would have been otherwise distributed among the side shoots. (*See Gard. Mag.*, vol. viii. p. 488.)

4524. *Chapman*, gardener at Shardelose, in Buckinghamshire, grows his horseradish every year in the same spot, finding great difficulty in clearing the ground from it. He trenches up as large a portion every winter as will supply the family throughout the year: in doing this, he picks out and trims the roots which are fit for use, and leaves the smaller fibres in the bottom of the trench, as sets for a successional crop. The roots for use are laid in by the heels in the shade, and the buds are rubbed off them as they protrude.

4525. *Preserving.* Horseradish, if dug up in autumn, may be preserved through the winter in sheds or cellars, among sand or dry earth.

SUBJECT. 8. *Indian Cress*, or *Nasturtium*. — *Tropæolum majus* and *minus* L. (*Bot. Mag.* 23.); *Oetan. Monog.* L. and *Tropæolea*, D. C. *Capucina*, Fr.; *Kepzerian-blume*, Ger.; *Spanache here*, Dutch; *Fior Cappuccino*, Ital.; *Capuchinas*, Span.; and *Mastrupo do Peru*, Port.

4536. *The Indian cress* is a hardy annual, a native of Peru. In its native country, it endures several seasons; but here, being unable to sustain our winter, it is treated as an annual plant, and requires to be sown every year.

4537. *Use.* The flowers and young leaves are frequently eaten in salads; they have a warm taste, like the common cress, thence the name of *nasturtium*. The flowers are also used as a garnish to dishes, in which they form a brilliant contrast with the flowers of borage. The berries are gathered green and pickled, in which state they form an excellent substitute for capers.

4538. *Species and varieties:* —

1. *Large Nasturtium* (*T. majus*), introduced in 1596. There is a variety with double flowers, which is propagated by cuttings, and requires to be treated as a green-house plant. The flowers are preferable for garnishing. There is another variety with beautiful brown velvet-like flowers, introduced into this country from Paris, in 1839.
2. *Small Nasturtium* (*T. minus*), introduced in 1596, is sometimes cultivated for culinary purposes; but is of weakly growth, and by no means equal to the large in produce. There is a variety of this species with double

flowers, propagated by cuttings, and preserved through the winter under glass; but, like the double variety of the large *nasturtium* (*T. majus*), it is more ornamental than useful. The seed pods, however, of this variety are preferable for pickling as a substitute for capers.

4539. *Culture.* The single varieties of both sorts are raised from seed, of which one ounce will sow twenty-five feet of drill. The plants will thrive in almost any soil, but a light fresh loam is best, as less likely to make the plants grow rank and luxuriant, and produce few berries, which one that is rich is apt to do. Care must be taken to select good sound seed, berries of the last year, for those of greater age will not grow at all, or not freely and regularly. "Sow in March or April, or not later than the beginning of May, in one small crop, of one, two, or three rows, for a moderate family. Either allot the large sort a situation in a single row, near a vacant fence, trellis, or wall, on which the runners may be trained; or divide an open compartment into rows, three or four feet asunder, to admit sticks for their support. Form drills an inch and a half deep; in which deposit the seeds two or three inches apart, and earth them over evenly. When the plants begin to advance in runners, let them be trained to a fence or trellis. It is generally necessary, at first, to conduct the main runners, but they will afterwards climb unassisted."

4540. *Taking the crop.* "For pickling let the berries just attain their full size, but pluck them while green, plump, and tender."

4541. *To save seed.* "Permit a sufficiency of the berries to remain till mature. In August and September, gather them as they ripen; spread them to dry and harden; then put them up for sowing next year." (*Abercrombie*.)

SUBJECT. 9. *Marigold*, or *Pot-marigold*. — *Calendula officinalis* L.; *Syng. Polyg. Necess.* L. and *Compositæ* J. *Souci de Jardin*, Fr.; *Ringelblume*, Ger.; *Gond bloem*, Dutch; *Fiorrancio*, Ital.; and *Clumeno*, Span.

4532. *The pot-marigold* is an annual plant, a native of France and Spain, and known in this country since 1573. It is a common inhabitant of cottage gardens, and in some parts of England the flowers are used in broths and soups.

4533. *The varieties are:* —

1. *The single orange-flowered*; most aromatic and proper for keeping.
2. *The single lemon-flowered*; rather less aromatic.
3. and 4. *The double-flowered* of two varieties.
5. *The chidding or prolificosa*; which sends out small flowers from the margins of the calyx of the large central flower. This variety of the marigold is cultivated chiefly for ornament.

4534. *Culture.* Sow in February, March, or April, and for a seed-bed four feet by four feet, sown in drills a foot asunder, a quarter of an ounce will suffice; "or you may deposit the seed in autumn (September), to have it come up forwarder in the spring, though the spring sowing will come up in very good time. Sow on a light dry soil, either in drills a foot asunder, or broadcast; and rake in the seed. When the plants are up two or three inches in growth, thin them to about twelve or fifteen inches asunder, or they may be transplanted with that interval. They will grow freely in either method, and come into flower the following May or June, and continue flowering in plentiful succession throughout summer and autumn; to be cut for use as wanted. A store for winter should be gathered when in full flower, spread to dry out of the sun, and afterwards put up in paper bags."

4535. *To save seed.* "The flowers, as far as they are left to run, will in autumn produce a competency." (*Abercrombie*.)

SUBJECT. 10. *Borage*. — *Borago officinalis* L. (*Eng. Bot.* 36.); *Pent. Monog.* L. and *Boraginæa* B. P. *Bourrache*, Fr.; *Borragen*, Ger.; and *Borragine*, Ital.

4536. *The borage* is an annual and sometimes a biennial plant. The light-blue flowers make a beautiful appearance, and are produced for several months in succession beginning with May. It is a native, or naturalised in several parts of Britain.

4537. *Use.* The young leaves and tender tops are used occasionally as salads, and to furnish a boiled dish in summer and autumn. The juice of the plant affords nitre, and the withered stalks have been observed to burn like match-paper.

4538. *Course of culture.* It is raised from seed, and for a bed four feet and a half by six feet, one ounce is requisite. "Sow every year in the spring, any time in February or March, till May, &c. for summer supply; and in any of the summer months, for young borage in autumn, as the plants of the spring and early summer sowings soon run up to stalks in the same year; and in July or August and September, to furnish young leafy plants for winter and following spring. A small crop of each sowing will be sufficient for the supply of a family. This herb loves a dry soil. Sow either broadcast, and raked in, or in small drills six to twelve inches asunder. Where the plants rise too close, thin them to that distance. Although this herb will grow when transplanted, it prospers best when it remains where sown. Where the young leafy tops and flower-spikes are in demand, permit the stem to run up."

4539. *To save seed.* "Leave some of the plants which first run: they will produce plenty of seed in autumn; and from self-sown seeds many young plants will come up spontaneously." (*Abercrombie*.)

SECT. IX. *Sweet Herbs.*

4540. Of *sweet herbs*, one or two kinds, as the lavender, peppermint, and some other mints, are extensively cultivated by market-gardeners for the druggists; but a very few square yards of the private kitchen-garden will suffice to cultivate as much of each as is ever wanted by any family. The sage, thyme, mint, and tansy, appear in single plants in the border of the cottager's garden.

SUBSECT. 1. *Thyme*. — *Thymus* L.; *Didy. Gymnos.* L. and *Labiata* J. *Thym*, Fr.; *Thimian*, Ger.; *Gomeene Thym*, Dutch; *Timo*, Ital.; *Tomillo*, Span.; and *Tomilho*, Port.

4541. Of *thyme* there are two species cultivated for culinary purposes, the common and the lemon thyme. Common or garden thyme is the *Thymus vulgaris* L.; a low evergreen under-shrub, a native of Spain and Italy, and cultivated in this country since 1548, and probably long before. It seldom rises above a foot high, has smaller flowers than the common wild thyme, and is more delicate in its flavour. There are two varieties, the broad and the narrow leaved, besides the variegated, grown for ornament. Lemon thyme is the *T. citriodorus* P. S.; a very low evergreen shrub, trailing and seldom rising about four or six inches in height. It is readily distinguished from the former, and from wild thyme, of which it has generally been considered as a variety, by its strong smell of lemons, as the trivial name imports.

4542. *Use*. The young leaves and tops are used in soups, stuffings, and sauces. For these purposes, the broad-leaved common is generally preferred; but the flavour of the lemon is much liked in peculiar dishes.

4543. *Culture*. "To raise the plant from seed is the general and most eligible method. It is occasionally multiplied by parting the roots of stocky close plants, and by slips of the young shoots."

4544. *By seed*. "Sow in March or April in a bed or border of light fine earth, either broadcast scattered thin, and raked in lightly, which is the general course, or in small shallow drills, six inches asunder; the young plants may either remain, or be transplanted in the summer, when two or three inches high. A portion may be drilled, for an edging to a border. Give occasional light waterings in dry warm weather, both before and after the plants are up. As soon as they are from three to five inches in growth, in June or July, taking the opportunity of rain, thin some out, and plant six inches asunder, and water at planting. Others may be planted in a single row to form an edging to a border, either set close to form at once a full edging, or as far as three inches apart. Seedlings thus treated will come in for use the same year. Those who raise considerable supplies of thyme for the markets, usually sow large portions thickly in beds, to remain till of useful growth; then to be drawn off root and top together, at different seasons, as wanted; it is then tied in small bunches for market. Some persons also transplant considerable portions in spring and summer, to six, ten, or twelve inches' distance, to form a stocky full growth, to be drawn off in large bushy plants."

4545. *By offsets*. "Thyme is also propagated by slips of the branchy shoots in the spring, or early in autumn; but more effectually by sections of the stool, top and root together, or by removing rooted branches. To make branches quickly root, loosen the mould about any established bushy plants, in spring or summer, and lay some fresh earth a small depth upon the spreading shoots: they will all be well rooted the same year for planting off. Plant in light rich earth: shade and water till rooted. In autumn, so provide against the effects of frost on exotic evergreens, dry and house a store for winter; either cutting the tops, or drawing entire plants."

4546. *To save seed*. "It is produced abundantly, and ripens in summer and autumn. Gather the seed-spikes, spread them upon a cloth to dry; rub out clean, and put the seeds up for sowing the following year." (*Abercrombie*.)

SUBSECT. 2. *Sage*. — *Salvia officinalis* L. (*Ger. Herb.* 623. f. 1.); *Dián. Monog.* L. and *Labiata* B. P. *Sauge*, Fr.; *Salbey*, Ger.; *Salis*, Dutch; *Salvia*, Ital. and Span.

4547. The *sage* is an evergreen under-shrub, a native of the south of Europe, and mentioned by Gerard, in 1597, as an inhabitant of our gardens.

4548. *Use*. The leaves are used in stuffings and sauces for many kinds of innoxious and strong meats; as well as to improve the flavour of various articles of cookery. The decoction called *sage-tea* is usually made from one variety, the small-leaved green, or sage of virtue; but any of the others are equally fit for this purpose.

4549. *Varieties*. These are —

1. Common, or Red.

2. Green.

3. Small-leaved green, or Sage of virtue.

4. Broad-leaved, or Balmic.

4550. *Estimate of sorts*. "The red is the principal sort in culinary use, having the most agreeable and fullest flavour; the green is next in estimation with the cook; but the small-leaved is generally preferred to those to eat as a raw herb, and for decoctions; while the broad-leaved balsamic species is the most efficacious in a medical way, and is also a tea-herb. However, any of the sorts may be occasionally used for those alternate purposes."

4551. *Culture*. "All the varieties may be propagated by slips or cuttings of the young shoots, taken from March to June; but most successfully in May and June, by detaching the young shoots of the same year. The outward shoots are to be preferred; slip or cut them off five or six inches long, stripping off the under leaves, and preserving the top leaves entire: plant them in a shady border, six inches asunder, inserting them quite down to the top leaves, and water them. They will soon take root freely, especially the young shoots planted in May and June. In the advancing growth, if they spindle up in flower-stalks, pinch or cut that part down, that the plants may shoot out full and stocky from the bottom in close bushy growth for use the same year. In gathering sage for use, cut or slip off the young side and top shoots neatly; and be careful not to stub too close, especially towards winter, and during that season. In July and the rest of summer, it is usual to gather some of young top growth to dry for winter. Keep the plants in regular bushy heads by cutting away disorderly growths, and the decayed flower-stalks in autumn. Keep them clear from weeds; and sometimes loosen the earth between and about the plants, with a hoe, garden-trowel, or small spade, in spring and autumn. Make a fresh plantation once in two, three, or four years, or as may be necessary by the plants becoming naked, stubby, and dwindling." (*Abercrombie*.)

SUBJECT. 3. *Clary*. — *Salvia Sclarea* L. (*Fl. Græc.* i. t. 27.); *Dian. Monog.* L. and *Labiata* B. P. *Ovale*, Fr.; *Scharlackkraut*, Ger.; and *Schiavoa*, Ital.

4552. The clary is a hardy biennial, a native of Italy, introduced in this country in 1562. The lower leaves are very large, the stem is about two feet high, clammy to the feel; the flowers are in loose, terminating spikes, composing whorls, and of a pale-blue colour.

4553. *Use*. The leaves are sometimes used in soups, though some dislike its scent. Its flowers are used for a fermented wine, and the whole plant is, like sage, esteemed medicinal.

4554. *Culture*. Clary is raised from seed, and sometimes from cuttings and slips. A small bed will supply most families; and, if raised from seed, a quarter of an ounce will suffice for a seed-bed to be transplanted from two feet by two. Sow in the last fortnight of March, or the course of April, in any bed or border thinly, and rake in the seed. In summer, when the plants are advanced two or three inches, transplant a portion of the strongest from twelve to eighteen inches apart, to allow competent room for the leaves to spread into full growth, when they will be fit for use the same year, and in continuation through winter until the following spring and summer.

4555. *To save seed*. In the spring, allot some old plants to run up into stalk: these will yield ripe seed in autumn.

SUBJECT. 4. *Mint*. — *Mentha* L.; *Didy. Gymnos.* L. and *Labiata* J. *Menthe*, Fr.; *Münze*, Ger.; *Munt*, Dutch; *Erba Santa Maria*, Ital. (*fig.* 740.); and *Mintu*, Span.

4556. Of mint there are several species cultivated in gardens; all of them indigenous perennials. The principal are —

4557. *The Peppermint* (*M. piperita* L.), (*Eng. Bot.* 687.) (a), is used almost entirely for distillation, for which it is extensively cultivated in low, rich, soft, marshy lands, especially such as can be irrigated or flooded.

4558. *The Spearmint* (*M. viridis* L.), (*Eng. Bot.* 949a.) (c), the young leaves and tops of which are used in spring salads, and form an ingredient in soups; they are also employed to give flavour to certain dishes, as peas, &c., being boiled for a time, and then withdrawn.

4559. *The Pennyroyal-mint* (*M. pulegium* L.), (*Eng. Bot.* 1906.) (b), *Poultie*, Fr.; *Poley*, Ger.; and *Puleggio*, Ital.; a trailing plant with small, smooth, ovate leaves, which is used for different branches of cookery, and also for distilling pennyroyal-water.

4560. *Culture*. All "the species are raised by the same methods, viz. by parting the roots, by offset young plants, and by cuttings of the stalks." By the roots. This is performed in spring or autumn. Having some full roots from any established beds, divide them as expedient; and, drawing drills with a hoe, about two inches deep, and six inches asunder, place the roots in the drills, moderately close, and earth them over to an equal depth. By offsets in the spring. Procure these from established plants, and dibble them, in rows, six inches asunder. By cuttings of the young stalks in May, June, or advanced summer. Taking the opportunity of showery weather, cut them into cuttings by dibble, six inches apart, inserted half way into the earth.

4561. *Soil*. Spearmint and peppermint like a moist soil; pennyroyal a strong loam.

4562. *Subsequent culture*. "Propagated in any of the above methods, the plants set in spring or summer will come into use the same year. Water new plants till they take root. Keep them clean from weeds. At the end of autumn, cut away any remaining stems; at which season, or in spring, spread a little loose earth thinly over the beds."

4563. *Taking the crop*. "For culinary use, or salads, gather both when the young green tops are from one inch to six inches in length, and in their advanced growth, throughout the summer. When nearly full grown in June, July, or August, or beginning to flower, gather a store for winter. Spread the hands thinly in some dry place, shaded from the sun, to be well dried; then, tied in bunches, house the store. When designed for distilling, let them attain full growth, coming into flower; then cut, and use the heads immediately. The peppermint, being principally used for distilling, and such of the pennyroyal as is wanted for the same purpose, should stand till they begin to flower; being then in highest perfection. Cut in dry weather, and tie in bunches, and carry under cover, ready for immediate use. Cut full-grown stalks close to the bottom."

4564. *New plantation*. "All the species continue by the roots many years; but when the plants shoot dwindling, or weakly, make a fresh plantation in time."

4565. *Forcing spearmint*. "Mint, in a young green state, may be obtained all winter, and early in spring, by planting some roots in a gentle hot-bed, or in pots or shallow pans, to be plunged therein. Plant the roots pretty thickly, and earth over an inch and a half deep; or some roots, thus planted in pots or boxes, may be placed in a stove. Plant for succession every three weeks, as forced roots soon decay. In order to have young leaves and tops all the summer, cut down some advanced stalks every month, when new shoots will be thrown up; and to have dried balm for the winter, permit others to complete their growth, and come into blossom. These last are to be cut as soon as the dew is off in the morning; for in the afternoon, and especially during bright sunshine, the odour of the plant is found to be much diminished. Dry the crop thus gathered in the shade, and afterwards keep it in small bundles, compactly pressed down, and covered with white paper. By the common mode of hanging up mint and other herbs in loose bundles, the odour soon escapes. The mint having a travelling root, the bed soon becomes covered, so as not to admit of further culture; hence, after four or five years' standing, a fresh plantation will require to be made."

SUBJECT. 5. *Marjoram*. — *Origanum* L.; *Didy. Gymnos.* L. and *Labiata* J. *Marjolaine*, Fr.; *Marjoran*, Ger.; *Mariolein*, Dutch; *Maggiorana*, Ital.; and *Mejoruna*, Span.

4566. Of marjoram four different species are cultivated; the *pot*, *sweet*, *winter*, and *common*.



4567. *Pot marjoram* is the *O. Onites* L. (*Bocc. Mus.* t. 32.); a hardy perennial under-shrub, a native of Sicily, introduced in 1759. Though hardy enough to withstand our winters, it seldom ripens its seeds in this country. It is in flower from July to November, and is propagated from seed, but chiefly from rooted slips.

4568. *Sweet marjoram* is the *O. Majorana* L. (*Moris.* a. 11 t. 3. f. 1.); a hardy biennial, a native of Portugal, and introduced in 1573. The flowers, which appear in June and July, are collected in small close heads; and hence is often called knotted marjoram. As the seed seldom ripens in this country, it is generally procured from France. When in blossom, the herb is cut over, and dried for winter use, so that a sowing requires to be made every year.

4569. *The winter sweet marjoram* is the *O. heracleoticum* L. (*Loeb. Ic.* 462.); a hardy perennial, a native of Greece, and introduced in 1640. The leaves of this species resemble those of *O. Majorana*; but the flowers come in spikes. It flowers from June to November; requires a sheltered dry soil, and seldom ripening its seeds in this country is propagated by cuttings and slips.

4570. *The common marjoram* is the *O. vulgare* L. (*Eng. Bot.* 1143.); a hardy perennial, a native of Britain, and found under thickets and copses on chalky soils. This species is only used in cookery in default of one of the others.

4571. *Use.* All the species, but especially the first three, are aromatics, of sweet flavour, much used as relishing herbs in soups, broths, stuffings, &c. The young tender tops and leaves together are used in summer in a green state; and they are dried for winter.

4572. *Culture.* The first three species prefer a light dry soil; the other, a calcareous soil and shady situation. Though the *O. Majorana*, or sweet marjoram, be a biennial in its native country, and here, when it receives the aid of a green-house through the winter, yet, in the open garden, it requires to be treated as an annual, and sown and reaped the same year. For a seed-bed three feet by three feet, a quarter of an ounce of seed is sufficient. Sow in April on a compartment of light earth, either in small drills, or broadcast; or sow a portion in a hotbed, if requisite to have a small crop forwarded. When the plants are one, two, or three inches high, thin the seed-beds; and plant those thinned out in a final bed, six inches apart, giving water; or, where larger supplies are required, some may remain thick where sown, to be drawn off by the roots as wanted. The pot, winter, and common marjoram may be propagated from offsets by parting the roots in spring and autumn. Plant in rows or in beds, allowing a square foot for each plant.

4573. *Gather the tops* of all the sorts as wanted for summer use; and when in full blossom, in July or August, for preservation through the winter.

SUBJECT. 6. *Savory.* — *Satureja* L.; *Didymia Gymnospermia* L. and *Labiata* J. *Sariette*, Fr.; *Saturei*, Ger.; *Keul*, Dutch; *Satoreggia*, Ital.; and *Ajedrea*, Span.

4574. *Of savory* two species are cultivated, the winter and summer savory.

4575. *Winter savory* is the *S. montana* L. (*Fl. Gr.* 543.); a hardy under-shrub, a native of the south of France and Italy, and known in this country since 1562.

4576. *Summer savory* is the *S. hortensis* L. (*Lam. Ill.* t. 504. f. 1.); a hardy annual, a native of Italy, and known in this country since 1652. The branches are slender, erect, and about a foot high; leaves opposite, and about an inch in length. It flowers in June and July.

4577. *Culture.* The perennial is generally propagated by slips, or cuttings, of the young side shoots, in April, May, June, or July; planted in a shady border, and watered; also by dividing the bottom off set-rooted shoots, the root and top-part together, planted as above. When the plants are a little advanced in branchy top growth, they may be transplanted: set some in single plants, a foot apart; others, to form a close edging. Keep the ground clear of weeds: in spring and autumn loosen the earth a little about the plants, and trim off decayed and irregular parts. This herb may also be occasionally raised from seed in the spring, as directed below, for the summer savory. It continues useful summer and winter; and some may be gathered, when of full growth, in autumn, to dry for winter use. The annual is always raised from seed. In March or April, sow either in small drills, nine by six inches apart; or on the smoothed surface, and rake in lightly. The plants may either remain, to be thinned, or some may be transplanted in June, nine by six inches asunder. This herb comes in for gathering from June until October. When a store is to be dried, draw it by the roots." (*Abercrombie.*)

SUBJECT. 7. *Basil.* — *Ocimum* L.; *Didyn. Gymnos.* L. and *Labiata* J. *Basilic*, Fr.; *Basilikum*, Ger.; and *Basilico*, Ital.

4578. *Of basil* two species are cultivated as culinary aromatics. *The sweet or larger basil* is the *O. Basilicum* L. (*Blackw.* t. 104.); a tender annual plant, highly aromatic, a native of the East Indies, and introduced into this country in 1548. *The bush or least basil* is the *O. minimum* L. (*Schk. Hand.* 2. t. 166.); an annual aromatic plant, a native of the East Indies, flowers in June and July, and was introduced into this country in 1573.

4579. *Use.* The leaves and small brachis, or leafy tops, are the parts gathered; and on account of their strong flavour of cloves, they are often used in highly seasoned dishes. A few leaves are sometimes introduced into salad, and not unfrequently into soups.

4580. *Culture.* Both species are raised from seed, and for a seed-bed of three feet by one and a half, to furnish plants for a final plantation four feet by two, a quarter of an ounce will be sufficient. Sow on a hotbed in the end of March, and plant out in a warm border of rich soil, the larger at eight or ten inches every way, and the lesser at six or eight inches square. Sometimes both sorts are sown in the open border; but so treated, they come up late and small. In transplanting from the hotbed, take care to raise the plants in small tufts, or single plants, with balls attached; by which they receive no check, and if watered after planting, and in dry weather, will soon produce abundance of tops.

4581. *Seed* can only be sown in England in warm dry seasons, and under the most favourable circumstances of situation and precocity. In general it is procured by the seedsmen from Italy.

SUBJECT. 8. *Rosemary.* — *Rosmarinus officinalis* L. (*Flor. Græc.* 1. t. 14.); *Diandra Monogynia* L. and *Labiata* B. P. *Romarin*, Fr.; *Rosmarin* Ger.; *Rosemaryn*, Dutch; *Rosmarino*, Ital.; *Romaro*, Span.; and *Rosmarinho*, Port.

4582. *The rosemary* is a hardy under-shrub, a native of the south of Europe, introduced in, or before, 1548. The plant is evergreen, and highly aromatic.

4583. *Use.* The flowers and calyces form a principal ingredient in the distillation of Hungary water. Infusions of the leaves are made in some drinks, and the sprigs are used as a garnish. In some parts of the west of England and in Wales, the sprigs are distributed to the company at funerals, as tokens of remembrance, and often thrown into the grave upon the coffin of the deceased.

4384. *Varieties*. These are —

1. *The green, or cocoon.* | 2. *The gold-striped.* | 3. *The silver-striped.*

4385. *Culture*. "The green is hardest as a plant, and is the sort generally used. The finest plants are raised from seed. Sow either broadcast or in small drills, six inches apart. The green is also raised by planting slips or cuttings of the young shoots in spring and summer, in a shady border. Let these be taken off five, six, or seven inches long, detaching the under-leaves. Set them in a row from six to twelve inches apart, nearly two thirds into the ground; water at planting, and occasionally afterwards, till they have struck. The plants will be strong and well rooted by autumn, when they should be transplanted at proper distances. A light sandy soil assists exotic evergreens, that retain some of their original delicacy, to stand the winter; partly by preventing them from growing too luxuriantly, and partly by not being a conductor of frost. In their final situations, train the plants, either with a bushy head, of moderate growth; or, if near a fence, in a fan-like order." (*Abercrombie*.) The striped sorts may be propagated by layers of the young wood, as they are not so free to grow from cuttings. Being a little tender, they must be planted in a warm situation. They are retained chiefly as ornamental, on account of the variegation of their leaves.

SUBSECT. 9. *Lavender*. — *Lavandula Spica* L. (*Schk. Hand. 3. t. 157.*); *Didym. Gyn-nosperm.* L. and *Labrida* J. *Lavande*, Fr.; *Spiklavendel*, Ger.; *Lavendel*, Dutch; *Lavendula*, Ital.; *Espiego*, Span.; and *Alfazema*, Port.

4386. *The lavender* is a hardy under-shrub, a native of the south of Europe, and introduced in 1658. The leaves and flowers are powerfully aromatic.

4387. *Use*. It is rather a medicinal plant than one used in cookery; though a few plants are kept in every garden. Imitation scent-bottles are made by the ladies of the fragrant spikes. They are also put in paper-bags, and placed among linens to perfume them. Lavender-water, a well known perfume, is distilled from the flowers; for which purpose the plant is extensively cultivated in different places, but more especially at Mitcham in Surrey, and Maidenhead in Berkshire.

4388. *Varieties*. The narrow-leaved and the broad-leaved, both equally good.
4389. *Propagation and culture*. "It is propagated by seeds, and also by cuttings and slips, like rosemary: it likes a dry soil, and may be planted either in distinct plants two feet asunder, or to form a sort of hedge-row, in one or more lines, especially where large supplies of flowers are required for distilling. The plants will advance in a close branchy growth, from a foot and a half to two feet high, or more; and, when established, will produce plenty of flowers in July and August: gather them while in perfection, cutting the spikes off close to the stem. Then give the plants occasional trimming, taking off the gross and rampant shoots of the year, and the decayed flower-spikes." Neill observes, "If lavender be planted in a dry, gravelly, or poor soil, its flowers have a powerful odour, and the severity of our winters has little effect on it; while in a rich garden soil, although it grows strongly, it is apt to be killed, and the flowers have less perfume."

SUBSECT. 10. *Tansy*. — *Tanacetum vulgare* L. (*Eng. Bot. 1229.*) *Syng. Polyg. Super-fua* L. and *Composita* J. *Tunaisie*, Fr.; *Rheinfarn*, Ger.; *Reinswar*, Dutch; and *Tanaceto*, Ital.

4390. *The tansy* is a perennial plant, growing in many parts of Britain on the sandy banks of rivers. The leaves and flowers are aromatic.

4391. *Use*. The young leaves are shredded down and employed to give colour and flavour to puddings; they are also used in omelets and other cakes, and were formerly in much repute as a vermifuge.

4392. *Varieties*. These are, the common; the curled, generally preferred; and the variegated, cultivated chiefly for ornament.

4393. *Culture*. Tansy may be propagated in spring or autumn by rooted slips, or by dividing the roots into several sets: plant them in any compartment of the kitchen or physic garden, from twelve to eighteen inches asunder. The plant continues for several years, producing abundant tufts of leaves annually. As they run up in strong stalks in summer, these should be cut down to encourage a production of young leaves low on the stem.

4394. *To have young tansy in winter*. Plant some roots either in a hotbed or in pots placed therein, or in a pinery or forcing-house, at any time from November to March. (*Abercrombie*.)

SUBSECT. 11. *Costmary, or Alecost*. — *Balsamita vulgaris* H. K., *Tanacetum Balsamita* L. (*Schk. Hand. 3. t. 240.*); *Syngenesia Polyg. Superfua* L. and *Composita* J. *Coq-des-jardins*, Fr.; *Frauenminze*, Ger.; and *Costo ortense*, Ital.

4395. *The costmary* is a hardy perennial plant, a native of Italy, and introduced in this country in 1568. The whole plant has a peculiarly agreeable odour, and its name, costmary, intimates that it is the *costus*, or aromatic plant of the Virgin. There is a variety with deep-cut, hoary leaves, but it is less fragrant than the other.

4396. *Use*. In France it is used in salads; and was formerly put into ale and negus; and hence the name of alecost. In this country, at present, it is but little used in the kitchen.

4397. *Propagation and culture*. It is a travelling-rooted plant, and readily propagated by division after the flowering season, or in spring. It delights in a dry soil, and a plantation once made will remain good for several years.

SECT. X. *Plants used in Tarts, Confectionery, and Domestic Medicine.*

4398. *Of confectionery plants*, excepting the species of rhubarb used as a substitute for, or addition to, gooseberries, this class occupies only a few yards of the largest kitchen-garden. Almost the only species worthy of introduction in that of the cottager, unless we except the chamomile, is the rhubarb.

SUBSECT. 1. *Rhubarb*. — *Rhæum* L.; *Enneandria Trigynia* L. and *Polygones* J. *Rhubarbe*, Fr.; *Rabarber*, Ger. and Dutch; *Rabarbaro*, Ital.; and *Ruibarbo*, Span. and Port.

4399. *Of rhubarb* there are several species and varieties in cultivation, all perennials.

4400. *Use*. The first four sorts are cultivated entirely, and the fifth principally, for the petioles of the root-leaves, which are peeled, cut down, and formed into tarts and pies in the manner of apples and

gooseberries. The *R. hybridum* affords the most abundant and succulent supply for this purpose, as the Elford rhubarb the earliest; unless we except a variety recently originated in the Epsom nursery, which is said to be the earliest of all. (See *Gard. Mag.*, vol. ix.)

4601. *Species and varieties.* The following are enumerated by Mr. Lindley:—

1. *Buck's rhubarb*, *Rheum undulatum*. A native of China, introduced in 1754.
2. *Common rhubarb*, *Rheum Rhaiponticum*. A native of Asia, cultivated in 1575.
3. *Elford rhubarb*, or *early scarlet*.

- Rheum undulatum*, var. A variety raised by Mr. William Buck, of Elford. (See *Gard. Mag.*, vol. iv. p. 104.)
4. *Hybrid rhubarb*, *Rheum hybridum*. A native of Asia, cultivated in 1778.

5. *The palmato-lobed*, or *Turkey rhubarb*, *Rheum palmatum*, considered by some to have a superior flavour (see *Gard. Mag.*, vol. i. p. 396); though this is doubted by others. (*Ibid.* vol. ii. p. 486.)

4602. *Estimate of sorts.* One of the most valuable varieties of rhubarb is the Elford, raised some years ago by Mr. William Buck, gardener to the Honourable Fulke Greville Howard, at Elford, near Lichfield, Staffordshire. It is a very early sort, and may be forced, either in the forcing-house, mushroom-house, or under garden pots in the open garden, in the manner of sea kale. It possesses the peculiar property of retaining its brilliant scarlet colour, although forced in perfect darkness; a property not possessed, probably, by any other culinary vegetable: in addition to which its flavour in a tart is not surpassed by that of any other variety. By potting the plants, and placing them in the forcing-house, or mushroom-house, in November, the leaf-stalks will be fit to gather by Christmas, and by bringing in other plants, a succession may be kept up till March. By placing large garden pots over the roots in the garden in February, and covering them over with hot dung, a succession may be kept up from March, till a crop can be gathered in the open air from the same variety, which will be a month before any other sort makes its appearance. *R. Rhaiponticum* and *hybridum* are grown only for cutting in the open air, as their colour and flavour are neither of them improved by forcing; the latter, having very long leaves and petioles, is by far the most desirable as an open crop. All the sorts require a good deep soil, trenched two or three feet deep, and the roots planted in rows four feet apart, and the plants three feet from each other. A strong plant of *R. hybridum*, however, will spread eight feet." (*Lindley's Guide to the Orchard and Kitchen Garden*, p. 573.)

4603. *Propagation and culture.* All the sorts may be raised either from seed or by dividing the roots. If from seed, which is the best mode, sow in light deep earth in spring; and the plants, if kept eight or nine inches asunder, will be fit for transplanting in autumn, and for use next spring. When the roots are divided, care should be had to retain a bud on the crown of each section; they may be planted where they are finally to remain. When planting is to be made, the ground, which should be sandy, and rather sandy, but well manured, should be trenched three spits, or as deep as the subsoil will admit, adding a good manuring of well-rotted bothee dung. Then plant in rows three feet wide by two feet in the rows for the *R. Rhaiponticum* and *palmatum*, and five feet wide by three feet in the rows for the *R. hybridum*. No other culture is required than keeping the ground free of weeds, occasionally stirring it during summer with a three-pronged fork, and adding a dressing of well-rotted manure every autumn or spring, stirring the earth as deep as possible. Such a plantation will continue good many years. Some never allow the flower-stalks to produce flowers; and others cut them over as soon as they have done flowering, to prevent the plants from being exhausted by the production of seeds. The former seems the preferable method, as the flower-stalks of plants cannot, like the leaves, be considered as preparing a reserve of nourishment for the roots.

4604. *Blanching.* The advantages of blanching the stalks of rhubarb for culinary purposes have been pointed out by T. Hare, Esq. (*Hort. Trans.*, vol. ii.). "These are twofold, namely, the desirable qualities of improved appearance and flavour, and a saving in the quantity of sugar necessary to render it agreeable to the palate, since the leaf stalks, when blanched, are much less harsh than those grown under the full influence of light in an open situation." It may either be blanched by earthing up the roots early in spring, or earthen pots or covers may be used, as in blanching sea kale.

4605. *Rhubarb may be forced* by any of the methods used in forcing sea kale or asparagus. For example, by boxes of roots placed in a mushroom box. (*Gard. Mag.*, vol. i. p. 307; vol. ii. p. 356; and vol. iii. p. 172.) Where the plants stand in the open garden, by linings between the beds, and by covering the plants with large pots, and laying litter over these (*Ibid.*, vol. iv. p. 104); by covering with boxes and leaves as in forcing sea kale. (*Ibid.*, vol. v. p. 544, &c.)

4606. *Knight*, who has forced the rhubarb in pots, gives the following *rationale* of his practice:—"The root of every perennial herbaceous plant contains within itself, during winter, all the organised matter, which it expends in the spring in the formation of its first foliage and flower-stems; and it requires neither food nor light to enable it to produce these, but simply heat and water: and if the root be removed entire, and its leaves become lifeless, it will be found to vegetate, after being replanted, as strongly as it would have done, if it had retained its first position. These circumstances led me, in the last winter, to dig up the roots of many plants of the common rhubarb (which I had raised from cuttings in the preceding spring), and to place them in a few large and deep pots, each pot being made to receive as many as it would contain. Some fine sandy loam was then washed in, to fill entirely the interstices between the roots, the tops of which were so placed as to be level with each other, and about an inch below the surface of the mould in the pots, which were covered with other pots of the same size, inverted upon them: being then placed in a vinery (in a situation where nothing else could be made to thrive, on account of want of light), and being copiously supplied with water, the plants vegetated rapidly and strongly; and from each pot I obtained three successive crops, the leaf stalks of the first two being crowded so closely as nearly to touch each other over the whole surface of the pots."

4607. *Taking the stalks.* Remove a little earth, and, bending down the leaf you would remove, slip it off from the crown, without breaking or using the knife. The stalks are fit to use when the leaf is half expanded; but a larger produce is obtained by letting them remain till in full expansion, as is practised by the market-gardeners. The stalks are tied in bundles of a dozen and upwards, and thus exposed for sale.

4608. *To save seed.* Leave one or two of the strongest flower-stalks to perfect their seeds, which they will do in July and August.

SUBJECT. 2. *Pompion and Gourd.*—*Cucurbita* L.; *Monac. Monad.* L. and *Cucurbitacea* J. Courge, Fr.; Kürbis, Ger.; *Kawwerde*, Dutch; *Zucca*, Ital.; *Calabaza*, Span.; and *Abobaro*, Port.

4609. *The pompion and gourd* tribe are natives of India and the East, all tender or half-hardy annuals, but producing fruit in the open air in Britain in the warmest period of our summers.

4610. *Use.* The fruit is used in soups and stews on the Continent and in Britain, also boiled or fried; and extensively in America, not only as above, but in pies and tarts. In the latter case, it is generally mixed with apples. Pumpkin pie, Mr. Main says, is a very common fare among country labourers in some parts of England. Crabs or wilding apples are always used along with the pumpkin, and both fruits are stored by the cottager for winter use. The tender tops of the shoots of gourds and pumpkins, and of all the edible *Cucurbitaceae*, boiled as greens or spinach, are still more delicate as vegetables than the fruit. In Italy the flowers are fried, and are considered most excellent. (*Gard. Mag.*, vol. viii. p. 464.) For various modes of cooking gourds and pumpkins, see *Gard. Mag.*, vol. vii. p. 190; vol. viii. p. 185, and 464.

4611. *Species and varieties.* These are numerous, but they may be all included under the following sorts; which, according to some, are distinct species, and according to others, in part, only, varieties or sub-species.

4612. (1.) *The pumpkin, pumpkin*, or, more correctly, *pompion*, is the *C. Pèpo L.* (*Potiron*, Fr.; *Pfebenkürbis*, Ger.); a native of the Levant, and introduced in 1570. This is the melon or millon of our early horticulturists, the true melon being formerly distinguished by the name of musk melon. Till about 1815 this was the principal plant of the gourd kind cultivated in the British gardens; in those of the rich chiefly as an ornament, and in those of the poor, in some parts of England, as a culinary vegetable, more especially for pumpkin pie.

4613. (2.) *Turban pumpkin*, or *Turk's cap* (*C. Pèpo* var. *clypeatus*; *Gerasmon turban*, *Patisson*, *Bonnet d'Electeur*, or *Artichaut de Jérusalem*, Fr.; *Pasterkürbis*, Ger.; and *Zucca Gerasolenne*, Ital. *Gard. Mag.*, vol. viii. p. 494.); cultivated chiefly for its singular form, but at the same time an excellent vegetable. The plant does not spread so much as most of the other species of the same family, which is a great advantage for small gardens.

4614. (3.) *The melon pumpkin*, or *squash* (*C. Melopepo L.*; *Courge melonde*, Fr.; *Melonenkürbis*, Ger.); a native of the Levant, and introduced in 1597. It is cultivated like the pumpkin, and the fruit is used in pies, or gathered when of the size of a hen's egg, dressed in salt and water, and sliced and served on a toast. It is also used for pickling. In North America it is cultivated as an article of food.

4615. (4.) *The large American gourd*, or *mammoth* (*C. Melopepo maxima L.*; *Potiron Jaune*, Fr.; and *Melonenkürbis*, Ger.) This is the largest of all the gourds, being sometimes 160 pounds in weight (see *Gard. Mag.*, vol. iii. p. 362.); and one, grown at Luscombe, near Exeter, having reached the enormous weight of 246 pounds! (*Ibid.* vol. vii. p. 102.) When the fruit is ripe, it will keep several months; and it is considered a good substitute for carrots and potatoes, either in soups and broths, or as a vegetable to meat. It is supplied in immense quantities by the market-gardeners round Paris to the hospitals of that city. († 476.)

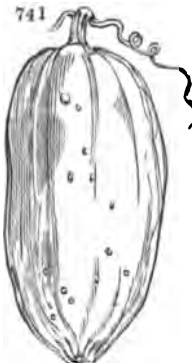
4616. (5.) *The warted gourd* (*C. verrucosa*) is a native of the Levant, and introduced in 1638. Its nature and uses are the same as those of the squash; and, like it, it is cultivated in North America as an article of food.

4617. (6.) *The bottle gourd*, or *false calabash* (*C. Lagenaria*), (*Rumph. Am. 5. t. 144.*) is a native of India, and introduced in 1597. Its culture and uses are the same as those of the last two sorts.

4618. (7.) *The orange-fruited gourd* (*C. aurantia*) is a native of Chili, introduced in 1802, and rather more tender than the common pumpkin. It is here hitherto cultivated chiefly for curiosity, and when trained spirally round a pole, or against a wall, and loaded with its yellow fruit, it is very ornamental. The fruit may be used like those of the other sorts.

4619. (8.) *The vegetable marrow* (*C. ovifera* var. *L.*; *Courge à la moëlle*, Fr.; *Mariage melonenkürbis*, Ger.) (*Ag. 741.*) is one of the most valuable varieties of this description of vegetable. It is useful for culinary purposes in every stage of its growth, peculiarly tender and sweet, and the plant is a great bearer. On the whole, it is considered the best of all the sorts for using in an unripe state, as the mammoth is the best for using ripe, as a substitute for carrots and potatoes.

4620. *Culture applicable to all the species.* They are propagated from seeds, which are large, and require to be covered nearly an inch. "Sow in April, in a hotbed under a frame or hand-glass, to raise plants for transferring to the open garden at the end of May under a warm aspect; or for planting out in the middle of May on a trench of hot dung under a hand-glass or half-shelter: otherwise sow, at the beginning of May, under a hand-glass without bottom-heat, for transplanting into a favourable situation; or sow three weeks later (after the 20th) at once in the open garden, under a south wall, for the plants to remain. The smaller-fruited kinds do best trained to an upright pole or trellis. From time to time earth up the shanks of the plants. As the runners extend five feet or more, peg down at a joint, and they will take root. Water copiously whenever warm weather makes the ground arid." (*Abercrombie.*)



SUBJECT. 3. *Angelica*. — *Angelica Archangelica L.* (*Fl. Dan. t. 206.*); *Pent. Dig. L. Umbellifera J. Angélique*, Fr.; *Engelwürtz*, Ger.; *Engelwortel*, Dutch; *Angelica*, Ital. and Port.; and *Anjelica*, Span.

4621. *The angelica* is a native of England, being sometimes found there in moist situations, and of the northern countries of Europe. The whole plant is powerfully aromatic. Though only a biennial, it may be made to continue several years, by cutting over the flower-stem before it ripens seed; in which case it immediately pushes out below. Considerable quantities of this plant are grown by the London gardeners in moist situations, and along the banks of ditches.

4622. *Use.* In Sweden and Norway, the leaves and stalks of this plant are eaten raw, or boiled with meat and fish; and the seeds, which are powerfully aromatic, are used to flavour ardent spirits. In France, England, and Germany, the tender stems, stalks, and the midribs of the leaves, cut in May, are candied with sugar by the confectioners.

4623. *Propagation and culture.* It delights in moist situations, or the banks of running water; but will grow freely in any soil and exposure. The plants are raised from seed, and, for a bed four feet and a half by six feet, sown in drills a foot apart, to be transplanted, half an ounce of seed will be requisite. "Sow in August, or as soon as the seed is ripe, as the plants will come up earlier and stronger than from a sowing in the spring. When the plants are advanced from four to six inches high, transplant them into rows two feet apart. They will soon strike root, and advance quickly in strong growth. In the second year, their strong erect branchy stalks will be several feet high, producing large umbels of seed, ripening in autumn, which, as well as the leaves of the plant, are used in medicine. But, for candying, the young shoots of the stems and stalks of the leaves are the useful parts: being cut, while green and tender, in May and June, they are made by confectioners into the sweetmeat called Angelica. In the second year, if seed is not wanted, cut the plants down in May, and the stool will send out side-shoots; by repeating this practice every year, the same plant may be long continued. Cuttings will also grow." (*Abercrombie.*)

SUBJECT. 4. *Anise*. — *Pimpinella Anisum L.*, *Tridgium Anisum Spr.* (*Blackw. t. 374.*); *Pent. Trig. L. and Umbellifera J. Anis*, or *Bouçage*, Fr.; *Anis*, Ger.; and *Anice*, Ital.

4624. *The anise* is an annual plant, a native of Egypt, and introduced to this country, according to Turner, in 1551.

4625. *Use.* It is cultivated in Malta and Spain for its seeds, which are annually imported as medicinal, and for distillation and expression. In this country, it is occasionally grown in the garden, to be used as a garnish, and for seasoning, like fennel.

4626. *Culture.* The seeds require to be sown in April, in a warm border, in a dry light soil; or raised in pots on heat, and removed to a warm site in May, where it will blossom and ripen seeds in August in favourable seasons. It does not bear transplanting, but the plants, when too thick, are to be thinned out to three or four inches' distance.

SUBSECT. 5. *Coriander.* — *Coriandrum sativum* L. (*Eng. Bot.* 67.); *Pentánd. Dig.* L. and *Umbelliferae* J. *Coriandre*, Fr.; *Koriander*, Ger. and Dutch; and *Coriandro*, Ital.

4627. *The coriander* is a hardy annual plant, originally introduced from the East, but now naturalised in Essex and other places, where it has long been cultivated for druggists and confectioners. The whole plant is highly aromatic.

4628. *Use.* In private gardens, it is cultivated chiefly for the tender leaves, which are used in soups and salads. On a large scale, it is cultivated for the seed, which is used by confectioners, druggists, and distillers, in large quantities.

4629. *Culture.* The plant delights in a sandy loam. It is raised from seeds, which may be sown in February, when the weather is mild and dry; and the quantity requisite for a bed four feet wide by six in length, to be sown in rows, is half an ounce; and when sown in drills, they may be nine inches apart, and the seed buried half an inch. "Where a constant succession is required, small successive monthly sowings will be necessary in spring and summer, as the plants in those seasons soon run to seed. There should be also small sowings in August and September, to stand the winter under the defence of a frame. The plants are to remain where sown." (*Abercrombie*.)

SUBSECT. 6. *Caraway.* — *Carrum Carui* L. (*Eng. Bot.* 1503.); *Pentándria Trigýnia* L. and *Umbelliferae* J. *Carvi*, Fr.; *Kümmel*, Ger.; *Karwey*, Dutch; *Carvi*, Ital.; and *Alcaravea*, Span.

4630. *The caraway* is a biennial aromatic plant, a native of England, being occasionally found in meadows and pastures.

4631. *Use.* The plant is cultivated chiefly for the seed, which is used in confectionery and in medicine. In spring, the under leaves are sometimes put in soups; and in former times the fusiform roots were eaten as parsnips, to which Parkinson gives them the preference. In Essex, large quantities of the seed are annually raised for distillation with spirituous liquors.

4632. *Culture.* It is raised from seed, of which a quarter of an ounce is sufficient for a seed-bed four feet by five. Sow annually, in autumn, soon after the seed is ripe; the seedlings will rise quickly, and should be thinned to a foot's distance each way. In default of sowing in autumn, sow in March or April, either in drills or broadcast; but the plants so raised will not in general flower till the following year. When the seed is ripe, the plant is generally pulled up in gathering, especially in field culture.

SUBSECT. 7. *Rue.* — *Ruta graveolens* L. (*Lam. Ill.* 345. t. 1.); *Decan. Monog.* L. and *Rutaceae* J. *Rue*, Fr.; *Raute*, Ger.; *Ruite*, Dutch; *Ruta*, Ital.; and *Ruda*, Span.

4633. *The rue* is a perennial evergreen under-shrub, a native of the south of Europe, but cultivated in this country since 1562, and probably long before.

4634. *Use.* The leaves are sometimes gathered as a medicinal simple, and are also given to poultry having the croup. In former days, it was called the herb of grace, from the circumstance of small bunches of it having been used by the priests for the sprinkling of holy water among the people.

4635. *Culture.* It is easily propagated by seeds, cuttings, or slips of the young shoots, in March, April, or May, planted in a shady border. The plant delights in a poor, dry, calcareous soil: in which it will continue for many years, and if cut down occasionally, always in full leaf and well furnished with young shoots. Letting it run to seed weakens the plant and shortens its longevity.

SUBSECT. 8. *Hyssop.* — *Hyssopus officinalis* L. (*Jac. Aug.* 3. t. 254.); *Didymmia Gymnos.* L.; and *Labiatae* J. *Hysope*, Fr.; *Isop*, Ger.; and *Isopo*, Ital.

4636. *The hyssop* is a hardy evergreen under-shrub, a native of the south of Europe, and introduced in 1548. The whole plant has a strong aromatic odour.

4637. *Use.* The leaves and young shoots are occasionally used as a potherb, and the leafy tops and flower-spikes are cut, dried, and preserved for medicinal purposes.

4638. *The varieties are* —

The white, blue, and red flowered; but the blue is the original colour, and most commonly cultivated.

4639. *Propagation and culture.* "It is raised by seed, by slips, and cuttings of the branches, and by slips of the root and top together. It likes a dry or sandy soil. When it is propagated by seed, sow in March or April a small portion, either broadcast and raked in, or in small drills, six inches apart. The plants may mostly be transplanted into final beds in June or July, nine inches apart, or some may be planted as an edging; or you may also sow some seed for an edging, to remain where sown. Give the edgings occasional trimming, in their established growth; cutting away also any decayed flower-spikes in autumn. You may take rooted offsets from established plants in March, April, August, or September; cuttings from the stalks in April and May; also rootless slips of the young shoots in June or July. After May, shade for a time, or plant in a shady border. If for culinary purposes, the distance from plant to plant may be nine inches; in the physic-garden, eighteen inches or two feet. Water at planting, and twice or thrice a week in dry weather till rooted." (*Abercrombie*.)

SUBSECT. 9. *Chamomile.* — *A'nthemis nobilis* L. (*Eng. Bot.* 980.); *Syngen. Polygámia Super.* L. and *Composita* J. *Camomille*, Fr.; *Kamille*, Ger.; and *Camomilla*, Ital.

4640. *The chamomile* is a hardy perennial, which grows wild in various parts of England in gravelly pastures, and by roadsides. The whole plant is bitter and highly aromatic.

4641. *Use.* It is cultivated on account of the flower, which is a safe bitter and stomachic, and much used under the name of chamomile tea. The double-flowering variety, though more beautiful than the single-flowered, is less useful; the aromatic principle not residing in the floccules of the ray, the multiplication of which constitutes the double flower. The double sort, however, is most cultivated by growers for the market, on account of its greater bulk and weight.

4642. *Varieties.* These are the common single, and the double-flowered.

4643. *Soil and culture.* This herb delights in a poor sandy soil. "Both kinds are propagated by parting the roots, or by slips of the rooted offsets, or of the runners. Detach them with roots, in little tufty sets, in March, April, or May; and plant them from eight to twelve inches asunder, giving water; repeat watering occasionally till they root; they will soon overspread the bed, and produce plenty of flowers the same year in July and August, and continue several years productive."

4644. *Taking the crop.* "The flowers should be gathered in their prime, in June or July, just when full-blown. Let them be spread to dry in a shady place; then put them in paper bags, and house them for use." (*Abercrombie.*)

SUBJECT. 10. *Elecampane.* — *Fusula Helénium* L. (*Eng. Bot.* t. 1546.); *Syng. Polyy.*
Super. L. and *Composita* J. *Fusula*, Fr. and Ger.; and *Inula*, Ital.

4645. *The elecampane* is a perennial plant, found in moist pastures in the south of England, and one of the largest herbaceous plants we have, rising from three to five feet high. The root is thick, fusiform, and aromatic; and was formerly in great repute, and the plant was cultivated in village gardens throughout Europe. In private gardens the plant still keeps its place in the physio-herb corner.

4646. *Use.* In France and Germany, the root is candied, and used as a stomachic, for strengthening the tone of the viscera in general. As a medicinal plant, it possesses the general virtues of alexipharmics.

4647. *Culture.* It is propagated by offsets in autumn, after the plant has done flowering: these, if planted in a deep soil, rather moist, or in a shady situation, will be fit for use the end of the second year. Roots of this age are said to be preferable to those of older plants.

SUBJECT. 11. *Liquorice.* — *Liquiritia officinalis* Meen., *Glycyrrhiza glabra* L. (*Lam.* ill. t. 625. f. 2.); *Diadél. Decén.* L. and *Leguminosæ* J. *Réglière*, Fr.; *Süßholz*, Ger.; *Zoe thout*, Dutch; *Regolizia*, Ital.; and *Regaliz*, Span.

4648. *The liquorice* is a hardy perennial plant, a native of the south of Europe, and introduced into this country in 1562. The roots run very deep into the ground, and creep to a considerable distance, sending up strong herbaceous stalks, four or five feet high. Stowe informs us that the planting and growing of *licorick* began about the first year of Queen Elizabeth.

4649. *Use.* It is cultivated on a large scale for the brewers and druggists, and in gardens for the saccharine juice obtained from the root by decoction, and used as an emollient in colds, fevers, &c.

4650. *Propagation and culture.* "Liquorice is propagated by cuttings of the roots. On account of the depth to which the root strikes, when the plant has room to flourish, the soil should have a good staple of mould thirty inches or three feet in depth. Taking the small horizontal roots of established plants, cut them into sections six inches long; having traced out rows a yard asunder, plant the sets along each row, at intervals of eighteen inches, covering them entirely with mould. For the first year, you may cultivate a light crop of lettuce or onions between the rows. During the summer, keep the plot clear from weeds; and when the subordinate crop comes off, hoe and dress the ground. At the close of autumn, or as a winter dressing, fork or dig between the rows, to stir and refresh the surface; and cut down the decayed stems."

4651. *Taking the crop.* "After three or four years' growth, the main roots will be of a mature size, and fit for consumption or the market. In the course of the following winter, begin to dig them up, opening a trench close to the first row, as deep as the roots; then, with the spade, turn out all the roots clean to the bottom; so proceed from trench to trench, and prepare the ground for some other crop." (*Abercrombie.*)

SUBJECT. 12. *Wormwood.* — *Artemisia Absinthium* L. (*Eng. Bot.* 1290.); *Syng. Polyy.*
Super. L. and *Composita* J. *Absinthe*, Fr.; *Wermuth*, Ger.; *Aleem*, Dutch; *Asensio*, Ital.; and *Ajenjo*, Span.

4652. *The wormwood* is a perennial plant, well known, and frequent in calcareous commons and by roadsides in England. The whole plant is intensely bitter and aromatic.

4653. *Use.* The seeds are used as stomachics, and the herb was formerly much employed as a vermifuge. The growth of the plant, Neil observes, "should be encouraged in poultry walks, it being found beneficial to them. The distillers in Scotland sometimes employ it in place of hops, and for their use small fields of it are occasionally sown."

4654. *Propagation and culture.* By seed, cuttings, or dividing the root: the latter is the easiest mode, and the future treatment may be the same as for rue or hyssop. The sea-wormwood (*A. maritima*), the Roman (*A. pónica*), and the Tartarian (*A. Santónica*) are propagated chiefly by cuttings, and may be treated like the common species.

SUBJECT. 13. *Blessed Thistle.* — *Centaurea benedicta* L. (*Zorn. Ic.* 122.); *Syngen. Polyy. Frustrata* L. and *Composita* J. *Centauree sudorifique*, Fr.; *Cardo benedicten*, Ger.; and *Cardo santo*, Ital.

4655. *The blessed thistle* is an annual plant, a native of Spain and the Levant, and introduced in 1548.

4656. *Use.* An infusion of the leaves is sometimes used as a stomachic, and is said to procure the return of appetite, where the stomach was injured by irregularities. A strong infusion promotes perspiration, and increases all the secretions. It was formerly used in cases of cancer; but at present is considered of little medical value.

4657. *Culture.* The seed is to be sown in autumn, in any light earth, and in a warm situation. Thinned and kept free from weeds, the plants will flower the following June and July, and if not

gathered, will produce seeds in August and September. Gather the herb when in flower, and take great care in drying it and keeping it in a dry airy place, to prevent its rotting or getting mouldy, which it is very apt to do.

SUBJECT. 14. Balm. — *Melissa officinalis* L.; *Didym. Gymnos.* L. and *Labiata* J. *Mélisse*, Fr., Ger., and Dutch; and *Melissa*, Ital. and Span.

4658. *The balm* is a hardy perennial, a native of Switzerland and the south of France: it was introduced into this country in 1573.

4659. *Use.* It is now little used, unless for making a simple balm-tea, which affords a grateful diluent drink in fever, and for forming a light and agreeable beverage under the name of balm wine.

4660. *Propagation.* It is readily propagated by parting the roots, preserving two or three buds to each piece, or by slips, either in autumn or spring.

4661. *Culture.* Plant the slips or sets in any bed of common earth, by dibble or trowel, and from eight inches to a foot apart, giving water, if dry weather. Those of the spring planting will soon grow freely for use the same year; and afterwards will increase by the root into large bunches of several years' continuance, furnishing annual supplies from March to September.

4662. *Dried balm.* Gather when coming into flower, and when the leaves are perfectly free from dew or moisture; then dry rapidly in the shade, or better in an oven; and, when cool, press the herbage into packages, and wrap them up in white paper till wanted for use. Keep the packages dry and in a close drawer.

SECT. XI. Plants used as Preserves and Pickles.

4663. *Of plants used as culinary preserves and pickles*, some are tender annuals, requiring to be reared to a certain stage of growth in hotbeds or stoves, as the capsicum and love-apple; others are marine plants, as the samphires, more generally gathered wild than cultivated in the garden. The remainder are chiefly common garden-plants, used also for other purposes, as the red cabbage, Indian cress, &c. The whole occupy but a few square yards of the largest kitchen-garden; and, except the red cabbage, few of them are seen in that of the cottager for the purposes of this section.

SUBJECT. 1. Love-apple, or Tomato. — *Solanum Lycopersicum* L.; *Lycopersicum esculentum* Dunal. (*Rumph. Amb.* 5. t. 154. f. 1.); *Pentán. Monog.* L. and *Solanaceæ* J. *Tomate*, Fr.; *Liebes Apfel*, Ger.; *Appeltjes des liefde*, Dutch; *Pomo d'Oro*, Ital.; and *Tomates*, Span.

4664. *The love-apple* is a tender annual, a native of South America, and introduced in 1596. The fruit is smooth, compressed at both ends, and furrowed over the sides; it varies in size, but seldom exceeds that of an ordinary golden pippin.

4665. *Use.* When ripe, the fruit, which has an acid flavour, is put into soups and sauces, and the juice is preserved for winter use, like ketchup, as a general sauce for both meat and fish; it is also used in confectionery, as a preserve; and when green, as a pickle. Though a good deal used in England in soups, and as a principal ingredient in a well-known sauce for mutton; yet, our estimation and uses of the fruit are nothing to those of the French and Italians, and especially the latter. Near Rome and Naples, whole fields are covered with it, and scarcely a dinner is served up in which it does not in some way or other form a part. Various receipts for making tomato sauce will be found in the *Gardener's Magazine*, vol. I. p. 353; and vol. vii. p. 698.

4666. *Varieties.* Those in general cultivation are—

The large, small, cherry, and pear-shaped red.

The large, and small, or cherry-shaped yellow.

4667. *Estimate of sorts.* "The first sort is in most estimation for domestic purposes, and should be cultivated accordingly; while a few plants of the other kinds may be raised for variety of the fruit."

4668. *Propagation and culture.* The plants must be raised and forwarded in a hotbed, under glass, from about the vernal equinox till May. Sow in any general hotbed about the end of March, or beginning or middle of April; and as to quantity of seed, one ounce will produce sixty plants. As soon as the plants are about two inches high, if they are immediately pricked into another hotbed, or into that where raised, singly into small pots placed in the hotbed, they will grow more stocky, and can be more successfully transplanted. About the middle or end of May, transplant them, each with a ball of earth, into a south border, to have the full sun, that the fruit may ripen in perfection. Some may be planted close to a south wall, if vacant spaces can be had; but as they draw the ground exceedingly, do not set them near choice fruit trees. Give water. During the first week or fortnight, if the nights be cold, defend them with hand-glasses, or by wheeling a large garden-pot over each plant; or transplant upon holes of hot dung, earthed to six inches depth, and cover with hand-glasses. When they begin to run, train them to stakes, or when planted near a wall or pales, nail up the branches. Some, instead of training them to stakes, allow them to spread over the surface of the soil, and to root into it like gourds or cucumbers, and find they produce equally abundant crops and larger fruit. (*Gard. Mag.*, vol. vii. p. 53.) In cold situations they may be trained against a wall or paling in the horizontal manner from a single upright stem; this stem being grown to its full length in a pot. For the details, see *Gard. Mag.*, vol. vii. p. 174. Towards the end of the season it is desirable to remove such of the leaves as shade the ripening fruit, in order that they may benefit from the direct influence of the sun. Some gardeners remove all the leaves, but this is evidently at variance with physiological principles.

4669. *Wilmot* plants at the foot of a bed sloping steeply to the south, and trains the runners on it by pegging them down. They frequently strike root at the joints; he "tops them as soon as their branches meet, clears off all the lateral shoots, and thins the leaves, by which the fruit is exposed and well ripened. In the fine season of 1818, each plant so treated produced, on an average, twenty pounds' weight of fruit." (*Hort. Trans.*, vol. iii. p. 346.) The fruit begins to ripen in August; gathered in October, and, hung up in bunches in any dry apartment, it will continue good for use in November.

4670. *Use ripe tomatoes*, when they are full grown, may be ripened by placing them on shelves in the hot-house. This is practised by Mr. M'Murtrie, who finds that, in three weeks or a month, green tomatoes so treated acquire as fine a colour as if they had been ripened on the plant in the open air. *Gard. Mag.*, vol. vii. p. 195.

4671. *To save seed.* "Gather some of the best ripe fruit in autumn; clear out the seed; wash and cleanse it from the pulp, and dry it thoroughly; then put it up in papers or bags, for use next spring." (*Abercrombie*.)

SUBSECT. 2. Egg-plant. — *Solanum Melongèna* L. (*Fluk. Phyt.* 226. f. 2.); *Pent. Monog.* L. and *Solanaceæ* B. P. *Melongène*, Fr.; *Tollapfel*, Ger.; and *Melanzana*, Ital.

4672. *The egg-plant* is a tender or green-house annual, a native of Africa, introduced in 1597. The plant rises about two feet high, with reclining branches; the flowers appear in June and July, of a pale violet colour, followed by a very large berry, generally of an oval shape, and white colour, much resembling a hen's egg; and, in large specimens, that of a swan.

4673. *Use.* In French and Italian cookery, it is used in stews and soups, and for the general purposes of the love-apple. The Chinese, on great occasions, are said to cook them while pendent on the tree, and bring the entire plant to table in a pot. *Gard. Mag.*, vol. viii. p. 53.

4674. *The varieties are*—

1. *The oval-shaped white.* | 2. *The globular-shaped white.* | 3, 4. *The purple, or violet-coloured, of both forms.*

4675. *Culture.* The plants are raised from seed, which may be sown in March or April, in a hotbed, in light rich earth. After they have shown two or three proper leaves, they may either be pricked out in another hotbed, or planted in small pots, to be shifted in rotation, till in size No. 16, in which they will produce their fruit. If the plants, instead of being shifted into fruiting-pots, are planted against a wall, or in a warm border in June, they will fruit in the open air, if the season is not unusually wet and cold.

4676. *To save seed.* Gather one or two ripe berries of each sort, large and well formed, and preserve them entire, till the seed is wanted for sowing.

SUBSECT. 3. Capsicum. — *Cápsicum* L.; *Pentándria Monog.* L. and *Solanaceæ* B. P. *Piment*, Fr.; *Spanischer Pfeffer*, Ger.; and *Peberone*, Ital.

4677. *Of the capsicum* there are three species in cultivation.

4678. *The annual capsicum, or Guinea-pepper*, is the *C. ánnuum* L. (*Knorr. Thes.* 2. t. C. 6.), an annual plant, which, though a native of India, endures the open air in this country during summer. It was introduced in 1548, and was cultivated in Gerard's time. It rises about two feet high, producing long, linear, dark-green leaves, on a branchy stem. The flowers are white, and appear in June and July, succeeded by berries, varying in shape and colour, and either long-podded, red and yellow; short-podded, red and yellow; round short-podded, red and yellow; or heart-shaped, red and yellow.

4679. *The cherry-pepper* (*C. cerasifórmè*) (*Hort. Kew.*) is an annual plant, a native of the West Indies, which also stands our summer. It was introduced in 1759, has the same general character of foliage as the Guinea-pepper, and flowers from June to September. It is characterised by its small cherry-shaped fruit, which is sometimes heart-shaped, bell-shaped, or angular, and in colour red or yellow.

4680. *The bell-pepper* (*C. gróssum*) (*Best. Syst. Aus.* 1. t. 11. f. 1.) is a stove biennial, a native of India, and introduced in 1759. It is of humble growth, flowers in July, and produces large red or yellow berries. It will endure the open air in summer, but requires a place in the stove during the winter and spring months.

4681. *Use.* The green pods, or inflated berries, of all these varieties, are used for pickling. They are sometimes also used in their ripe state, when they form a spice of the hottest quality, known by the name of Cayenne pepper. The berries of the last named species are deemed better for pickling than the others, the skin being thick, pulpy, and tender.

4682. *Culture.* All the three species, with their varieties, are raised from seed; a small parcel, or the produce of two pods, will be a sufficient quantity of each or of any one variety for ordinary supply. Sow all the annual sorts at the end of March, "or beginning or middle of April, in a moderate hotbed, under a frame. Cover the seed a quarter of an inch deep. When the plants are two or three inches in growth, prick some into a new slender hotbed, to forward them for final transplanting; or, in default of this, prick them into a bed of natural earth, at the beginning of May, if fine, settled, warm weather; defend them with a frame, or awning of mats, at night and in cold vicissitudes. Give water lightly at planting, and occasionally afterwards in moderate supplies, to assist their fresh rooting and subsequent growth. At the beginning of June, when the weather is settled warm, transplant them into the open garden, in beds of light rich earth, from twelve to eighteen inches apart, giving water. They will thus advance freely, flower in July or August, and produce plenty of pods from August till the end of September. Under the deficiency of a hotbed or stove, or for succession, annual capsicums may be raised in a bed of light rich earth, under a hand-glass; but the sowing must be deferred to fine warm weather in May. Give the plants air in the day, but cover them close at night, till danger from frost is over. At the close of June, transplant as above. The perennial species must be wintered in the stove." (*Abercrombie.*)

4683. *To save seed.* Leave one or two of the largest and handsomest-shaped pods to ripen in autumn; after gathering them, the best way is to hang them up in a dry place, and not take out the seed till wanted for sowing in spring.

SUBSECT. 4. Samphire, three Species of different Orders and Genera.

4684. *Common samphire* is the *Crithmum maritimum* L. (*Eng. Bot.* 819.); *Pent.*



Dig. L. and *Umbellifera* J. *Perce-pierre*, or *Saint Pierre*, Fr.; *Meerfenchel*, Ger.; and *Finochio marino*, Ital. (*fig.* 742. a.) It is a perennial plant, a native of Britain, and found on rocky cliffs by the sea, and in dry stone walls. The root-leaves are triternate, those of the stem lanceolate and fleshy; the flowers appear on a stem of about eighteen inches high in August, and are of a yellow colour. The name samphire is a corruption of *sampier*, and this again a corruption of the French name *Saint Pierre*.

4685. *Use.* Samphire forms an excellent pickle, and a frequent addition to salads. In taste, it is crisp and aromatic, and constitutes a light and wholesome condiment. It is generally gathered in places where it is found native; and the allusion to the practice by Shakespeare, in his description of Dover cliff, is well known. The plant is also used medicinally.

4686. *Culture*. It is propagated by paring the roots, or by sowing the seed in April; but is rather difficult of cultivation. Marshall says, "It likes a cool situation; but yet prefers a sandy or a gravelly soil, and plenty of water. Some," he adds, "have found it to do best in pots, set for the morning sun only." Bradrick placed it in a sheltered dry situation, screened from the morning sun; protected it by litter during winter, and in spring sprinkled the soil with a little powdered barilla: "This I do," he says, "to furnish the plant with a supply of soda, since in its native place of growth it possesses the power of decomposing sea-water, from which it takes the fossil alkali, and rejects the muriatic acid. With this treatment it has continued to flourish at Thames Ditton for some years, producing an ample supply of shoots, which are cut twice in the season." (*Hort. Trans.* ii. 232.)

4687. *Golden samphire* is the *Vaula crithmifolia* L. (*Eng. Bot.* 68.); *Syn. Polyg. Super.* L. and *Compositæ* J. *L'Isle perce-pierre*, Fr.; *Goldene Meerfenchel*, Ger. (*fig.* 742. b.) It is a perennial plant, found on sea-shores, generally within salt-water mark. It is occasionally gathered and brought to Covent Garden market, under the name of golden samphire; but has not, we believe, been introduced in the garden.

It is used for the same purposes as the common samphire.
4688. *Marsh-samphire* is the *Salicornia herbacea* L. (*Eng. Bot.* t. 415.); *Dian. Monog.* L. and *Chenopodeæ* R. P. *Salicornie*, Fr.; *Glassewahn*, Ger.; and *Erbsoot*, Ital. (*fig.* 742. c.) It is an annual plant, a native of Britain, and not uncommon in salt-marshes, and other aits and lalets of low land overflown by the sea. It is occasionally gathered and brought to market; and is used for pickling, and in salads, like the two plants above described. This and the former species might be cultivated in the garden, by imitating a small portion of salt-marsh.

Sect. XII. Edible Wild Plants, neglected, or not in Cultivation.

4689. *The subject of edible wild plants* is here introduced, as highly deserving the study of horticulturists, partly to increase their resources, and partly to induce such as have leisure to try how far these plants may be susceptible of improvement by cultivation; but principally to enable the gentleman's gardener to point out resources to the poor in his neighbourhood, in seasons of scarcity. All vegetables not absolutely poisonous may be rendered edible by proper preparation. Many sorts, for example, are disagreeable from their acrid and bitter taste; but this might be, in a great degree, removed by maceration, either in cold or hot water. The vegetable matter once reduced to a state of insipidity, it is easy to give it taste and flavour, by adding salt of some sort, which is an article never scarce through the influence of bad seasons; or by vinegar, or oils; by the addition of other vegetables of agreeable tastes and flavours, as of thyme, mint, celery-seed, onions, &c.; or by the addition of roasted vegetable matter, as of the powder of roasted carrot, parsnep, potato, or dandelion-roots, or of beans, peas, or wheat; or, if it can be had, of toasted bread, which will render almost any thing palatable.

4690. *Gooseberry, birch, beech, willow, and other leaves*, we are told, were formerly eaten as salads; and there can be little doubt that aboriginal man would eat any green thing that came in his way, till he began to improve. It may be worth while for man in his present multiplied and highly civilised state, to reflect on these things, with a view to resources in times of famine, or in travelling or voyaging, or touching at or settling in new or uncultivated countries. (*Perry's Voyage to the Polar Regions*, &c. 1821.) Edible wild plants may be classed as greens and potherbs, roots, legumes, salads, teas, and plants applied to miscellaneous domestic purposes.

SUBJECT. 1. Greens and Pot-herbs from Wild Plants.

4691. *Black bryony*. *Tamus communis* L. (*Eng. Bot.* 91.); *Dicr. Hex.* L. and *Smilacæ* J. A twining perennial, growing in hedges, and commonly considered a poisonous plant; but the young leaves and tops are boiled and eaten by the country people in spring.

4692. *Burdock*. *Arcium Lappa* L. (*Eng. Bot.* 1228.); *Syn. Pol. Æg. L.* and *Compositæ* J. A well known perennial, the tender stalks of which many people eat boiled as asparagus. (*Bryant*.)

4693. *Charlock*. *Brasica arvensis* L. (*Eng. Bot.* 1748.); *Tetrad. Silic. L.* and *Cruciferae* J. A common annual weed in corn-fields. The young plant is eaten in the spring as turnip-tops, and is considered not inferior to that vegetable. The seeds of this have sometimes been sold for feeding birds instead of rape; but being hot in its nature, it often renders them diseased.

4694. *Chickweed*. *Alone media* L., *Stellaria media* E. B. (*Eng. Bot.* 537.); *Decan. Trig. L.* and *Caryophyllæ* J. This common garden-weed is said to be a remarkably good pot-herb, boiled in the spring.

4695. *Shepherd's purse*. *Capsella bursa-pastoris* D. C. (*Eng. Bot.* 1485.); *Tetrad. Silic. L.* and *Cruciferae* J. An excellent plant in Philadelphia, brought to market in large quantities in the early season. The taste, when boiled, approaches that of the cabbage, but is softer and milder. This plant varies wonderfully in size and succulence of leaves, according to the nature and state of the soil where it grows. Those from the gardens and highly cultivated spots near Philadelphia come to a size and succulence of leaf scarcely to be believed without seeing them. They may be easily blanched by the common method, and certainly, in that state, would be a valuable addition to the list of delicate culinary vegetables. (*Correa de Serra*, in *Hort. Trans.*, vol. iv. p. 445.)

4696. *Fat hen*. *Chenopodium virginicum* L. (*Eng. Bot.* 717.); *C. album* L. (*Eng. Bot.* 1793.); *Pent. Dig. L.* and *Chenopodeæ* J. Both these plants are annuals, common among rubbish of buildings, dunghills, &c. Boiled, and eaten as spinach, they are by no means inferior to that vegetable. Several other native, but less common species of this genus, may be applied to the same use.

4697. *Ox-tongue*. *Picris hieracioides* L. (*Eng. Bot.* 972.); *Syn. Pol. Æg. L.* and *Compositæ* J. This annual, common in clayey pastures and wastes, when boiled, affords a good green.

4698. *Sauce alone, or Jack by the hedge*, is the *Erysimum Alliaria* L. (*Eng. Bot.* 796.); *Tetrad. Silic. L.* and *Cruciferae* J. (*fig.* 742. d.) A biennial plant; found by hedges where the soil is dry and rich. The stem rises two or three feet high, with heart-shaped leaves of a yellowish green colour; the flowers are white, and appear in May. The whole plant, as the trivial name imports, scents strongly of garlic. It is occasionally used as a salad, boiled as a pot-herb, or introduced in sauces. Neill observes, that, "when gathered as it approaches the flowering state, boiled separately, and then eaten to boiled mutton, it certainly forms a most desirable pot-herb; and to any kind of salted meat, an excellent green."

4699. *Sea-orache*. *Atriplex littoralis* L. (*Eng. Bot.* 708.); *Poly. Monac. L.* and *Chenopodeæ* R. P. This is annual, and is eaten in the same manner as the chenopodium, as greens or spinach.

4700. *Sea-beet*. *Beta maritima* L. (*Eng. Bot.* 285.); *Pent. Dig. L.* and *Chenopodeæ* J. This biennial is common on various sea-shores, and is also used like the orache, fat hen, and white beet.

4701. *Spotted hawkweed*. *Hypochaeris maculata* L. (*Eng. Bot.* 925.); *Syn. Pol. Æg. L.* and *Compositæ* J. The leaves of this perennial are eaten as salad, and also boiled as greens.

4702. *Stinging nettle*. *Urtica dioica* L. (*Eng. Bot.* 1750.); *Monoc. Pent.* L. and *Urticeæ* J. This perennial, found in dry rubbishy soils and in hedges, is but seldom seen in places where the hand of man has not been at work, and may therefore be considered a sort of domestic plant. Early in February the tops will be found to have sprung three or four inches, furnished with tender leaves; in Scotland, Poland, and Germany, these are gathered as a pot-herb for soups, or for dishes like spinach; and their peculiar flavour is by many much esteemed. No plant is better adapted for forcing; and in severe winters, when most of the brassica tribe have been destroyed, it forms an excellent resource. Collect the creeping roots, and plant them either on a hotbed, or in pots to be placed in a forcing-house, and they will soon send up abundance of tender tops: these, if desired, may be blanched, by covering with other pots. We have known the nettle forced by being planted close to the flue in a vinery, so as to produce excellent nettle-kale and nettle-spinach in the last week of January.

4703. *Wild rocket* is the *Sisymbrium officinale* L. (*Eng. Bot.* 725.); *Tetrad. Silig.* L. and *Cruciferae* J. A common annual, of a yellowish hue, from two to three feet high, with the leaves runcinated, and the seed-pods inclined upwards, close to the stalk. It is sometimes used as a pot-herb; and the tender young leaves, in salading, greatly resembling mustard in its taste and flavour.

4704. *Willow-herb*. *Epilobium angustifolium* L. (*Eng. Bot.* 1947.); *Oct. Monog.* L. and *Onagraceæ* J. The young and tender shoots are eaten as asparagus, and the leaves are a wholesome green.

4705. *Sow-thistle* is the *Silene alba* L. (*Eng. Bot.* 843.); *Sing. Polyp.* L. and *Compositæ* J. A hardy annual, and a well known weed in rich garden and field soils. There is a prickly and a smooth variety, both abounding in a milky bitter juice. The tender tops of the smooth variety are in some countries boiled and used as greens, or mashed as spinach; hence the origin of the Linnean trivial name *oleracea*.

SUBSECT. 2. Roots of Wild Plants edible.

4706. *Arrowhead*. *Sagittaria sagittifolia* L. (*Eng. Bot.* 84.); *Mon. Polyda.* L. and *Arimaceæ* R. P. The roots of this aquatic perennial are said to be very similar to those of the West India arrow-root (*Maranta arundinacea* L.). They are sometimes dried and pounded, but are reported to have an acrid unpleasant taste; though this might, it is believed, be got rid of by washing the powder in water.

4707. *Common nut*. *Avicennia officinalis* L. (*Eng. Bot.* 1998.); *Mon. Polyda.* L. and *Articulæ* R. P. This plant is very common in hedges and woods in loamy soils; in the Isle of Portland it is very abundant, and there the roots are dug up by the country people, macerated, steeped, and the powder so obtained is dried, and sent to London, and sold under the name of Portland sago.

4708. *Bitter vetch*, or *mouse peas*. *Orobanch tuberosus* L. (*Eng. Bot.* 1153.); *Diad. Decdn.* L. and *Leguminosæ* J. The tubers are said to be chewed by the Scottish Highlander as a substitute for tobacco. Boiled till a fork will pass through them, and dried slightly and roasted, they are served up in Holland and Flanders in the manner of chestnuts, which they resemble in flavour. Dickson (*Hort. Trans.*, vol. ii. p. 359) recommends cultivating them in a bed or border of light rich soil, paved at the depth of twenty inches, to prevent their roots from running down. Plant the tubers six inches apart, and three inches below the surface; the second year some will be fit to gather, and, by taking only the largest, the bed will continue productive for several years, adding some fresh compost every year.

4709. *Earth nut*. *Bulbocodium* L. (*Eng. Bot.* 988.); *Pent. Dig.* L. and *Umbelliferae* J. The roots of this bulbous perennial are eaten raw, and are by some considered a delicacy here, but though much more of in Sweden, where they are an article of trade: they are eaten also stewed as chestnuts.

4710. *Meadow-sweet*. *Spiraea Filipendula* L. (*Eng. Bot.* 384.); *Icos. Di-Pentag.* L. and *Rosaceæ* J. The tubers of this perennial, common in most meadows where the soil is inclined to peat, or boggy, are ground and made into bread in Sweden.

4711. *Pilewort*. *Ranunculus Ficaria* L. (*Eng. Bot.* 584.); *Polyda. Polyp.* L. and *Ranunculaceæ* J. The young leaves, in spring, are boiled by the common people in Sweden, and eaten as greens. The roots are sometimes washed bare by the rains, so that the tubercles appear above ground; and in this state have induced the ignorant, in superstitious times, to fancy that it has rained wheat, which these tubercles somewhat resemble. (*Derham's Physico-Theology*.)

4712. *Sage*. *Orethia rubra* L. (*Eng. Bot.* 338.); *Gymn. Monda.* L. and *Orchideæ* R. P. The powder of the roots is used in forming the beverage called *sagep*. Though imported chiefly from Turkey, yet the roots of this country, either gathered wild, or cultivated for use, might answer the same purpose. This plant is particularly abundant in the vale of Gloucester.

4713. *Silver-weed*. *Potentilla Anserina* L. (*Eng. Bot.* 861.); *Icos. Polyda.* L. and *Rosaceæ* J. The roots of this plant taste like parsneps, and are frequently eaten in Scotland either roasted or boiled. In the islands of Jura and Col they are much esteemed, as answering in some measure the purposes of bread, they having been known to support the inhabitants for months together during a scarcity of other provisions. They often tear up their pasture-grounds with a view to get the roots for their use; and as they abound most in barren and impoverished soils, and in seasons when other crops fail, they afford a most reasonable relief to the inhabitants in times of the greatest scarcity. (*Lightfoot's Fl. Scot.*)

4714. *Solomon's seal*. *Polygonatum vulgare* D. (*Eng. Bot.* 280.) The roots are dried, ground, and made into bread; and the young shoots are boiled and eaten as greens.

4715. *The man-a-clow's all head*. *Brachy galictis* L. (*Eng. Bot.* 1675.); a plant common in moist, rich corn-fields, which increases rapidly by its creeping roots, and forms on these during the summer a number of thickened, elongated, tuberous-looking buds, which abound in a sweetish farinaceous matter. Planted in a rich soil, these roots become large and tender, and form a delicacy in the winter season. (*Gard. Mag.*, vol. v. p. 546.)

4716. *The common comfrey* (*Symphitum officinale* L., *Eng. Bot.* 817.) has tuberculated roots and succulent stems, both abounding in farinaceous matter. When the plant is cultivated, and the stalks are blanched, they are not only wholesome, but agreeable. (*Ibid.*)

4717. *The tree primrose*, or *German rampion* (*Oenothera biennis* L.; *Onagra*, or *Jambon des Jardins*, Fr.; and *Kapuzner Seltzer*, Ger.), is a native of Virginia, but is naturalised in some parts of England. Its roots are fusiform, white, and, in deep soil, of great length. When the plant is cultivated like the carrot or parsnep, its roots are crisp and sweet, and fit to be used like those of the rampion. It is cultivated for this purpose in Germany. (See *Lippold's Taschenbuch*, p. 282; *Don Jerdiner*, edit. 1838, p. 222; and *Gard. Mag.*, vol. ii. p. 457.)

SUBSECT. 3. Leguminous Wild Plants edible.

4718. *Sea-peas*. *Plum maritimum* L. (*Eng. Bot.* 1046.); *Diad. Decdn.* L. and *Leguminosæ* J. These peas have a bitterish disagreeable taste, and are therefore rejected when more pleasant food is to be got. In the year 1555, however, when there was a great famine in England, the seeds of this plant were used as food, by which, according to Turner, thousands of families were preserved. The bitter of these seeds might in all probability be removed by steeping and kiln-drying, as in preparing for the mill peas which are to be split.

4719. *Wild vetches*. *Lathyrus*, *Vicia*, and *Ervum*, L.; *Diad. Decdn.* L. and *Leguminosæ* J. The seeds of all the British species of these genera may be used as peas. They are found in hedges, woods, and corn-fields, and are most prolific in dry seasons.

SUBSECT. 4. *Salads from Wild Plants.*

4730. *Ladies' smock*. *Cardamine pratensis* L. (Eng. Bot. 776.); *Tetrad. Sibig.* L. and *Cruciferae* J. The leaves of this plant afford an agreeable acid salad, greatly resembling the American cress.

4731. *Stone-crop, or orpine*. *Sedum Teiðþálm L.* (Eng. Bot. 1319.); *Decad. Pentag. L.* and *Sempervivaceae* J. *Trivque Madame*, Fr. The leaves are eaten in salads like those of purslane, to which, by the French, it is considered equal.

4732. *Sea-binewood*. *Convolvulus Soldanella* L. (Eng. Bot. 314.); *Pent. Monog. L.* and *Convolvuidaceae* B. P. This plant abounds on sea-coasts, where the inhabitants gather the tender stalks, and pickle them. It is considered to have rather a cathartic quality.

4733. *Sweet cicely*. *Scandix odorata* L. (Eng. Bot. 687.); *Pentida. Dig. L.* and *Umbelliferae* J. The leaves of this plant used to be employed like those of chervil. The green seeds ground small, and used with lettuce or other cold salads, give them a warm agreeable taste. The smell of the plant attracts bees, and the insides of empty hives are often rubbed with it before placing them over newly cast swarms, to induce them to enter.

4734. *Buckhorn-plantain, or star of the earth*. *Plantago Coronopus* L. (Eng. Bot. 892.); *Teiðind. Monog. L.* and *Plantaginaceae* B. P. *Corne de Cerf*, Fr.; *Krahenfuss*, Ger.; and *Coronopo*, Ital. This is a hardy annual, a native of Britain, found in sandy soils. It is a low spreading plant, with linear pinnated leaves, and round stalk: producing short spikes of starry flowers from May to August. It was formerly cultivated as a salad herb, and used like the common cress: but is now neglected in English gardens, perhaps on account of its rank and disagreeable smell. It is still, however, regularly sown in French gardens. It is raised by seed, which may be sown the first week in March; and after the plants have come up, they should be thinned so as each may occupy from five to nine square inches. To ensure a succession of tender leaves, cut off the flowers as they appear.

4735. *Ox-eye daisy*. *Chrysanthemum leucanthemum* L. (Eng. Bot. 601.); *Synq. Polyg. Super. L.* and *Compositae* J. *Marguerite premiere*, Fr.; *Grosse Wackerrose*, Ger.; and *Lessandro*, Ital. This is a perennial plant, common in dry pastures. The leaves, which spring immediately from the root, are obovate with foot-stalks; from these a stem arises from two to three feet high, furnished with oblong, embracing pinnatifid leaves. The flowers are large, with yellow disks and white rays, and appear in June and July. The young leaves were much used in Italy in salads in Bauhin's time; and they are mentioned by Dr. Withering as being fit for this purpose. The plant is easily propagated by dividing the roots after the flowering season. To produce succulent tender leaves, it should be placed in soft, rich, moist earth.

SUBSECT. 5. *Substitutes for Chinese Teas from Wild Plants.*

4736. *Speedwell*. *Veronica spicata* L. (Eng. Bot. 2.); *Didm. Monog. L.* and *Scrophulariaceae* B. P. This plant is sometimes used as a substitute for tea; and is said to possess a somewhat astringent taste like green tea.

4737. *Spring grass*. *Anthoxanthum odoratum* L. (Eng. Bot. 647.); *Didm. Dig. L.* and *Gramineae* B. P. This is a highly odoriferous grass, a decoction of which is said to bear a considerable resemblance to tea.

4738. *Other substitutes*. The leaves of the black currant afford a very good substitute for green tea; and those of *Saxifraga crassifolia* are said, by Tooke (*Russ. Emp.*), to be used as tea in Siberia. *Betónica officinalis* (Eng. Bot. 1142.) is said to have the taste and all the good qualities of foreign tea, without the bad ones.

SUBSECT. 6. *Wild Plants applied to various Domestic Purposes.*

4739. *Butterwort*. *Pinguicula vulgaris* L. (Eng. Bot. 70.); *Didm. Monog. L.* and *Lentibulariæ* B. P. The inhabitants of Lapland and the north of Sweden give to milk the consistence of cream by pouring it warm from the cow upon the leaves of this plant, and then instantly straining it, and laying it aside for two or three days till it acquires a degree of acidity. This milk they are extremely fond of; and once made, they need not repeat the use of the leaves as above, for a spoonful or less of it will coagulate another quantity of warm milk, and make it like the first, and so on, as often as they please to renew their food. (*Lightfoot's Flor. Scot.*, p. 77.)

4740. *Cow-parney*. *Hieracium Sphecoditum* L. (Eng. Bot. 899.); *Pent. Dig. L.* and *Umbelliferae* J. The inhabitants of Kamchatka, about the beginning of July, collect the foot-stalks of the radical leaves of this plant, and, after peeling off the rind, dry them separately in the sun; and then tying them in bundles, they lay them up carefully in the shade. In a short time afterwards these dried stalks are covered over with a yellow saccharine efflorescence, tasting like licorice, and in this state they are eaten as a delicacy. The Russians, not content with eating the stalks thus prepared, contrive to get a very intoxicating spirit from them, by first fermenting them in water with the greater bilberry (*Vaccinium uliginosum*), and then distilling the liquor to what degree of strength they please; which, Gmelin says, is more agreeable to the taste than spirits made from corn. (*Lightfoot's Fl. Scot.*)

4731. *Heath*. *Erica vulgaris* L. (Eng. Bot. 1013.); *Ocidea. Monog. L.* and *Ericae* J. Formerly the young tops are said to have been used alone to brew a kind of ale; and even now, the inhabitants of Isala and Jura continue to brew a very potable liquor, by mixing two thirds of the tops of the heath with one of malt. (*Lightfoot's Fl. Scot.*)

4732. *Substitute for capers*. The flower-buds of the marsh-marigold (*Cheltha palustris* L.) form a safe substitute for capers; and likewise the young seeds of the common radish; and the unripe seeds of the nasturtium, or Indian cress. A species of spurge, common in gardens, (*Euphorbia Lathyris*) is vulgarly called caper-bush, from the resemblance of its fruit to capers; and though acid and poisonous, like the other plants of this genus, its seeds are sometimes substituted by the Parisian restaurateurs for the pods of the true capers. For more minute details respecting the plants enumerated in this section, and various others which might be used as food, or in domestic economy, see Bryant's *Flora Dietetica*, and Lightfoot's *Flora Scotica*, Hudson's *Flora Anglica*, and the local floras of all parts of Europe.

SUBSECT. 7. *Poisonous native or common Plants to be avoided in searching for edible Wild Plants.*

4733. *The principal poisonous plants, natives or growing in Britain, are the following: those marked thus (*) are also the most valuable plants in the native materia medica: the whole, for obvious reasons, ought to be known at sight by every gardener:—*

Bitter Poisons, for which acids, astringents, wines, spirits, and spices are useful correctives. *Colchidinum autumnale**, *Cicuta virosa**, *Cotyledon autumnalis**, *Oenanthe crochata*, *Prunus Laurus*, *Ruscus*. The berries of this shrub are used for pies and puddings by the cottagers in the neighbourhood of Moor Park, Hertfordshire, but the leaves are deleterious.

Acrid Poisons, which should be counteracted by powerful astringents, as bark, and afterwards the stomach restored

by soft mucilaginous matters, as milk, fat broth, &c. *Aconitum Napellus*, and *preciosum*, *Actæa spicata*, *Rhus Toxicodendron*.

Stupefying Poisons, to be counteracted by vegetable acids and emetics. *Aethusa Cyathium*, *Atriplex Solanacea*, *Datura Stramonium**, *Nicotiana glauca*, *Solanum Dulcamara** and *aligrum*, *Lactuca virosa*, *Alysum graveolens*. The two latter plants, it is well known, afford, in a cultivated state, lettuce

and celery; but wild, in hedges and ditched, they are poisonous.

Foetid Poisons, to be attacked by ether, wine, or acids. *Conium maculatum**, *Digitalis purpurea**, *Heleborus foetidus*, *Juniperus Sabina*, *Scrophularia squarrosa*.

Draught Poisons, to be corrected by acids, alkalies, and astringents. *Asclepias syriaca*, *Bryonia dioica*, *Euphorbia Lathyris* and *emphyatoides*, *Mercurialis perennis* and *annua*, *Periploca græca*, *Peritrium album*.

4734. *The poisonous fungi will be found in a succeeding section.*

SECT. XIII. *Foreign hardy herbaceous culinary Vegetables, little used as such in Britain.*

4735. *The culinary plants of other countries* are in general the same as our own; but a few may be mentioned which are more commonly cultivated in France, Germany, and America, than in England, but which would thrive in the latter country.

4736. *The Claytonia perfoliata* (Pentst. Monog. L. and Portulacæ J.) is a hardy annual, a native of America, of the easiest possible culture in any soil. Sown in autumn, it endures the winter, and flowers in April and May. Its perfoliate foliage is not very abundant, but it is exceedingly succulent, and not inferior to common spinach in flavour. It has no pretensions to supersede, or even to be generally cultivated as a spinach plant; but in very poor soils, under trees, or in other peculiar circumstances, it may be found a useful resource.

4737. *The Basella dila and rabra* (Pentst. Trig. L. and Chenopodæ J.) are stove-biennials, raised on hotbeds near Paris, and transplanted into warm borders, where they furnish a summer spinach equal to that of the orache. (Hort. Twar, 489.) They are also grown for the same purpose in China. (Livingstone, in Hort. Trans., vol. v. p. 54.)

4738. *The Virginian poke* (Phytolacca decandra L.; Decda. Pentst. L. and Chenopodæ J.) is a hardy perennial with large ramose roots, shoots half an inch in diameter, and five or six feet high; the leaves five inches long and two and a half inches broad, smooth, and of a deep green. It grows vigorously in a good deep soil, and furnishes ample supplies of young shoots, which in America and the West Indies are boiled and eaten as spinach. (Miller's Dict. art. Phytolacca; Correa de Serra, in Hort. Trans., vol. iv. p. 446.)

4739. *The subtle cabbage of China* (B. chinensis L.), used both as a potherb and a salad (Barroo; Abei), and the wild cabbage of America (B. washitana Muhl.), used as a potherb, might be grown for similar purposes in this country. The procumbent cabbage of China is mentioned by Livingstone (Hort. Trans., vol. v. p. 55.) as being a hardy plant, supplying leaves the whole of winter.

4740. *The Shavonese salad* (Hydrophyllum virginicum L.; Pentst. Monog. L. and Boragaceæ J.) is a hardy perennial, very prolific in lobed lucid green leaves which hold water (whence the name), and are used by the Indians both raw and boiled.

4741. *The Aplus tuberosa*, Ph. (Diadph. Decda. L. and Leguminosæ J.) is a hardy tuberous-rooted perennial, a native of North America, the tubers of which are used by the Indians.

4742. *The broad-root* (Psoralea esculenta L.; Diadph. Decda. L. and Leguminosæ J.) is a hardy perennial, a native of Missouri, and used there as potatoes are in this country.

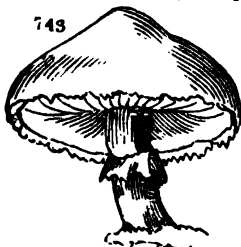
4743. *The quamaak* (Scilla esculenta L. Herd. Monog. L. and Asphodellæ J.) is a native of North America, and there used as food.

4744. *Other hardy esculents.* The Indian corn (Zea Mays) is grown in some parts as a garden-plant, the ears being gathered green or partially ripe, and boiled or roasted. For details of the culture of this plant, see Gard. Mag., vol. vi. p. 60. and 63. and Encyc. of Agr., § 5149. The common millet is grown on the continent as a garden-plant for its seeds, to be used as a substitute for rice: the Polish millet (Digitaria sanguinalis) is grown for this purpose in the cottage gardens in Poland; as is the carnation poppy (Papaver somniferum), for its seeds, which form a seasoning to buck-wheat porridge. Nigella sativa and arvensis, hardy annuals, are cultivated in Flanders for their seeds, which are used as celeri-seeds are in this country, in soups and also in puddings. The Pekin mustard (Sinapis pekinensis) is a hardy annual, and the most extensively used herbaceous plant in China, being, as Livingstone informs us (Hort. Trans., vol. v. p. 54.), carried about the streets of Canton and other towns in the boiled state. The Amarantus polygamus, a hardy annual, grown in China as a spinach plant, and a number of others belonging to the Cruciferae, Chenopodæ, Portulacæ, &c. might be mentioned. The Tagetes lucida forms an excellent substitute for tarragon, in making tarragon vinegar.

SECT. XIV. *Edible Fungi.*

4745. Only one species of *edible fungus* has yet been introduced into the garden, though there can be no doubt the whole would submit to, and probably be improved by, cultivation. All of them are natives of Britain, and may be gathered wild at certain seasons, so that though they do not enter into the plot of the cottager, they are, or may be, enjoyed by him. In Poland and Russia, there are above thirty edible sorts of fungi in common use among the peasantry. They are gathered in all the different stages of their growth, and used in various ways: raw, boiled, stewed, roasted; and being hung up and dried in their stoves or chimneys, form a part of their winter stock of provisions. Fungi, however, are not equally abundant in Britain, owing to the general cultivation of the soil; and therefore the good sorts being little familiar to the cottager, most of them are passed over as deleterious. Indeed, the greatest caution is requisite in selecting any species of this tribe for food; and though we have given a catalogue both of the good and bad sorts of mushrooms, we can advise none but the botanist to search after any but the common sort (*Agaricus campestris*) as food.

SUBSECT. 1. *Cultivated Mushroom.* — *Agaricus campestris* L. and Sowerby, A. edulis Bulliard (Eng. Bot. Fungi, t. 1.); *Cryptogamia Fungi* L. and of the natural order of *Fungi Gymnocarpi* Persoon. *Champignon Comestible*, Fr.; *Essbare Blättereschampe*, Ger.; *Hampernoelje*, Dutch; and *Pratajuolo*, Ital. (fig. 743.)



4746. *The mushroom* is a well known native vegetable, springing up in open pastures in August and September. It is most readily distinguished, when of middle size, by its fine pink or flesh-coloured gills, and pleasant smell; in a more advanced stage, the gills become of a chocolate colour, and it is then more apt to be confounded with other kinds of dubious quality; but that species which most nearly resembles it, is slimy to the touch, and destitute of the fine odour, having rather a disagreeable smell: further, the noxious kind grows in woods or on the margins of woods, while the true mushroom springs up chiefly in open pastures, and should be gathered only in such places.

4747. *Use.* The garden-mushroom is eaten fresh, either stewed or boiled; and preserved as a pickle, or in powder, or dried whole. The sauce commonly called *ketchup* (supposed, by Martyn, from the Japanese, *kit-jap.*) is, or ought to be, made from its juice, with salt and spices. Wild mushrooms, from old pastures, are generally considered as more delicate in flavour, and more tender in flesh, than those raised in artificial beds. But the young, or button mushrooms, of the cultivated sort, are firmer and better for pickling; and in using cultivated mushrooms, there is evidently much less risk of deleterious kinds being employed.

4748. *Species.* The following catalogue of edible and poisonous mushrooms is taken from Sowerby's splendid work on English fungi.

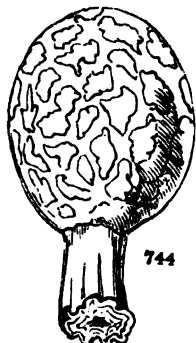
Edible Sorts.			
<i>Agaricus campestris.</i> Common field, or cultivated mushroom.	<i>A. pratensis.</i> Champignon.	<i>A. orbatus.</i> Fairy ring, or Scotch bonnets.	<i>A. pipératus.</i> Pepper.
<i>A. violaceus.</i> Violet, or blue.	<i>A. muscarius.</i> Orange.		<i>A. cantharellus.</i> Bell.
<i>A. cinnamon.</i> Cinnamon.	<i>A. solitarius.</i> Solitary.	<i>Dangerous Sorts.</i>	
<i>A. lactiflans.</i> Milky.	<i>A. procures.</i> The griseote of the French, or Tall.	<i>A. cantharellus,</i> var. Dangerous variety of cultivated mushroom.	<i>A. aurantiacus,</i> var. Dangerous variety of orange mushroom.
<i>A. Chantarellus.</i> Chantarelle.	<i>A. delicatulus.</i> Sweet mushroom.	<i>A. dypterus.</i> Long-stalked.	<i>A. muscaria.</i> Poisonous, or toad-stool.
	<i>A. virgineus.</i> Manzeron mushroom.	<i>A. muscarius.</i> Reddish.	

4749. *General criteria of wholesome and deleterious fungi.* Unwholesome fungi will sometimes spring up even on artificial beds in gardens; thus, when the spawn begins to run, a spurious brood are often found to precede a crop of genuine mushrooms. The baneful quality of the toad-stool (*A. virbeus*) is, in general, indicated by a sickly nauseous smell; though some hurtful sorts are so far without any thing disagreeable in the smell, as to make any criterion, drawn from that alone, very unsafe. The wholesome kinds, however, invariably emit a grateful rich scent.

4750. *Antidote to poisonous sorts.* All fungi should be used with great caution, for even the *cham-pignons* and edible garden-mushrooms possess deleterious qualities when grown in certain places. All the edible species should be thoroughly masticated before taken into the stomach, as this greatly lessens the effects of poisons. When accidents of this sort happen, vomiting should be immediately excited, and then the vegetable acids should be given, either vinegar, lemon-juice, or that of apples; after which, give ether and antispasmodic remedies, to stop the excessive bilious vomiting. Infusions of gall-nut, oak-bark, and Peruvian bark, are recommended as capable of neutralizing the poisonous principle of mushrooms. It is, however, the safest way not to eat any of the good but less common sorts, until they have been soaked in vinegar. Spirit of wine and vinegar extract some part of their poison; and tannin matter decomposes the greatest part of it. (*Botanist's Companion*, vol. ii. p. 145.)

4751. *Culture.* For the culture of the common mushroom, see Chap. VII. Sect. XIV. (3813.) With respect to the other edible sorts, as already observed, they are seldom gathered for use in Britain, excepting by experienced botanists; and none of them, as far as we know, have yet been brought under cultivation. We think, however, that some of them, as the *A. aurantiacus*, *A. delicatulus*, and *A. pratensis*, might very readily, and without danger, be introduced to the garden; treating them like the garden-mushroom, or imitating the climate of the season of the year in which they are found in perfection, and the soil, situation, and exposure, &c. where they are found in greatest abundance, and of the best quality. In the first instance, it would, perhaps, be preferable to propagate from seed, in order to make sure of the species. In the present improved state of horticulture, if this branch of culture were once attempted, it would soon be rendered available by every gardener who can cultivate the common mushroom.

SUBJECT. 2. *Morel.* — *Phallus esculentus* L., *Helvella esculenta* of Sowerby (tab. 51.); and *Morchella esculenta* of Persoon. *Cryptogamia Fungi* L. and *Gymnocarpi* Persoon. In French, German, and Italian, not distinguished from the Champignon by any popular name. (fig. 744.)



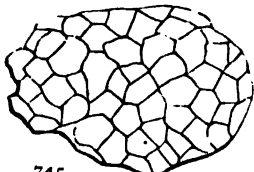
4752. *The morel* is distinguished by its cylindrical, solid, or hollow stem, white and smooth; the cap is hollow within, and adhering to the stem by its base, and latticed on the surface with irregular sinuses. The height is about four inches. It rises in the spring months, in wet banks, in woods, and in moist pastures. It is in perfection in May and June, and should not be gathered when wet with dew, or soon after rain. Gathered dry, they will keep several months.

4753. *Use.* Morels are used, either fresh or dried, as an ingredient to heighten the flavour of gravies, ragouts, &c.

4754. *Culture.* Though this vegetable has not yet been introduced in garden-culture, like the mushroom, there can be no doubt of the attempt being attended with success. The spawn should be collected in June, and planted in beds or ridges, differently composed, and some laid up for use in dry and moist envelopments, in order, by experiment, to come to the best mode of cultivation. Lightfoot says, he has raised the phallus from seed.

SUBJECT. 3. *Truffle*, or *Subterraneous Puff-ball.* — *Tuber cibarium* Sibth. and *albidum* Cæs. (Sowerby, tab. 309.); *Cryptogamia Fungi* L. and *Angiocarpi* Per. *Truffe*, Fr.; *Trüffel*, Ger.; *Aardnoot*, Dutch; and *Tartufo nero*, Ital. (fig. 745.)

4755. *The truffle* is a subterraneous fungus, growing naturally some inches below the surface in different parts of Britain; and very common in the downs of Wiltshire, Hampshire, and Kent, where dogs are trained to scent it out. The dogs point out the spot by scraping and barking; and the truffles, which are generally found in clusters, are dug up with a spade. The truffle is globular, seldom the size of a hen's egg, without any root, and either of a dark colour, approaching to blackness, as in the *T. cibarium*, or whitish, as in the other species. The surface is uneven and rough; the flesh firm, white while young, but when old, it becomes black, with whitish veins.



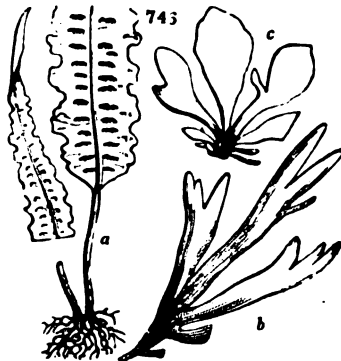
4756. *Use.* They are used, like the mushroom, in stuffings, gravies, and other high-seasoned culinary preparations. They are generally procured from Covent Garden market, as they bear carriage to any distance. The kind the most celebrated on the continent are those brought from the oak forests of Perigord, in the district of Maine.

4757. *Culture.* An attempt has been made to cultivate the truffle in Germany, and a pamphlet has been published on the subject, and translated into French, the essence of which will be found in *Gard. Mag.*, vol. i. p. 320; and in vol. x.

SECT. XV. *Edible Fuci.* — *Cryptogamia Alga* L. and *Fucaceae* Lamouroux. *Farec*, Fr.; *Meergras*, Ger.; and *Fuco*, Ital.

4758. *The edible British fuci* may be shortly enumerated, because some of them are occasionally used as condiments by families living near the sea-coast; and because they furnish articles of resource for the local poor, especially in seasons of scarcity. There are numerous species; all of which, in common with every other class of sea-weeds and zoophytes, are employed in gardening as manures; and in general economy for making kelp or *alkali*. The following are the principal of the British species, which are considered edible by the inhabitants of sea-shores.

4759. *Laminaria saccharina*. Sweet fucus, or sea-belt. (Fig. 746. a.) Lightfoot mentions, that the common people on the coast of England sometimes boil this species as a potherb. Anderson says, the Icelanders boil it in milk to the consistence of pottage, and eat it with a spoon. They are also said to soak it in fresh water, dry it in the sun, and then lay it up in wooden vessels; it soon becomes covered with a white efflorescence of salt, which has a sweetish taste, and in this state they eat it with butter. They also feed their cattle with this species.



4760. *Halymenia palmata* L. Dulce. (Fig. 746. b.) Both the tender stalks and young fronds are eaten fresh from the sea, commonly without any preparation; they are sometimes considered as forming a salad, but more generally are used as a whet. Dulce formerly was frequently fried and brought to table. It is said, that the inhabitants of the Greek islands are fond of this species, adding it to ragouts and olios, to which it communicates a red colour, and at the same time imparts some of its rich and gelatinous qualities. The dried leaves, infused in water, exhale an odour somewhat resembling that of sweet violets, and they communicate that flavour to vegetables with which they are mixed. Lightfoot mentions, that in the Isle of Skye, in Scotland, it is sometimes used in fivers, to promote perspiration, being boiled in water, with the addition of a little butter. It grows not uncommonly on rocks which are barely uncovered at the ebb of the tide; but is more frequent as a parasite on *Fucus nodosus*; and it occurs also on the stems of *Laminaria digitata* attaining in this situation a considerable size, perhaps twelve or fifteen inches long, while, in general, it is only about six or eight inches. It is soft and limber, and does not become rigid by drying, being of a more loose texture than many other sea-weeds.

4761. *Halymenia edulis* L., red dulce (Fig. 746. c), is by many preferred to the *H. palmata*, especially for cooking in the frying-pan. Like that species, its smell somewhat resembles sweet violets. It is of a deep, opaque, red colour, giving out a purple dye.



4762. *Laminaria esculenta* L. Badderlocks, or seaware. (Fig. 747. a.) The mid-rib, stripped of its membrane, is the part chiefly eaten. In Orkney, the *pinnae* are also eaten, under the name of *wickles*.

4763. *Sphaerococcus ciliatus* L., ciliated dulce, and *Laminaria digitata*, fingered dulce, sea-girdle, and hangers (Fig. 747. b), are sometimes gathered and eaten like *Halymenia edulis*, *palmata*, and other species.

4764. *Laminaria digitata*. In Scotland, the stem of this species is used for making handles to pruning-knives. A pretty thick stem is selected, and cut into pieces about four inches long. Into these, while fresh, the blades are stuck, and as the stem dries, it contracts and hardens, closely and firmly embracing the hilt of the blade: when these handles have become hard and shrivelled, and have been tipped with metal, they are hardly to be distinguished from hartshorn.

4765. *Chondria pinnatifida* L. Pepper dulce. In Scotland, it is eaten along with the *Halymenia palmata*, and in Iceland it is used instead of spice. This species is common to Scotland, Iceland, the Red Sea, and the shores of Egypt.

4766. *F. natans* L. Floating fucus. The succulent fronds, Turner mentions, are selected and pickled like samphire; and the young shoots are eaten as a salad, seasoned with juice of lemons, pepper and vinegar.

4767. *Ulva lactuca* L. (Fig. 747. c.) Lettuce-leaves, or oyster-green. The thin, green, pellicular membranes of which this vegetable is composed are eaten raw, as a salad, and esteemed a great delicacy by such as have been accustomed to the use of marine vegetables.

4768. *Supplies.* No submarine production has hitherto been cultivated in the garden; though it might be worth while to try what could be done by a stone cistern of salt water, and other contrivances. In the mean time, families in any part of Britain or Ireland, desirous of enjoying these vegetables, might have them regularly forwarded from the sea-shores, especially from such as are rocky. There are very few species known to be absolutely poisonous.

4769. *Edible nests.* We may add, as matter of curiosity, that the transparent edible nests of the East Indian swallow, so much in repute at the luxurious tables of the rich, in China and the East, are now generally believed to be almost entirely composed of gelatinous fuci; and more especially of the *F. fichenoides*. (Turner, t. 118.) The plant is also in high estimation for the table in India.

CHAP. IX.

Horticultural Catalogue. — Hardy Fruit-trees, Shrubs, and Plants.

4770. *The hardy fruits of a country may be considered, in reference to the vegetable appendages of the table, as next in utility to bread, corn, and culinary esculents. The excellent meats which they afford to the second course, and their contributions to the dessert, give them a peculiar value in the domestic economy of all those whose condition in life rises above the care of mere subsistence; and there are some sorts, as the gooseberry and apple, which, happily, either are or may be within the reach of the most humble occupier of a cottage and garden. Many fruits are as wholesome as they are pleasant; and some greatly assist the cure of particular diseases. Cider, perry, and the various wines which may be made from the juices of fruits, are acceptable offerings to the social circle, when made in the best manner; and form important articles of commerce. We shall arrange the hardy fruits as —*

4771. *Kernel fruits or Pomes; including the apple, pear, quince, medlar, service.*

4772. *Stone fruits; as the peach, nectarine, almond, apricot, plumb, and cherry.*

4773. *Berries; as the mulberry, barberry, elderberry, gooseberry, currant, raspberry, cranberry, and strawberry.*

4774. *Nuts; as the walnut, chestnut, filbert.*

4775. *Native and neglected hardy fruits, deserving cultivation, or useful in domestic economy; as the sloe, bird-cherry, wild service, mountain ash, bilberry, &c.*

4776. *The varieties of most of these fruits are so numerous, and each described as having so many good qualities, that the inexperienced selector may well be puzzled in making a choice, even from the comparatively limited lists which we have prepared for the following sections. When to all the names in these lists, and those of the nurserymen, we add the numerous new names annually brought forward by the Horticultural Societies of this country and of France, the difficulty of selection seems insupportably increased. The experienced and well informed gardener will be able to find out his way in this labyrinth; but what are others to do? We would say, as a prudent mode, consult the selections recommended by eminent practical men, and more especially those of Mr. Thompson, which we have given in this chapter, and also in those on planting the kitchen-garden and orchard. (3316. and 3340.) There are probably not half so many distinct sorts, as there are names in use; and of that half, most likely two thirds are not worth cultivating. Of most of the sorts originated from seed, sufficient time has not elapsed to judge of their merits; they are all described as good; but unquestionably many of them are worth little in comparison with the best old sorts. Some of the new cherries and peaches might be adduced as examples; and the Poonah grape, lately imported from the East Indies, and stated to be "a valuable addition to our gardens" (*Hort. Trans.*, vol. iv. p. 517.), has been in the country (in the Brompton Nursery, for example) for an unknown length of time, under a different name. It is one of the worst descriptions of raisin grapes, with a small elliptical berry, having little flesh, juice, or flavour. We make these remarks not to discourage from originating or importing new fruits; nor to dissuade from choosing new sorts; but to guard the inexperienced against being led away by names and appearances. The Horticultural Society are doing much to illustrate the subject of fruits, and in a few years they will no doubt settle a nomenclature, and determine the merits of all the fruits now in Europe, or perhaps the world.*

SECT. I. *Kernel Fruits.*

4777. *The principal hardy kernel fruits are the apple and pear, too well known for their important uses to require any eulogium. In this section are also included the quince, medlar, and service.*

SUBSECT. 1. *Apple. — Pȳrus Mālus L. (Eng. Bot. 179.); Icos. Di-Pentag. L. and Rosācea J. Pomme, Fr.; Apfel, Ger.; and Pomo or Melo, Ital.*

4778. *The apple is a spreading tree with the branches more horizontal than in the pear-tree; the leaves ovate; the flowers in terminating umbels, produced from the wood of the former year; but more generally from very short shoots or spurs from wood of two years' growth. The fruit is roundish, umbilicate at the base, and of an acid flavour. In its wild state, it is termed the crab; and is then armed with thorns, with smaller leaves, flowers, and fruit, and the pulp of the latter extremely acid. It is a native of most countries of Europe in its wild state; and the improved varieties form an important branch of culture in Britain, France, Germany, and America, for the kitchen, the table, and for the manufacture of cider. From whence we at first received the cultivated apple is unknown; but in all probability it was introduced by the Romans, to whom twenty-two varieties were known in Pliny's time (78.), and afterwards the stock of varieties greatly increased at the Norman conquest. According to Stow, carp and peppins were brought into England by Mæscal, who wrote on fruit-trees in 1572. The apple-tree is supposed by some to attain a great age. Haller mentions some trees in Herefordshire that attained a thousand years, and were highly prolific; but Knight considers two hundred years as the ordinary duration of a healthy tree, grafted on a crab-stock, and planted in a strong tenacious soil. Speechly (*Hints*, p. 58.) mentions a tree in an orchard at Burton-joyce, near Nottingham, of about sixty years old, with branches extending from seven to nine yards round the bole, which, in 1792, produced upwards of 100 pecks of apples. Of all the different fruits which are produced in Britain, none can be brought to so high a degree of perfection, with so little trouble; and*

of no other are there so many excellent varieties in general cultivation, calculated for almost every soil, situation, and climate, which our island affords. Very good apples are grown in the Highlands and Orkneys, and even in the Shetland Isles (*Colled. Hort. Mem.*, vol. ii.), as well as in Devonshire and Cornwall; some sorts are ripe in the beginning of July, and others, which ripen later, will keep till June. Unlike other fruits, those which ripen latest are the best.

4778. *Use.* For pies, tarts, sauces, and the dessert, the use of the apple is familiar to every one. Duduit, of Maseres, has found that one third of boiled apple pulp, baked with two thirds of flour, having been properly fermented with yeast for twelve hours, makes a very excellent bread, full of eyes, and extremely palatable and light. (*New Month Mag.*, June 1821.) The fermented juice forms cider, a substitute both for grape wine and malt liquor. In confectionary, it is used for comfits, *compotes*, marmalades, jellies, pastes, tarts, &c. In medicine, verjuice, or the juice of crabs, is used for sprains, and as an astringent and repellent; and, with a proper addition of sugar, Withering thinks a very grateful liquor might be made with it, little inferior to Rhenish wine. Lightfoot affirms that the crab mixed with cultivated apples, or even alone, if thoroughly ripe, will make a sound, masculine wine. The apple, when ripe, is laxative; the juice is excellent in dysentery: boiled or roasted apples fortify a weak stomach. Scopoli recovered from a weakness of the stomach and indigestion from using them; and they are equally efficacious in putrid and malignant fevers with the juice of lemons or currants. In perfumery, the pulp of apples, beat up with lard, forms pomatum: and Bosc observes (*N. Cours d'Agriculture*, &c. in loco), that the prolonged stratification of apples with elder-flowers, in a close vessel, gives the former an odour of musk extremely agreeable. In dyeing, the bark produces a yellow colour; and, in general economy, the wood of the tree is used for turning, and various purposes, where hardness, compactness, and variegation of colour, are objects.

4780. *Criterion of a good apple.* Apples for the table are characterised by a firm juicy pulp, elevated poignant flavour, regular form, and beautiful colouring; those for kitchen use, by the property of falling, as it is technically termed, or forming in general a pulpy mass of equal consistency, when baked or boiled, and by a large size. Some sorts of apples have the property of falling when green, as the Keswick, Carlisle, Hawthorned, and other codlins; and some only after being ripe, as the russet tribes. Those which have this property when green, are particularly valuable for affording sauces to geese early in the season, and for succeeding the gooseberry in tarts. For cider, an apple must possess a considerable degree of astringency, with or without firmness of pulp, or richness of juice. The best kinds, Knight observes, are often tough, dry, and fibrous; and the Siberian Harvey, which he recommends as one of the very best cider apples, is unfit either for culinary purposes or the table. Knight has found that the specific gravity of the juice of any apple recently expressed, indicates, with very considerable accuracy, the strength of the future cider. Considering the various uses of the apple, we agree with Speechnly in regarding it as a fruit "of more use and benefit to the public in general, than all the other fruits, the produce of this island, united."

4781. *Varieties.* Tussier, in 1573, mentions in his list of fruits, "apples of all sorts." Parkinson, in 1629, enumerates fifty-seven sorts. Evelyn, about thirty years afterwards, says (*Pomona*, pref.), "It was through the plain industry of one Harris, a fruiterer to Henry VIII., that the fields and environs of about thirty towns in Kent only, were planted with fruit from Flanders, to the universal benefit and general improvement of the county." Gibson (*Churches of Dove and Homelacy*) mentions that Lord Seudamore, ambassador to the court of France in the time of Charles I., collected in Normandy scions of cider-apple trees, and when he returned to England, encouraged the grafting them throughout the county of Hereford. Harlith, in 1650, speaks of "one who had 200 sorts of apples," and "verily believes there are nearly 500 sorts in this island." Ray, in 1688, selected, from the information of the most skilful gardeners about London, a list of 78 sorts. Succeeding writers have been enabled greatly to increase the list, partly from the almost continual accession of sorts received from the continent during intervals of peace, but principally from the great numbers raised from seeds. The second edition of the *Catalogue of Fruits*, published by the Horticultural Society of London in 1831, contains the names of 1400 sorts of apples; and, although some of these may, when fruited, prove synonymous, yet the accession of new collections within the seasons of 1832 and 1833, would doubtless extend the number of distinct sorts beyond 1500. A variety of apple, like those of most other plants, is supposed by some to have only a limited duration; and hence, on taking a retrospective view of the lists of sorts given by Parkinson, Evelyn, and other authors, many of them are not now to be found, or are so degenerated or diseased, as no longer to deserve the attention of the planter. "The mott," Knight observes, "and its successful rival, the red-streak, with the musts and golden pippin, are in the last stage of decay, and the stire and foxwhelp are hastening rapidly after them." After making a great variety of experiments for several years, and after many attempts to propagate every old variety of the apple, this author observes (*Tr. on Apple and Pear*, p. 15), "I think I am justified in the conclusion, that all plants of this species, however propagated from the same stock, partake in some degree of the same life, and will attend the progress of that life, in the habits of its youth, its maturity, and its decay; though they will not be any way affected by any incidental injuries the parent tree may sustain after they are detached from it."

4782. Knight next directed his attention to raising new varieties from seeds, and has, by crossing one sort with another, and by having constantly several thousands of seedlings rearing, from which, as they show fruit, to select the best sorts, succeeded in producing several new varieties of apples, much esteemed for the table and the press. Of several of these sorts, and how obtained, accounts will be found in the work above quoted, and in the *Horticultural Transactions*, and a compend of their history and properties will be found in our table (p. 694.). Several eminent horticulturists, in different districts, are now engaged in a similar manner; and there can be little doubt, valuable accession will, in a few years, be made to this class of fruits. Some, however, as Williamson (*Hort. Trans.*, vol. iii. p. 291.), and Speechnly (*Hints*, p. 188.), consider that the deterioration of the apple and other fruits may be owing to the climate, and that the return of genial summers would restore to us from old trees as good fruit as heretofore. Such also is our opinion, and Knight's doctrine appears to us contrary to general analogy in vegetable life. It is unquestionably true that all varieties have a tendency to degenerate into the primitive character of the species; but to us it appears equally true, that any variety may be perpetuated with all its excellencies by proper culture, and more especially varieties of trees. However unsuccessful Knight may have been in continuing the mott, red-streak, and golden pippin, we cannot alter our conviction, that by grafting from these sorts they may be continued, such as they are, or were when the scions were taken from the trees, to the end of time. As to plants propagated by extension, "partaking in some degree of the same period of life as the parent," we cannot admit the idea as at all probable. Vines, olives, poplars, and willows have been propagated by extension for ages, and are still, as far as can be ascertained, as vigorous as they were in the time of Noah or Pliny. If we are wrong in this opinion, we are open to correction.

4783. *A great variety of apple trees in a bearing state* may be seen in different nurseries both in Britain and Ireland, but especially near London: from these in the autumn, the fruit may be tasted from the trees, and either young plants newly worked, or plants in a state of bearing, fixed on and marked, to be taken up at the proper season. The advantages of this mode, especially to such as possess but a small garden, are too obvious to require comment.

4784. *The choice of sorts* depends on the object in view. The first thing an inexperienced gardener has to do is to consider the various domestic uses of the apple, and then determine what is wanted according

to the family or market to be supplied; the next thing is to consider how those wants may be supplied in his given soil, situation, and circumstances; and the last thing is to study the catalogue of sorts, and select accordingly.

4765. *The following sorts of apples, enumerated as dessert, may also be used as kitchen apples:—*"Sugar-loaf pippin, Wormsley pippin, Autumn pearmain, King of the pippins, Fessy's pippin, Ribston pippin, Old pomelo-roy, Bedfordshire pearmain, Pennington's seedling, Reine des Canadas, Dutch mignonne, Sweeney nonpareil, Downton nonpareil, Newtown pippin, Boston russet.

4766. *Among those enumerated as kitchen apples the following may be also used for the dessert:—*"Gravenstein, Blenheim pippin, Bedfordshire foundling, Brabant bellefleur, London pippin, White winter Calville, Northern greening, Rhode Island greening."

4767. *Selections of apples for cottage gardens.* "From the lists of apples already given, the extensive cultivator will find no difficulty in forming his collection, for he could even try the whole; he could plant with sorts which he found he could obtain with the cleanest stems, and after proving the others, by working several sorts on one tree, he could then easily transform the whole, by grafting, into the kinds which promised to succeed best in his particular soil or situation. There is, however, another class, the *Possessors of Cottage Gardens*, who of course have not the means of trial, such as the above, in their power. It will, therefore, become a question of importance to them to know the sorts best adapted for an extremely limited selection. Various circumstances render this a difficult point of information; but the following will, probably, convey something useful on the subject."

4768. *For cottage gardens, where the soil and situation are favourable for the production of the apple, the following sorts are recommended by Mr. Thompson:—*"Where the space will admit of only one tree, the best is the Ribston pippin; where two, the Ribston pippin and the Dutch mignonne; where three, the Wormsley pippin, Ribston pippin, and Dutch mignonne; where four, the Wormsley pippin, King of the pippins, Ribston pippin, and Dutch mignonne; where five, the Wormsley pippin, King of the pippins, Ribston pippin, Old nonpareil, and Downton nonpareil; where six, the Wormsley pippin, King of the pippins, Ribston pippin, Alfriston, Old nonpareil, and Downton nonpareil; where seven, the Wormsley pippin, King of the pippins, Ribston pippin, Alfriston, Dutch mignonne, Old nonpareil, and Downton nonpareil; where eight, the Wormsley pippin, King of the pippins, Ribston pippin, Bedfordshire foundling, Court pendu plat, Alfriston, Brabant bellefleur, and Scarlet nonpareil or Downton nonpareil; where nine, the Wormsley pippin, King of the pippins, Ribston pippin, Bedfordshire foundling, Court pendu plat, Alfriston, Brabant bellefleur, Scarlet nonpareil, and Downton nonpareil; and where ten, to the preceding add Pennington's seedling."

4769. *For training against cottages, or walls in cottage gardens.* "It often happens, that one or more trees can be trained against a cottage wall or roof, or against some wall appertaining to a cottage; in these cases the proper sorts are Ribston pippins, Old nonpareils, and, if a large kitchen apple be required, the Bedfordshire foundling."

4790. *In situations liable to spring frosts,* "which so often kill the blossoms of the generality of apples, the Court pendu plat is recommendable, as its blossoms expand very late in the season."

4791. *Under less favourable circumstances,* "where the Ribston pippin may not succeed, the Bedfordshire foundling will be a hardier substitute; or, the King of the pippins, which is still hardier; the Northern greening may be planted for late kitchen use. For an autumn kitchen apple, perhaps, none in this case is more to be recommended than the Keswick codling. The Hawthornden comes into an abundant bearing state at an early age; and were it not liable to die off in some soils, it might be preferred to the preceding."

4792. *A wet soil, and a cold bleak situation, are what the cottager has the greatest difficulty in contending with; a poor soil he can enrich. In some instances it may be possible for him to remedy a wet soil by drainage; but in other cases, he may find this beyond his means. He should, however, take care to plant the tree very shallow, or even place it entirely on the dug surface, and then cover the roots with the best mould he can collect. This he should afterwards keep mulched if the weather becomes very dry; but otherwise, he should only keep the soil slightly stirred occasionally by a fork; or, if this cannot be done without injuring the roots, merely hoeing it will be better. In short, every thing should be attended to that will encourage the roots to run near the surface; the latter should, therefore, be trod upon as little as possible. Rotten manure should be applied; even leaves could be collected and applied in a state approaching to vegetable mould." For the above eight valuable paragraphs, we are indebted to Mr. Thompson.*

4793. *Another source of choice may respect the soil, situation, and climate of the garden, or orchard, in which they are to be planted, or the character, whether of dwarfs, espaliers, or wall trees, which they are to assume there. The winter and spring table apples may require a south wall in one district, while in another they may attain equal maturity as standards or espaliers. Where there is ample room, a selection of large sorts, as the Alexander and Baltimore apples, or of such as are the most beautifully coloured, as the violet, carnation, &c., may be made to gratify the eye; where room is wanting, useful sorts and great bearers are to be preferred, as the golden and Ribston pippin, summer pearmain, codlings, grey russet, summer and winter calvilles, &c. In general, small-sized fruit, as the Harveys and Granges, are to be preferred for standards, as less likely to break down the branches of the trees, or be shaken down by winds; middling sorts for walls and dwarfs, and the largest of all for espaliers. In respect to a soil liable to produce canker, sorts raised from cuttings may be desirable, as the Burknott and codling tribe; and where an occupier of a garden has only a short interest therein, such as come into immediate bearing, as the Burknotts, and others from cuttings, and the Hawthornden, and other short-lived dwarf sorts on Paradise or creeping stocks, may deserve the preference. On the contrary, where a plantation is made on freehold property, or with a view to posterity, new varieties on crab or free stocks should always be chosen, as the Grange, Ingestrie, Harvey, &c. Some excellent sorts will grow and produce crops every where, as the Hawthornden, codling, and Ribston pippin; the latter of which, Nicol says, will grow at John o' Groat's House, and may be planted in Cornwall; others are shy bearers in cold situations, as the Newtown pippin of America, and most of the newly imported French sorts.*

4794. *Choice of plants and planting.* This depends in some degree on the object in view, the richness of the soil, and the shelter; young trees are more likely to succeed in exposed sites and poor soils, but the apple bears transplanting at a greater age than any other fruit tree. It may be planted in any open weather from November till February.

4795. *No complete arrangement of apples has yet been made in this country, nor has such been satisfactorily done in the Continent. The difficulty of making such an arrangement will be considerable, and the possibility of arriving at perfection in such an undertaking is rendered doubtful from the great number of the varieties, and the want of permanently decisive characters among them. In the mean time, the following tables present a selection of the best sorts, arranged only as regards the purposes for which they are chiefly useful; and the order of succession in their ripening. This mode of arranging the sorts will, it is presumed, enable the cultivator to keep a regular supply throughout the year. If at any particular time of the year he finds the demand more urgent, it will be advisable in that case to plant, not only a greater number of trees that ripen about the given time, but also a greater variety of sorts, so that in case some should fail in bearing, there may be a chance of others being fruitful; for few sorts will bear successively every season. Those who wish for more detailed descriptions, and for excellent figures of many of the sorts, we refer to Ronalds's *Pyrus Malus Bretonfordensis*; and to those who wish to make themselves acquainted with the numerous synonyms which belong to each kind, we would recommend the latest edition for the time being of the Horticultural Society's *Fruit Catalogue*. The tables have been prepared for us by Mr. Thompson, of the Horticultural Society's Garden, on which account it is hardly necessary for us to say that the most perfect confidence may be placed in them.*

4796. A DESCRIPTIVE CATALOGUE OF APPLES CULTIVATED IN BARRAIX, ARRANGED AS DESERT, KITCHEN, AND CIDRE FAURS;
and nearly in the order of their ripening.

I. DESERT APPLES.

No.	Name.	Synonymes.	Home, when, and where originally procured, or assemblage.	Where figured.	Description.	Size.	Figure.	Colours.	Ripe in Lantz till	Consistence and flavour.	Barre.	Character of the tree, and general reputation of the fruit.
1.	White Junataing	Owen's golden beauty	In England before 1658	Lang. Pom. t. 71.	Lindley's Guide No. 1.	Small	Roundish	Pale yellow	July	Tender, crisp, & juicy	Good	Small tree of low growth
2.	Ear. red Margaret	Red Junataing	Probably as old as the pre- ceding	Ronalds, t. 11.	Pom. Mag. 46.	be. me.	Conical	Greenish yell. str. red	Aug.	Tender and rich	Good	Inclined to bear at the extremi- ties
3.	Sugar-loaf pippin	-	-	Pom. Mag. t. 3.	Pom. Mag. 3.	Med.	ovate-obliq.	Greenish yellow	Aug.	Crisp, subacid	Good	Free-spreading and vigorous
4.	Boretoaky	-	-	Pom. Mag. t. 10.	Pom. Mag. 10.	Med.	Roundish	Greenish yell. and red	Aug.	Firm, juicy, brisk	Good	A handsome early fruit
5.	Red Quarenden	-	-	Pom. Mag. t. 194.	Pom. Mag. 94.	Med.	Oblate	Reddish	Sept.	Tender, juicy, and pleasant	Good	Free-spreading and vigorous
6.	Irish peach	Red Quarenden	-	Pom. Mag. t. 196.	Pom. Mag. 96.	Med.	Conical	Greenish brown & red	Sept.	Tender and rich	Good	Bears at the extremities
7.	White Astrachan	Transparent de Moscovie	Ireland	Pom. Mag. t. 125	Pom. Mag. 125.	be. me.	Conical	Pale green	Aug.	Tender and delicate	Good	Vigorous; fruit with snow-white
8.	Red Astrachan	Transparent de Moscovie	1815	Pom. Mag. t. 125	Pom. Mag. 125.	Med.	Roundish	Greenish & crimson red	Sept.	Crisp, subacid	Mid.	Vigorous tree
9.	Leiden pippin	-	-	Pom. Mag. t. 56.	Pom. Mag. 56.	Med.	Roundish	Pale green, & bright red	Aug.	Tender and pleasant	Good	Allied to white Astrachan
10.	Summer golden	-	-	Pom. Mag. t. 56.	Pom. Mag. 56.	Small	Rash-ovate	Yel. & brownish red	Sept.	Firm, sugary, and rich	Good	Medium-sized tree
11.	Osain	-	-	Pom. Mag. t. 5.	Pom. Mag. 5.	Med.	Oblate	Pale yellow	Aug.	Firm, peculiarly rich, & good	Good	One of the best summer apples
12.	Summer thorn	Watson's new	Found at an old abbey at Arbroath	Ronalds, t. 2.	Pom. Mag. 3.	Med.	Oval	Pale yellow and red	Sept.	Crisp, juicy	Good	Medium-sized tree
13.	Longville's kernel	Sam's crab	A Scotch apple	Pom. Mag. t. 65.	Ronalds, p. 5.	Med.	Oval	Streaked	Aug.	Juicy and sweet	Good	Productiveness bears a large share of its merit
14.	Duchess of Olden	-	-	-	Pom. Mag. 65.	Med.	Roundish	Blossomed over & streak	Sept.	Tender and rich	Good	Vigorous tree
15.	Bowyer's russet	-	-	Pom. Mag. t. 121	Pom. Mag. 121.	Small	Rash-ovate	Yellowish russet	Oct.	Tend. sharp, aromatic	Good	Healthy and vigorous
16.	Wormsley pippin	Knight's codlin	Raised by Mr. Knight, say 1800	Pom. Mag. t. 80.	Pom. Mag. 80.	Med.	Roundish	Pale green	Sept.	Crisp, juicy, and rich	Good	Healthy vigorous tree; excellent
17.	Autumn pearmain	Summer pearmain	-	Pom. Mag. t. 80.	Pom. Mag. 80.	Med.	Rash-ovate	Yellowish gr. and red	Oct.	Firm, juicy	Good	Medium-sized tree
18.	Yellow ligature	-	-	Hooker's Pom. 227.	Hooker's Pom. 227.	Med.	Oval	Yellow	Sept.	Firm, juicy	Good	Medium-sized tree
19.	Kerry pippin	-	-	Pom. Mag. t. 107	Pom. Mag. 107.	Med.	Oval	Yellowish red	Oct.	Firm, sugary, & rich	Good	Healthy tree; excellent fruit
20.	Broken	-	-	Pom. Mag. t. 107	Pom. Mag. 107.	Med.	Rash-ovate	Yellowish red	Sept.	Firm, sugary, & rich	Good	Healthy tree; excellent fruit
21.	Hamphire yellow	Wyke pippin	-	Ronalds, t. 25.	Pom. Mag. 117.	Small	Obliq.	Yellowish	Jan.	Firm, sugary, & rich	Mid.	Moderately vigorous
22.	K. of the pippin	-	-	Pom. Mag. t. 117	Pom. Mag. 117.	ab. me.	Partish	Yellow and red	Oct.	Firm, juicy, and rich	Good	Vigorous healthy tree
23.	Golden reindeer	-	-	Pom. Mag. t. 69.	Pom. Mag. 69.	Med.	Oval	Yellow and red	Jan.	Sugary, rich, yellowish	Good	Medium-sized tree; handsome
24.	Franklin's golden	Ladlow's fall pippin	-	Pom. Mag. t. 69.	Pom. Mag. 69.	Med.	Oval	Yel. with brown scars	Oct.	Crisp, juicy, luscious, rich	Good	Vigorous tree
25.	Corinth aromatic	-	-	Pom. Mag. t. 68.	Pom. Mag. 68.	Med.	Rash-ovate	Russeted and red	Oct.	Firm, juicy, rich, and Mid.	Good	Medium-sized tree
26.	Early nonpareil	-	-	Ronalds, t. 2.	Pom. Mag. 48.	Large	Roundish	Russeted and red	Oct.	Crisp, tender, with Good	Good	Harsh small tree
27.	Early nonpareil	-	-	Pom. Mag. t. 67.	Pom. Mag. 67.	Small	Rash-ovate	Greenish yellow	Feb.	Crab, juicy	Good	Harsh small tree
28.	Court of Wick	-	-	Hooker's Pom. 234.	Hooker's Pom. 234.	be. me.	Rash-ovate	Greenish yellow	Nov.	Firm, juicy, and rich	Good	Harsh small tree
29.	Wool's Hunting-	-	-	Mag. t. 23.	Mag. t. 23.	be. me.	Oval	Yellow and russet red	Oct.	Firm, juicy, and rich	Good	Harsh small tree; very excellent fruit

29.	Golden pippin	-	Pom. Herford. 2.	-	Pom. Mag. t.113	Small	Roundish	Yellow	-	Nov.	April	Very rich and sugary	Mid.	Small delicate tree, but esteemed the richest apple
30.	Dorseton	-	Pom. Mag. t.113	1804	-	Pom. Mag. 115	Small	Roundish	Yellow	-	Nov.	Jan.	Good	Medium sized tree
31.	Margil	-	Pom. Mag. t.136	-	-	Pom. Mag. 36	Small	Ovate	Greenish yel. and red	Nov.	Feb.	Firm, yel. var. & rich	Great	Small slender-eriged tree
32.	Elston pippin	-	Pom. Mag. t.141	1668	-	Pom. Mag. 141	Small	Roundish	Greenish yel. and red	Nov.	March	Crisp, juicy, peculiar	Good	Spreading tree, deserving a wall
33.	Barcelone pearmain	-	Pom. Mag. t.85	-	-	Pom. Mag. 85	Med.	Oval	Yel. and red speckled	Nov.	Jan.	Firm, tolerably rich	Good	Tree moderately vigorous
34.	Syracuse house	-	Pom. Mag. t.81	-	-	Pom. Mag. 81	Med.	Oblate	Slightly ripened	Nov.	Feb.	Firm, rich, subacid	Good	Medium-sized tree
35.	Old penny-roy	-	Pom. Mag. t.133	-	-	Pom. Mag. 133	Med.	Conical	Brownish yellow	Nov.	Feb.	Firm and rich	Good	Firm and rich
36.	Adams's pearmain	-	Pom. Mag. t.133	-	-	Pom. Mag. 133	Med.	Conical	Yellow and red	Nov.	Feb.	Firm, rich, and sugary	Good	Very handsome fruit
37.	Old pearmain	-	Pom. Mag. t.133	-	-	Pom. Mag. 133	Med.	Conical	Yellowish green and red	Nov.	March	Rich yellowish flesh	Good	Spreading healthy tree
38.	Irish russet	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Russet and red	Nov.	Feb.	Firm and high flav.	Good	Healthy flat-headed tree
39.	Pimston russet	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Russet and red	Nov.	Feb.	Firm, rich, aromatic	Good	Slender-eriged tree
40.	Queen's apple	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Russet and red	Nov.	March	Crisp, somewhat aromatic	Mid.	Slender tree
41.	Male Cate	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow and red	Nov.	March	Tender and delicate	-	Tolerably vigorous
42.	Hubbard's pearmain	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Pale green and red	Nov.	March	Sugary and very rich	Good	Small tree; excellent fruit
43.	Feunition's	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Pale russet	Nov.	April	Beak, subacid, rich f.	Good	Vigorous
44.	Belleville du	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow russet	Nov.	March	Beak, subacid, rich f.	Good	Vigorous
45.	Trappist's golden	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Greenish yel. & brown	Nov.	April	Beak, subacid, rich f.	Good	Vigorous
46.	Barckhamwell	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Feb.	Beak, subacid, rich f.	Good	Vigorous
47.	Dutch mignonette	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
48.	Cornish Gullflower	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
49.	Golden Harvey	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
50.	Bramley's nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
51.	Martin nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
52.	Dorseton nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
53.	Breddick's nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
54.	Old nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
55.	Sweet nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
56.	Countess's nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
57.	Bramley's nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
58.	Lamb's nonglass	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
59.	Newtown pippin	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous
60.	New rock pippin	-	Pom. Mag. t.130	-	-	Pom. Mag. 130	Med.	Oblate	Yellow	Nov.	Dec.	Firm, juicy, rich	Good	Modestly vigorous

A DESCRIPTIVE CATALOGUE OF APPLES — continued.

III. CIDER APPLES.

No.	Name.	Synonym.	Flow, white, and color, original, preserved, or simulated.	When sown.	Described.	Size.	Figure.	Color.	Ripe in	Leads till	Consistence and flavor.	Breeds.	Character of the tree, and general reputation of the fruit.
94.	Shorbon later var.		By Knight from 8th Cr. and gold Harvey	1806	Lindley, No. 210.	Small	Roundish ovate.	Yellow	Sept.		More sweet than bitter.	Great	Tree free from insects and canker.
95.	Fenley		By Knight, say	1806	Lindley, No. 198.	Small	Roundish.	Orange yellow	Oct.	Nov.	Specific grav. 1080.	Great	Healthy vigorous tree
96.	Shorbon Harvey		By Knight, say	1807	Lindley, No. 211.	Small	Roundish.	Yellow	Oct.	Nov.	Specific grav. 1091.	Good	Healthy vigorous tree
97.	Shorbon		By Knight, say	1807	Lindley, No. 209.	Med.	Roundish.	Yellowish.	Oct.	Nov.	Specific grav. 1084.	Good	Produces very excellent cider
98.	Dorset	(Old table apple)	Very different var.		Lindley, No. 212.	Med.	Roundish.	Yellow and red	Dec.	Jan.	Specific grav. 1078.	Good	Fruit, clear of high excellence
99.	Barnet	(See table apple)	An old var.	1808	Lindley, No. 193.	Med.	Ovate.	Dark red	Dec.	Jan.	Specific grav. 1078.	Good	Healthy tree
100.	Forchard Harvey	(See table apple)	Known before		Lindley, No. 199.	Med.	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1078.	Good	Healthy tree
101.	Cocagee	(See table apple)		1791	Lindley, No. 204.	Med.	Conical.	Greenish yellow	Oct.	Nov.	Specific grav. 1079.	Good	Healthy tree
102.	Payson crab		Seedling by Knight		Lindley, No. 205.	Small	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1081.	Great	Healthy tree
103.	Shorbon	(See table apple)	An old var.		Lindley, No. 203.	Med.	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1078.	Great	Healthy tree
104.	Shorbon	(See table apple)			Lindley, No. 203.	Med.	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1078.	Great	Healthy tree
105.	Shorbon	(See table apple)			Lindley, No. 203.	Med.	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1078.	Great	Healthy tree
106.	Golden Pippin	(See table apple)			Lindley, No. 203.	Med.	Roundish.	Yellowish	Oct.	Nov.	Specific grav. 1078.	Great	Healthy tree

4797. *Propagation.* The apple, like most other hardy trees, may be propagated by seeds, cuttings, suckers, layers, or engrafting: by seeds, for obtaining new varieties, and by the other modes for continuing such as are in esteem.

4798. *By seeds.* The first business here is, the choice of the seeds; which should be taken from fruits, having the properties it is desired to perpetuate or improve in the greatest degree. The sorts of apples proper for crossing or reciprocal impregnation, appear to be those which have a great many qualities in common, and some different qualities. Thus the golden pippin has been crossed by other pippins or rennets, and not by calvils or codlings. A small-sized apple, crossed by a large sort, will be more certain of producing a new variety than the above mode; but will be almost equally certain of producing a variety destitute of valuable qualities; the qualities of parents of so opposite natures being, as it were, crudely jumbled together in the offspring.

4799. *Knights's mode of cutting out the stamens of the blossom to be impregnated, and afterwards, when the stigma is mature, introducing the pollen of the other parent, is unquestionably the most scientific mode of performing the operation.* In this way he produced those excellent apples, the Downton, red and yellow Ingestrie, and Grange pippin, from the same parents; viz., the seed of the orange pippin, and the pollen of the golden pippin. The Bringe-wood pippin he produced from golden pippin blossoms (divested of their stamens) dusted with the pollen of the golden Harvey apple. The seeds may be sown in autumn, in light earth, covered an inch, and either in pots or beds. The end of the first year they should be transplanted into nursery rows, from six inches to a foot apart every way. Afterwards they should be removed to where they are to produce fruit; and for this purpose the greater the distance between the plants the better. It should not be less than six or eight feet every way. The quickest way to bring them into a bearing state, Williams, of Pitmaston, considers (*Hort. Trans.*, vol. 1, p. 333.), is to let the plants be furnished with lateral shoots from the ground upwards; so disposed as that the leaves of the upper shoots may not shade those situated underneath, pruning away only trifling shoots. This mode of treatment occurred to him on reflecting on Knight's *Theory of the Circulation of the Sap*. Observing the change in the appearance of the leaves of his seedling plants as the trees advanced in growth, he thought it might be possible to hasten the progress of the plants, and procure that peculiar organisation of the leaf, necessary to the formation of blossom-buds, at a much earlier age. He in consequence adopted the mode above described, and succeeded in procuring fruit from seedling apples at four, five, and six years of age, instead of waiting eight, ten, and even fifteen years, which must be the case by the usual mode of planting close, and pruning to naked stems.

4900. *Macdonald*, an eminent Scotch horticulturist, has also succeeded in obtaining fruit from seedlings at an early period by grafting, already stated (2827), as one of the uses of that mode of propagation. In 1806, he selected some blossoms of the nonpareil, which he impregnated with the pollen of the golden pippin and of the Newtown pippin. When the apples were fully ripe, he selected some of the best, from which he took the seeds, and sowed them in pots, which he placed in a frame. He had eight or nine seedlings, which he transplanted into the open ground, in spring 1809. In 1811, he selected out a few of the strongest plants, and put them singly into pots. In spring 1812, he observed one of the plants showing fruit-buds. He took a few of the twigs, and grafted them on a healthy stock on a wall; and in 1813 he had a few apples. This year (1816) his seedling yielded several dozens, and also his grafts; and he mentions, that the apples from the grafts are the largest. He is of opinion that in giving names to seedlings, raised in Scotland, the word "Scotch" should be mentioned. On this practice Mr. Thompson remarks; "The mode of grafting seedlings on old but healthy trees is certainly to be preferred for bringing them into a bearing state. It is true, that by allowing the laterals to extend themselves, fruit will be obtained at an earlier age than if the growth of wood and leaves were promoted by shortening the shoots so as to cause them to push again with greater vigour. The fruit, however, from these comparatively weak laterals cannot be so perfect as when produced from buds situated in the vicinity of a large body of stem,

whose vessels, filled with many years' secretions of saccharine substance, can better supply the fruit depending upon it, than the watery, scarcely ligneous twigs of a young seedling."

4801. *A very common practice among those who raise fruit-trees from seed* is, in the second or third season, to select such plants only as have broad and roundish leaves, throwing away the rest; experience having taught, that the former more frequently produce fruit of improved qualities, or at least larger, than those plants which have narrow-pointed leaves. The width and thickness of the leaf, Knight observes, "generally indicate the size of the future apple; but will by no means convey any correct idea of the merits of the future fruit. Where these have the character of high cultivation, the qualities of the fruit will be far removed from those of the native species; but the apple may be insipid or highly flavoured, green, or deeply coloured, and of course well or ill calculated to answer the purposes of the planter. An early blossom in the spring, and an early change of colour in the autumnal leaf, would naturally be supposed to indicate a fruit of early maturity; but I have never been able to discover any criterion of this kind on which the smallest dependence may be placed. The leaves of some varieties will become yellow and fall off, leaving the fruit green and immature; and the leaves in other kinds will retain their verdure long after the fruit has perished. The plants whose buds in the annual wood are full and prominent, are usually more productive than those whose buds are small and shrunk in the bark; but their future produce will depend much on the power the blossoms possess of bearing the cold, and this power varies in the different varieties, and can only be known from experience. Those which produce their leaves and blossoms rather early in the spring are generally to be preferred, for though they are more exposed to injury from frost, they less frequently suffer from the attacks of insects; the more common cause of failure. The disposition to vegetate early or late in the spring, is like almost every other quality in the apple-tree, transferred in different degrees to its offspring; and the planter must therefore seek those qualities in the parent tree which he wishes to find in the future seedling plants. The most effective method I have been able to discover of obtaining such fruits as vegetate very early in the spring, has been by introducing the farina of the Siberian crab into the blossom of a rich and early apple, and by transferring in the same manner the farina of the apple to the blossom of the Siberian crab. The leaf and the habit of many of the plants, that I have thus obtained, possess much of the character of the apple, whilst they vegetate as early in the spring as the crab of Siberia, and possess, at least, an equal power of bearing cold; and I possess two plants of this family, which are quite as hardy as the most austere crab of our woods."

4802. *Abercrombie* observes that, "as the codling is a sort found to change very little from seed, or not for the worse, new plants of it are sometimes raised by sowing the kernels, not by way of experiment for a new uncertain variety, but with some dependence on having a good sort resembling the parent."

4803. *By cuttings.* Every variety of apple may be grown from cuttings; though some with much greater facility than others. All those of the burknot and codling tribes grow as well this way as by any other, and some allege, that the trees so raised are not liable to canker (*Hort. Trans.*, vol. i. p. 193.) which is supposed to be owing to their "putting out no tap-root, but spreading their numerous fibres from the knot or burr horizontally." Even the golden pippin may be continued in this way, and the trees have remained seven years in perfect health, when grafts taken not only from the same tree, but from the very branch, part of which was divided into cuttings, cankered in two or three years. "All apple-trees raised in this way," Biggs observes, "from healthy one-year-old branches, with blossom-buds upon them, will continue to go on bearing the finest fruit, in a small compass, for many years. Such trees are peculiarly proper for forcing, and not liable to canker." (*Hort. Trans.*, vol. i. p. 65.) The cuttings are to be chosen from the young wood of horizontal or oblique branches, rather than from upright ones; from six to eight inches or more in length, with a small portion of old wood at the lower end. Cut off the tip of the shoot, and all the buds, excepting two or three next the tip or upper extremity; then smooth the sections at the lower end, and insert them three or four inches in sandy loam, pressing the earth firmly to them, watering, and covering with a hand-glass. The proper time for this operation is early in February, and the glass should not be touched, excepting to give water, till the shoots have sprung an inch or two. Shade during the mid-day sun, and begin to harden by giving air in July; finally remove the glass in August; and in October transplant to nursery rows, or in pots, according to future intention. With the burknot tribe, all that is necessary is to plant the cuttings in a shady border, and treat them like those of the gooseberry or currant.

4804. *By layers.* The success of this mode of propagation may be considered as certain: as it has nothing peculiar in its application to the apple, we need only refer to general directions (2806.) for performing the operation. The after treatment of the plants is the same with that for those originated by the foregoing or following modes.

4805. *By suckers.* This mode is generally confined to the paradise and creeping apple or stocks.

4806. *By grafting and inoculation.* This may be said to be the universal practice in propagating the apple. The first consideration is the choice of stocks; of these, there are five sorts in common use:—*Seedling apples*, used for full standards, and riders or wall standards; *seedling crabs*, for standards and half standards; *codling apples*, from layers or cuttings, for dwarfs and espaliers; *paradise apples*, or *doucins*, from layers or cuttings, for low dwarfs and trained; and *creeping apples*, from layers or cuttings, for the best dwarfs or bushes. Dubreuil, gardener at Rouen, recommends the doucin for clayey and light soils, and a free stock for such as are chalky and siliceous. (*Hort. Trans.*, vol. iv. p. 566.)

4807. *Stocks of seedling apples.* The seeds should be selected from the fruit of vigorous growing young or middle-aged healthy trees; but when wanted in large quantities, they are procured from cider makers; private propagators will adopt the first mode. The sowing and after treatment is the same as for seedling crabs.

4808. *Seedling crabs.* "A preference," Knight observes, "has generally and justly been given to apple-stocks raised from the seeds of the native kind, or crab, as being more hardy and durable than those produced from the apple. The offspring of some varieties of the crab, particularly of those introduced from Siberia, vegetate much earlier in the spring than the other trees of the same species; and thence the inexperienced planter will probably be led to suppose, that such stocks would accelerate the vegetation of other varieties in the spring, and tend to produce an early maturity of the fruit in autumn. In this, however, he will be disappointed. The office of the stock is, in every sense of the word, subvenient; and it acts only in obedience to the impulse it receives from the branches: the only qualities, therefore, which are wanting to form a perfect stock, are vigour and hardiness."

4809. *Seeds, sowing, and culture.* In recollecting the seeds to sow, it must be remembered, that the habits as well as the diseases of plants are often hereditary, and attention should be paid to the state of the tree from which the seeds are taken: it should be large and of free growth, and, rather in a growing state than one of maturity or decay. The crab-trees, which stand in cultivated grounds, generally grow more freely and attain a larger stature than those in the woods, and therefore appear to claim a preference. The seeds should be taken from the fruit before it is ground for vinegar, and sown in beds of good mould an inch deep. From these the plants should be removed in the following autumn to the nursery, and planted in rows at three feet distance from each other, and eighteen inches between each plant. Being here properly protected from cattle and hares, they may remain till they become large enough to be planted out; the ground being regularly worked and kept free from weeds.

4810. *Codling stocks* are raised chiefly from layers, which, at the end of the season, are taken off, and planted in nursery rows two feet between the rows, and one foot plant from plant.

4811. *Paradise*, or as they are called by the French, *doucin* stocks, are raised either from layers or suckers; and stocks from *creeping apples* (so named from their aptitude to throw up suckers), or the *Dutch paradise*, chiefly from the latter mode. They may be planted in nursery rows somewhat closer than the codling stocks.

4812. *All stocks* require to stand in the nursery till they are from half an inch to an inch thick, at the height at which they are to be grafted; such as are intended for full standards or riders will, in general, require to grow three or four years before being fit for this operation; those for half standards two years, and those for dwarfs one year. The ground between them must be kept clear of weeds, and stirred every winter; the side shoots of the plants, at least to the height at which they are intended to be grafted, rubbed off as they appear, and all suckers carefully removed. Where budding is adopted, the stocks may be worked at nearly half the diameter of stem requisite for grafting; and stocks for dwarfs planted in autumn or spring may be inoculated the succeeding summer. No great advantage, however, is gained by this practice, as such plants require to stand at least another year, before they have produced their bud-shoots.

4813. *Soil and situation of the nursery.* "A difference of opinion appears always to have prevailed respecting the quality of the soil proper for a nursery; some have preferred a very poor, and others a very rich soil; and both perhaps are almost equally wrong. The advocates for a poor soil appear to me to have been misled by transferring the feelings of animals to plants, and inferring that a change from want to abundance must be agreeable and beneficial to both. But plants in a very poor soil become stunted and unhealthy, and do not readily acquire habits of vigorous growth, when removed from it. In a soil which has been highly manured, the growth of young apple-trees is extremely rapid; and their appearance, during two or three years, generally indicates the utmost exuberance of health and vigour. These are, however, usually the forerunners of disease, and the 'canker's desolating tooth' blasts the hopes of the planter. In choosing the situation for a nursery, too much shelter, or exposure, should be equally avoided; and a soil, nearly similar to that in which the trees are afterwards to grow, should be selected, where it can be obtained. Pasture ground, or unmanured meadow, should be preferred to old tillage, and a loam of moderate strength and of considerable depth to all other soils." (27. on *App. and Pear.*)

4814. *Grafting.* The first business is to select the scions, the principles of which have been already noticed (2857.). At whatever season scions are to be inserted, Knight observes, "the branches, which are to form them, should be taken from the parent stock during the winter, and not later than the end of the preceding year: for if the buds have begun to vegetate in the smallest degree, and they begin with the increasing influence of the sun, the vigour of the shoots, during the first season, will be diminished, and the grafts will not succeed with equal certainty; though a graft of the apple-tree very rarely fails, unless by accidental injury, or great want of skill in the operator. The amputated branches must be kept alive till wanted, by having the end of each planted in the ground, a few inches deep, in a shady situation."

4815. *Stocks destined to form standard trees,* may either be grafted at the usual height at which the lateral branches are allowed to diverge, which is commonly six feet, or they may be grafted near the ground, and a single shoot trained from the graft, so as to form the stem of the tree. The propriety of grafting near the ground, or at the height of six or seven feet, will depend on the kind of fruit to be propagated, whether it be quite new and just beginning to bear, or a middle-aged variety. In new and luxuriant varieties, and these only should be propagated, it will be advantageous to graft when the stocks are three years old, as the growth of such will be more rapid, smooth, and upright than that of the crab, and there will be no danger of these being injured by beginning to bear too early. Middle-aged varieties will be most successfully propagated by planting stocks of six or seven feet high, and letting them remain ungrafted till they become firmly rooted in the places in which the trees are to stand. One graft only should be inserted in each stock; for when more are used, they are apt to divide when loaded with fruit, and to cleave the stock, having no natural bond or connection with each other. When the stocks are too large for a single scion, I would recommend that the grafts be inserted in the branches, and not in the principal stem. This practice is not uncommon in various parts of England; and is general in Germany, with free stocks, where, however, they often neglect to graft the trees; and thus, as Neill observes, produce an endless variety of sorts, some good, but most of them little better than crabs.

4816. *Stocks, intended to form half standards,* are grafted at three or four feet from the ground; and those for *dwarfs* at eight or ten inches, or lower. Miller and Knight agree in recommending to graft near the ground where lazing and vigorous trees are wanted; but the practice of the continental gardeners, and the opinions of some in this country, are in favour of leaving a stem below the graft of not less than a foot in length.

4817. *The kind of grafting generally adopted* for moderate-sized stocks is the *whip* or *tongue* method (2841.), or the mode of saddle-grafting (2847.) adopted by Knight; and the general time for the apple is the end of February and greater part of March. Much depends on the season and situation; the guiding principle is, to make choice of the time when the sap of the stock is in full motion; while that of the scions, from having been previously cut off and placed in the shade, is less so.

4818. *The common season for budding the apple* is July; as there is nothing peculiar to this tree in performing that operation, we refer to the general directions. (2864.)

4819. *Transplanting grafted trees in the nursery.* "It has been recommended," Knight observes, "to remove grafted trees once or twice during the time they remain in the nursery, under the idea of increasing the number of their roots; but I think this practice only eligible with trees which do not readily grow when transplanted. I have always found the growth of young apple trees to be much retarded, and a premature disposition to blossom to be brought on by it; and I could not afterwards observe that those trees, which had been twice removed, grew better than others. It has also been supposed that many small roots, proceeding immediately from the trunk, are, in the future growth of the tree, to be preferred to a few which are large; but as the large roots of necessity branch into small, which consequently extend to a greater distance, the advantages of more transplantations than from the seed-bed to the nursery, and thence to the garden or orchard, may reasonably be questioned."

4820. *Soil and site for permanent planting.* Any common soil, neither extremely sandy, gravelly, nor clayey, on a dry subsoil, and with a free exposure, will suit this tree. On wet, hilly subsoil, it will do no good, but after being planted a few years will become cankered, and get covered with moss. Where fruit trees must be planted on such soils, they should first be rendered as dry as possible by under-draining; next, provision made for carrying off the rain-water by surface gutters; and, lastly, the ground should not be trenched above a foot deep, and the trees planted rather in hillocks of earth, above the surface, than in pits dug into it. There is no point of more importance than shallow trenching and shallow planting in cold wet soils, in which deep pits and deep pulverisation only serve to aggravate their natural evils of moisture and cold. (*Song, in Calcd. Mem.*, vol. iv. p. 140.)

4821. Knight observes, that "the apple tree attains its largest stature in a deep strong loam or marly clay; but it will thrive in all rich soils, which are neither very sandy nor wet at bottom. It succeeds best," he adds, "in situations which are neither high nor remarkably low. In the former its blossoms are frequently injured by cold winds, and in the latter by spring frosts, particularly when the trees are planted in the lowest part of a confined valley. A south or south-east aspect is generally preferred, on account of the turbulence of the west, and the coldness of north winds; but orchards succeed well in all aspects; and where the violence of the west wind is broken by an intervening rise of ground, a south-west aspect will be found equal to any."

4822. *Abercrombie* says, "all the sorts of apple tree may be planted in any good common soil, with a free exposure, whether that of a garden, orchard, or field; so that the ground be neither very low nor excessively wet, nor subject to inundation in winter. Avoid, as far as possible, very strong clayey and gravelly soils."

4823. *Mode of bearing.* "In all the varieties of the common apple, the mode of bearing is upon small terminal and lateral spurs, or short robust shoots, from half an inch to two inches long, which spring from

the younger branches of two or more years' growth, appearing first at the extremity, and extending gradually down the side: the same bearing branches and fruit spurs continue many years fruitful." (*Abercrombie*.)

4984. *Pruning*. "As, from the mode of bearing, apple trees do not admit of shortening in the general bearing, it should only be practised occasionally: first, where any extend out of limits, or grow irregular and deformed; and, secondly, a good shoot contiguous to a vacant space is shortened to a few eyes, to obtain an additional supply of young wood from the lower buds of the shoot for filling up the vacancy. But to shorten without such a motive, is not merely the cutting away of the first and the principal bearing part of the branches, but also occasions their putting forth many strong useless wood shoots where fruit-spurs would otherwise arise; and both effects greatly tend to retard the trees in bearing; whereas the fertile branches, being cultivated to their natural length, shoot moderately, and have fruit-spurs quite to the extremity." (*Abercrombie*.)

4985. *Espaliers and wall trees* require a summer and winter pruning. 4986. *The summer pruning*. Train in the young shoots of the same year, which are likely to be wanted in the figure, and retrench them where ill placed or too numerous; for as the trees continue bearing many years on the same branches, they only require occasional supplies of young wood; therefore, begin in May or June to pinch off or cut out close all fore-right, ill placed, and superfluous shoots; retaining only some of the promising laterals in the more vacant parts, with a leader to each branch; train in these between the mother branches, at their full length, all summer; or, where any vacancy occurs, some strong contiguous shoot may be shortened in June to a few eyes, to furnish several laterals the same season. Keep the shoots in all parts closely trained, both to preserve the regularity of the espalier, and to admit the air and sun to the advancing fruit.

4987. *The winter pruning* may be performed from November till the beginning of April. This comprehends the regulation of the wood-branches, the bearers, and of the young shoots. First, examine the new shoots trained in the preceding summer; and if too abundant, retain only a competency of well placed and promising laterals, to furnish vacant parts, with a leading shoot to each parent branch. Continue these mostly at full length, as far as there is room. Cut out close the superabundant and irregular young shoots; and where any of the elder branches appear unfruitful, cankered, or decayed, cut them either clean out, or prune short to some good lateral, as may seem expedient. Also prune into order any branches which are very irregular, or too extended. Carefully preserve all the eligible natural fruit-spurs; but remove all unfruitful stumps and snags, and large projecting rugged spurs; cutting close to the old wood. As each espalier is pruned, let the old and new branches be laid in at convenient distances, according to the size of the fruit, four, five, or six inches asunder, and neatly tied or nailed to the wall or trellis. (*Abercrombie*.)

4988. *Training espaliers*. The following mode, as described by Mearns, is the most general, and by using stakes, which do not answer so well for any other species of espalier-tree as for apples, is also the most economical:—In the first stage of training, the stakes require to stand as close together as twelve or fourteen inches, and to be arranged in regular order to the full height of five feet, with a rail slightly fastened on the top of them for neatness' sake, as well as to steady them. If stakes of small ash, Spanish chestnut, or the like, from coppices or thinnings of young plantations, be used, they will last for three or four years, provided they are from one inch and a half to two inches in diameter, at a foot from the bottom. They need not be extended farther in the first instance than the distance to be considered probable the trees may reach in three years' growth: at that period, or the following season, they will all require to be renewed, and the new ones may be placed on each side, to the extent that the trees may be thought to require while these stakes last, finishing the top, as before, with a rail. As the trees extend their horizontal branches, and acquire substance, the two stakes on each side of the one that supports the centre leader of the tree can be spared, and removed to any of the extremities where wanted. And as the tree extends farther, and acquires more substance, every other stake will be found sufficient; and the centre stake can be spared also, after the leader has reached its destined height, and is of a sufficient substance to support itself erect. When such a form of training is completed, and the branches of sufficient magnitude, about six, eight, or twelve stakes will be sufficient for the support of the horizontal branches, even when they have the burden of a full crop of fruit. At any other time, about six stakes to each tree will be all that are necessary.



4989. *In selecting trees for the usual horizontal training*, look out for those which have three fine shoots. Or it is better to plant them one year where they are to remain to get their roots well established, and then to head them down to within eight or nine inches of the ground, and to encourage three shoots from the top of each stool (*fig. 748. a*), so that the first and lowermost horizontal shoots may be tied down within ten inches of the ground.

4990. In the pruning season cut down the middle shoot of the three, reserving what is left as an upright leader, its length being about twelve inches from the base of the other two, and train these in a horizontal position (*b*), fixing the middle shoot, which was cut down perpendicularly to the stake it is planted against. But if it is against a wall or pales, it may be better to zigzag the upright leader, for the more regular distribution of the sap, and when that is intended, the leader should be left a little longer, to allow of its being bent. In espalier training this zigzagging is not so readily done, nor is it necessary where the trees are not intended to rise high. It is always necessary, in the course of training the young wood across the stakes, in summer, to have large oar or similar rods, to tie them to, in order to guide the shoots of the year in a proper direction. The proper ties are small oar twigs.

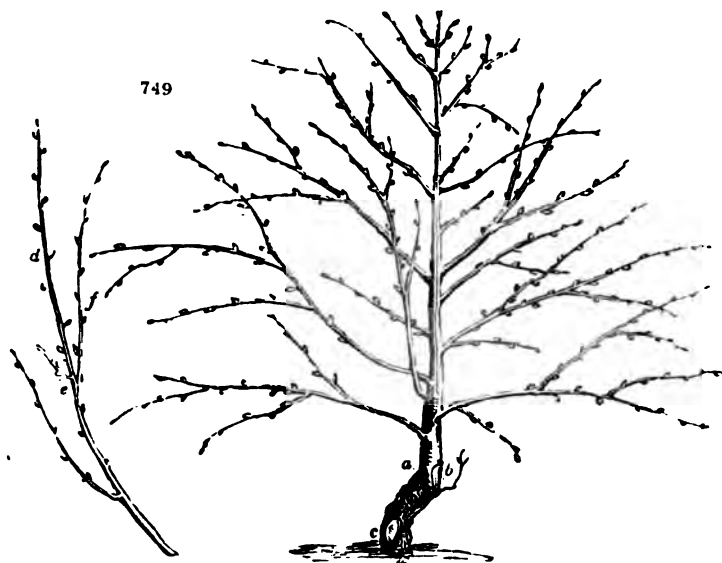
4991. *The following summer* encourage three other shoots in the same way as the season before (*c*), then cut off the middle shoot at ten, twelve, or fifteen inches above the base of the other two, and train these last as in the former season (*d*); and so continue training, year after year, till the trees have reached their destined height. (*Mearns, in Hort. Trans.*, vol. v. p. 46.) An improvement on this mode consists in cutting down the leading shoot during summer, in the manner practised by Harrison, of Wortley Hall, as described in the succeeding paragraph.

4992. *Training against a wall*. The horizontal mode is unquestionably to be preferred for so vigorous a growing tree as the apple; and Harrison's mode of conducting the process (*Tr. on Fruit Trees*, 1823, ch. ix.) appears to us much the best. The peculiarity of his method is, that, instead of training the leading shoot in a serpentine or zigzag manner, with Hitt or Mearns, to make it send out side shoots, he adopts the much more simple and effectual mode of cutting down the current year's shoots in June; by which means he gains annually a year, as side shoots are produced on the young wood of that year, as well as on last year's wood which it sprang from.

4993. *The tree being a maiden plant* is the first year headed down to seven buds. Every bud pushing, two of the shoots, the third and fourth, counting upwards, must be rubbed off when they are three inches in length; the uppermost shoot must be trained straight up the wall for a leading stem, and the remaining

four horizontally along the wall. The leading shoot having attained about fifteen inches in length, cut it down to eleven inches. From the shoots that will thus be produced select three, one to be trained as a leader, and two as side branches. Proceeding in this way for seven years, the tree will have reached the top of a wall twelve feet high. With weak trees, or trees in very cold late situations, this practice will not be advisable, as the wood produced would be too weak, or would not ripen; but in all ordinary situations, it is obviously a superior mode to any that has been hitherto described in books. In pruning the spurs of apple and other trees, Harrison differs from many gardeners in keeping them short, never allowing one spur to have more than three or four fruit buds, and in cutting off the spurs entirely, or cutting them down for renewal every fourth or fifth year. Every practical gardener, desirous of excelling in the training and spurting of fruit trees, ought to possess Harrison's treatise.

4834. *Heading down* apple trees that are much cankered, is strongly recommended by Forsyth, who gives an example of one (*fig. 149*), after it had been headed down four years, which bore plenty of fine fruit. The point at which it was headed down (*a*) was within eighteen inches of the soil; and under it, on the stump, were two large wounds (*b*) and (*c*), made by cutting out the canker part, and which being covered with the composition were soon nearly filled up with sound wood. Very little pruning is at first given to trees so cut, but afterwards a regular succession of bearing wood is kept up by removing such as have borne for three or four years. Thus, one branch (*d*), which has done bearing, is cut off, and succeeded by another (*f*), and when that is tired also, it is cut off, and replaced by a third (*e*), and so on.



4835. *Grafting old apple trees* of different sorts with superior varieties, is an obvious and long-ried improvement. In this case, if the tree is a standard, it is only headed down to standard height; in old subjects, most commonly the branches only are cut over within a foot or two of the trunk, and then grafted in the crown or cleft manner.

4836. *The injuries* done to apple trees generally originate either from other vegetables or from insects. The first are few, and may be easily overcome by removing the mistletoe and the different mosses and lichens which have been allowed to fix upon the trees through negligence.

4837. *The injuries from insects* are much more numerous, and are of so many descriptions that they require all the watchfulness of the gardener to detect their first approach, and his judgment afterwards to administer suitable remedies. The greatest enemy to this tree is the *Eriosma lanigera* (*Aphis lanigera* *L.*), commonly known by the various names of woolly aphis, apple bug, coccus, or American blight. The origin and history of this fearful pest was investigated by Sir Joseph Banks. Although it first appeared in a nursery in Sloane-street so recently as the year 1787, it is now found in every part of the kingdom. It is a minute insect, covered with long cotton-like wool; it makes its habitation in the chinks of the bark, and there multiplies very fast. It may be effectually extirpated in two ways; either by anointing the infected trees with spirit of tar, or, as Sir J. Banks recommends, and in fact proved on his own trees, by taking off all the ragged and dead bark, and then scrubbing the trunk and branches with a hard brush and strong lime water.

4838. *What are called blights, produced by insects*, are particularly common among apple trees. Early in the spring, and immediately on the opening of the buds, they are attacked by the caterpillars of two or three small moths, which conceal themselves in the opening leaves while yet tender, which they cause to curl or roll up. Whether the eggs of these insects are deposited early in the same year, or late in the preceding autumn, has not been ascertained. Handpicking in this case is clearly of no use, unless on low and choice trees. The operation described by Mr. Samuel Curtis, of Glasenwood, near Coggeshall, Essex, that is, watering the trees and dusting them with quicklime, (see 3274. and 3103.), appears to have been directed against insects of this description; and, as it was attended with complete success, his simple process deserves particular attention.

4839. *When the leaves are fully expanded, other caterpillars* feed upon them, as the larvæ of the figure. of-eight moth (*Bombyx caruleocephala* *F.*), and some few others, but rarely to produce serious injury: these may be annoyed, and in part destroyed, by the smoke of burning weeds, litter, moist straw, &c. or by violently shaking the trees. Judicious culture and pruning will do much to prevent all vegetable diseases, such as canker, &c., but will have little or no effect in warding off the injuries occasioned by insects. (See an interesting paper on this subject in *Gard. Mag.*, vol. ix. p. 441.; also vol. iii. p. 315.; iv. p. 363.; v. p. 363.; vii. p. 357. and 368.; viii. p. 530. 580. and 581.)

Sussex. 2. *Pear*. — *Pyrus commutata* L. (*Eng. Bot.* 1784.); *loco*. *Di-Pendog*. L. and *Rooden* J. *Poirier*, Fr.; *Birbaum*, Ger.; *Peer*, Dutch; *Pero*, Ital.; and *Pera*, Span.

4840. *The pear tree*, in its wild state, is a thorny tree, with upright branches, tending to the pyramidal form, in which it differs materially from the apple tree. The twigs or spray hang down; the leaves are elliptical, obtuse, serrate; the flowers in terminating villous corymbs, produced from wood of the preceding year, or from buds gradually formed on that of several years' growth, on the extremities of very short protruding shoots called, technically, spurs. It is found in a wild state in England, and abundantly in France and Germany, as well as other parts of Europe, not excepting Russia, as far north as lat. 51°. It grows in almost any soil. The cultivated tree differs from the apple, not only in having a tendency to the pyramidal form, but also in being more apt to send out tap-roots; in being, as a seedling plant, longer (generally from fifteen to eighteen years) of coming into bearing; and when on its own root, or grafted on a wild pear-stock, of being much longer lived. In a dry soil it will exist for centuries, and still keep its health, productiveness, and vigour. Our remarks on the history of the apple will apply almost without exception to the pear. The Romans, in Pliny's time, possessed thirty-six varieties, and the fruit is still, as formerly, more valued, both in Italy and France, than the apple.

4841. *Use*. As a dessert fruit the pear is much esteemed, and generally preferred to the apple. It is also used for baking, *compotes*, marmalade, &c. Pared and dried in the oven, the fruit will keep several years, either with or without sugar. This mode of preparing the pear is about as common in France as the making of apple-pies is in this country; and what is favourable to the practice is, that bad eating sorts answer best for drying. Boos (*Nouveau Cours d'Agric.*, in *loco*) describes two methods of drying pears for preservation; and adds, that he has tried them after three years' keeping, and found them still very good. Perry, the *poiré* of the French, is made from the fermented juice, in the manner of cider, and the best sorts are said by Withering to be little inferior to wine. The wood of the pear tree is light, smooth, and compact, and is used by turners, and to make joiner's tools, picture-frames to be dyed black, &c. The leaves will produce a yellow dye, and may be used to give a green to blue cloths.

4842. *Criterion of a good pear*. *Dessert pears* are characterised by a sugary aromatic juice, with the pulp soft and sub-liquid, or melting, as in the *beurrés*, or butter-pears; or of a firm and crisp consistence, or *breaking*, as in the winter *bergamots*. *Kitchens pears* should be of large size, with the flesh firm, neither breaking nor melting, and rather austere than sweet, as the warden. *Perry pears* may be either large or small; but the more austere the taste, the better will be the liquor. Excellent perry is made from the wild pear.

4843. *Varieties*. Tusser, in 1573, in his list of fruits, mentions "peeres of all sorts." Parkinson enumerates sixty-four varieties; Mortimer, in 1708, has many sorts; and Miller has selected eighty sorts, and described them from Tournefort. In France, the varieties of the pear are much more numerous than even the varieties of the apple. The catalogue of the Luxemburg nursery at Paris contained, in the beginning of the present century, 189 select sorts. The British nursery lists at the present time contain from 300 to 400 names, among which, it may be observed, the number of good sorts are fewer in proportion than in the apple lists. In the present very imperfect state of the nomenclature of fruits, we are most happy in being able to lay before our readers a descriptive catalogue, containing a selection of all the best varieties, prepared for us by Mr. Thompson of the Horticultural Society's Garden, who has examined and compared many hundred sorts. They are arranged as dessert, kitchen, and perry pears, and the kinds in each division are set down in the order of their ripening.

4844. *Sorts of pears to be recommended where the space is very limited; or for cottage gardens*. Jargonelle, Marie Louise, beurré de Capiaumont, beurré Diel, glout moreau, Easter beurré, beurré rance. These are all of first-rate excellence, deserving the protection of walls where such can be afforded, but, with the exception of the jargonelle, they are all hardy enough for standards, in any climate tolerably good, as regards the growth of this class of fruits. It would be difficult to select fewer sorts than the above, because some might prefer a sort which would come fit for use in autumn; others in winter or spring. Several sorts may, however, be worked on the same tree, where the space will not admit of one of each being planted. For instance, the beurré de Capiaumont is such a great and constant bearer (nothing to the contrary has been observed of it since it first began to bear in this country), that a whole tree would be more than sufficient for a small demand; it might therefore be partly worked with glout moreau, or Easter beurré. It may be farther remarked, that the beurré Diel requires to have the branches kept rather thin, as otherwise its large and abundant foliage becomes too dense for the admission of sun and air to the fruit. (See *Gard. Mag.*, vol. ii. p. 253; and vol. iv. p. 107. and 245.)

A DESCRIPTIVE CATALOGUE OF PEARS — continued.
I. DESSERT PEARS — continued.

No.	Name.	Synonyms.	How, when, and where originated, preserved, or introduced.	Where figured.	Description.	Size.	Figure.	Colour.	Ship in Late Fall	Consistency and flavour.	Harvest.	Character of the tree, and general reputation of the fruit.
28.	Beurré Diel	-	-	-	Pom. Mag. t. 119.	Very large.	Obt. or ob. pyr.	Yellow brown	- Oct.	Battery and rich	- Great	Hardy vigorous tree
29.	Huen's Locon- variable	-	-	1815	Lindley, No. 53.	Med.	Roundish	Pale yell. rus.	- Oct.	Battery and rich	- Great	Standard
31.	Winter Nells	-	-	1800	Pom. Mag. t. 118.	Med.	Obovate	Yellowish rus. brown	- Nov.	Battery, melting, very rich	- Good	Deserves a wall
32.	Cressane	-	-	-	Dahmsel, t. 23.	Med.	Roundish	Greenish brown	- Nov.	Battery, rich, juicy	- Mod.	Wall
33.	Forille	-	-	-	Hort. T. v. t. 17.	Med.	Obovate	Yellow, green and red	- Nov.	Tender and battery	- Good	Vigorous tree
34.	St. Germain	-	-	-	Hooker's Pom. Mag. t. 112.	Med.	Pyramid.	Yellowish green and brown	- Nov.	Melting; cool refresh- ing juice	- Good	Tender and requires a wall
35.	Napoleon	-	-	-	Lindley, No. 169.	Large	Obt. pyr.	Pale green	- Nov.	Battery and melting	- Good	Vigorous tree, free from canker / wall or standard
36.	Beurré d'Aren- berg	-	-	1808	Pom. Mag. t. 75.	Large	Turbinate	Yellowish green and brown	- Dec.	Battery and very rich	- Mod.	Wall or standard
37.	Gloire d'Ardenne	-	-	-	Lindley, No. 129.	Large	Obtuse el. apic.	Pale green	- Nov.	Battery, melting; ex- cellent	- Great	Deserves a wall, but does not per- ticularly require it; a most valuable sort
38.	Chammonel	-	-	-	Hort. Trans. vii. t. 4	Large	Obtuse	Yellowish brown	- Nov.	Melting, sugary, and good	- Great	Well known
39.	Babine	-	-	-	Dahmsel, t. 40.	Large	Obovate	Greenish brown	- Nov.	Melting and good	- Good	Hardy and succeeds well as a standard
40.	Colmar	-	-	-	Dahmsel, t. 50.	Med.	Obovate	Greenish yellow	- Nov.	Battery, sugary, and Mod.	- Good	Requires a wall
41.	Passe-Colmar	-	-	-	Pom. Mag. t. 64.	Med.	Obovate	Greenish yellow rus.	- Dec.	Melting, and sweet	- Great	Wall or stand.; free from canker
42.	Knapton's Monarch	-	-	-	Hort. Trans. 3d ser. t. 2.	Med.	Obovate	Yellowish brown	- Dec.	Melting and very rich	- Good	A hardy thorny tree
43.	President du Role	-	-	-	Hort. Trans. 3d ser. t. 2.	Med.	Obovate	Greenish yellow rus.	- Dec.	Melting, and sweet	- Good	Fruit resembles Passe Colmar
44.	Ne plus Meurt	-	-	-	-	Med.	Roundish	Greenish rus.	- Nov.	Battery and rich	- Great	Fruit irregularly formed, but keeps well
45.	Bonne Beurré	-	-	-	Pom. Mag. t. 78.	Large	Roundish	Yellow, green, rus. b.	- Jan.	Battery and melting	- Great	Does well as does also the Beurré Rance; these being the two most valuable keeping pears, and should be planted in the garden to do the best service they supply.
46.	Beurré Rance	-	-	-	Pom. Mag. t. 83.	Large	Obt. pyr.	Brownish green	- Mar.	Melting, juicy, and rich	- Good	Standard

In the *Horticultural Society's Fruit Catalogue* for 1857, there are no fewer than 677 sorts of pears enumerated; besides nearly as many names as synonyms. It becomes, therefore, of the utmost consequence to the practical gardener, to be able to make a selection; and that which has been made for him in the above Table by Mr. Thompson, may be considered as the very best that ever has been made, or that probably can be made with our present stock of sorts, and extent of knowledge. As all the pears in the Society's garden have not yet fruited, there may possibly be some among them as good as any in the above list; but, as soon as such sorts shall be discovered, we have no doubt that on application to the council of the Society, and in permit Mr. Thompson to furnish us with all useful particulars respecting them, and in the *Gardener's Magazine*, as supplementary to the above list. In the mean time there is in the *Horticultural Society's Fruit Catalogue*, p. 113, not to have one variety, the Beurré Spence, which, though it is stated in the *Catalogue*, p. 113, not to have fruited in the Chiswick garden, yet as it is strongly recommended by Van Mons as the very best of pears, and as it has fruited three successive years in our garden at Baywater, may be added to the above list, perhaps between Nos. 20. and 21. Mr. Braddick asked Mr. van Mons, who had raised 80,000 new pears, which, of all the sorts that he had raised, was the one which he would give the preference. He immediately replied, with no hesitation, "the Beurré Spence;" and added, "this fruit, in its taste, is insuperable, and has no competitor." (*Gard. Mag.* vol. i. p. 143.) The name of Spence was given to this year by M. van Mons, in honour of the celebrated entomologist.

A DESCRIPTIVE CATALOGUE OF PEARS — *continued*.

II. KITCHEN PEARS.

No.	Name.	Synonymes.	How, when, and where originally procured, or abundant.	Where figured.	Described.	Size.	Figure.	Colour.	Ripe in Late till	Consistence and flavour.	Borer.	Character of the tree, and general reputation of the fruit.
47.	Best d'Héri	-	-	Hort. Trans. 2d Hort. Trans. 3d Med. ser. i. t. 12.	-	Med.	Roundish oblong, superior	Yellow and red. bush.	Oct.	Tender; and flavoured.	Great	Succeeds well as a standard
48.	Bequène Musqué	-	-	Hort. Trans. 2d Hort. Trans. 3d Med. ser. i. t. 12.	-	Med.	Oblong, superior	Pale yellow	Oct.	Sues tender; excel- lent	Great	Hardy tree; fruit excellent stewed; in a raw state dis- agreeable
49.	Spanish Bon Chrétien	-	-	Duhamel, t. 46.	Lindley, No. 144.	Large	Pyrami- dal	Yellowish green and red	Nov.	Tender and very good	Mod.	Requires a wall
50.	Bon Chrétien	-	-	-	-	Large	Obovate	Brownish yellow	Nov.	-	Great	Extraordinary bearer as a stand- ard fruit; usually good, but rather black when ripe, but in better; succeeds as a standard
51.	De L'ère	-	-	-	-	Large	Obovate	Russet	Nov.	-	Good	Succeeds well as a standard
52.	Double de Guerre	-	-	-	-	Large	Obovate	Brownish russet and red	Nov.	-	Good	Hardy for dwarf in open ground
53.	Belissime d'Hiver	-	-	-	-	Large	Obovate	Brownish russet and red	Nov.	-	Good	Hardy for dwarf in open ground
54.	Chapal	-	-	-	-	Large	Obovate	Brownish russet and red	Nov.	-	Good	Hardy for dwarf in open ground
55.	Catillac	-	-	-	-	Large	Obovate	Brownish russet and red	Nov.	-	Good	Hardy for dwarf in open ground
56.	Uvedale's St. Ger- main	-	-	-	-	Large	Obovate	Brownish russet and red	Nov.	-	Good	Hardy for dwarf in open ground

III. PERRY PEARS.

No.	Name.	Synonymes.	How, when, and where originally procured, or abundant.	Where figured.	Described.	Size.	Figure.	Colour.	Ripe in Late till	Consistence and flavour.	Borer.	Character of the tree, and general reputation of the fruit.
57.	Barland	-	-	Pom. Her. t. 37.	Lindley, No. 157.	Small	Obovate	Greenish russet	-	-	Great	Specific gravity of juice 1070
58.	Holmore	-	-	Pom. Her. t. 37.	Lindley, No. 158.	Small	Roundish	Yellow, green, and red	-	-	Great	Specific gravity of juice 1066
59.	Huffcap	-	-	Pom. Her. t. 34.	Lindley, No. 159.	Med.	Obovate	Greenish russet	-	-	Great	Specific gravity of juice 1070
60.	Longland	-	-	Pom. Her. t. 35.	Lindley, No. 160.	Med.	Oval	Yellowish	-	-	Great	Specific gravity of juice 1065
61.	Oldfield	-	-	Pom. Her. t. 11.	Lindley, No. 161.	Below med.	Turbinate	Pale russet green	-	-	Great	Specific gravity of juice 1067
62.	Telton Squash	-	-	Pom. Her. t. 15.	Lindley, No. 162.	Med.	Roundish	Greenish russet	-	-	Mod.	Hardy tree; fruit slightly esteemed; tree rather uncertain in bearing.

4846. *Propagation.* The pear may be propagated by layers or suckers, but not easily by cuttings. These modes, however, are productive of very indifferent plants, and are justly rejected in favour of raising from seed, and grafting or budding. (See *Gard. Mag.*, vol. II. p. 193. and 432, and iv. p. 962 and 402.)

4847. *From seed.* This mode is adopted either for the purpose of obtaining new varieties, or for producing pear-stocks. In the former case, the same principles of selection or crossing are to be followed which we have stated in treating of raising seedling apple trees, between which and the pear tree, the chief difference is, that the latter requires a longer period, nearly double, to come into bearing, and that the proportion of good sorts to bad, so originated, is but very small. Professor Van Mons, proprietor of the *Pépinière de la Fidélité*, at Brussels, has upwards of 800 approved sorts of new pears, raised from seed by himself and M. Duquesne, of Mons, in the course of fifteen or sixteen years, and selected from, probably, 8000 new seedling fruits. Van Mons observed to Neill, that "he seldom failed in procuring valuable apples from the seed; for those which were not adapted to the garden as dessert fruit, were probably suited for the orchard, and fit for baking or cider-making. With pears the case was different, many proving so bad as to be unfit for any purpose." (*Hort. Tour.*, &c., p. 300.) Whenever a seedling indicates, by the blunt shape, thickness, and wooliness of its leaves, or by the softness of its bark and fulness of its buds, the promise of future good qualities, as a fruit-bearing tree, Van Mons takes a graft from it, and places it on a well-established stock: the value of its fruit is thus much sooner ascertained. (*Hort. Tour.*, &c., p. 310.) At Brussels, seedlings yield fruit in four or five years, in Britain seldom before seven or ten years have elapsed. The fruit of the first year of bearing is always inferior to that of the second and third years. If a pear or an apple possess a white and heavy pulp, with juice of rather pungent acidity, it may be expected in the second, third, and subsequent years, greatly to improve in size and flavour. New varieties of pears, and indeed, of all fruits, are more likely to be obtained from the seeds of new than of old sorts. (*Hort. Tour.*, &c., p. 305, 309.)

4848. *In raising pears for stock,* the seeds from perry-makers are generally made use of; but the most proper are those from the wild pear, as likely to produce plants more hardy and durable. There is, however, less difference between free pear-stocks for those raised from the cultivated fruit, and wild pear-stocks, than there is between free apple and crab stocks. The seeds, being procured, may be sown, and afterwards treated as directed for seedling crab or apple-tree stocks.

4849. *Grafting and budding.* The most common stocks for grafting the pear are the common pear and wilding; but as the apple is dwarfed, and brought more early into a bearing state by grafting on the paradise or creeper, so is the pear by grafting on the quince or whitethorn. The pear will also succeed very well on the whitebeam, medlar, service, or apple; but the wilding and quince are in most general use. Pears on free stocks grow luxuriantly in good soil on a dry bottom; those on wildings grow less rapidly, but are deemed more durable, and they will thrive on the poorest soil, if a hardy variety, and not overpruned. "On the quince," Miller observes, "breaking pears are rendered gritty and stony; but the melting sorts are much improved: trees on these stocks may be planted in a moist soil with more success than those on wildings or thorns." On the thorn, pears come very early into bearing, continue prolific, and, in respect to soil, will thrive well on a strong clay, which is unsuitable both to those on quinces and wildings; but they are supposed to have an unfavourable influence on the fruit, in rendering it smaller and hard; and the grafts or buds require to be inserted very low, that the moisture of the earth may tend to favour the swelling or enlargement of the diameter of the stock, which does not increase proportionally to, nor ever attains the same size as the stem of the pear. Dubreuil, a French gardener, recommends the quince-stock for clayey and light soils, and the free stock for chalky and siliceous soils. (*Hort. Trans.*, vol. iv. p. 566.) The free and wilding pear-stocks are to be planted in nursery rows, at the same distance as recommended for free and wilding apples; and the quince and thorn at the same distance as the paradise and creeper apples; in other respects, the management is the same as for the apple.

4850. *Choice of plants.* Abercrombie takes trees at one year from the graft, and thence to the sixth year, or older. Forsyth says, "I would advise those who intend to plant pear-trees, instead of choosing young ones, to look out for the oldest that they can find in the nursery, and with strong stems."

4851. *Soil and site.* "A dry, deep loam," Abercrombie observes, "is accounted the best soil for the pear-tree when the stock is of its own species; on quince-stock it wants a moist soil, without which it will not prosper. Gravel is a good subsoil, where the incumbent mould is suitable. Cold clay is a bad subsoil: to prevent fruit trees from striking into it, slates may be laid just under the roots. For wall trees, the soil should be made good to the depth of three feet; for orchard trees, eighteen inches may do. Pear trees, on their own stocks, will thrive on land where apples will not even live; supposing the plants to be hardy varieties, little removed from wildings, and to have room to grow freely as standards. To the more choice of the early autumn and prime winter pears, assign south, east, or west walls. Knight and M'Phail recommend a strong, deep, loamy soil, and the latter a high wall for training the better sorts."

4852. *Planting finally* is performed any time, in mild weather, from October to March; standards are placed from twenty-five to forty feet apart every way; half standards from twenty to thirty; and dwarf standards, in borders from fifteen to twenty feet from stem to stem. Wall and espalier trees are planted from fifteen to thirty feet apart, according as they may have been planted on pear or quince stocks.

4853. *Mode of bearing,* as in the apple tree. "The pear tree," M'Phail says, "does not produce blossoms on the former year's wood, as several other sorts of trees do. Its blossom-buds are formed upon spurs growing out of wood not younger than one year old, and consequently, projecting spurs all over the tree must be left for that purpose." "In some pears," Knight observes, "the fruit grows only on the inside of those branches which are exposed to the sun and air; in others it occupies every part of the tree." (See *Gard. Mag.*, vol. II. p. 322.)

4854. *Pruning and training standards.* "Permit these to extend on all sides freely. Several years may elapse before any cross-placed, very irregular, or crowded branches, dead and worn-out bearers, require pruning, which give in winter or spring. Keep the head moderately open in the middle." "Pruning," Knight observes, "is not often wanted in the culture of the pear tree, which is rarely much encumbered with superfluous branches; but in some kinds, whose form of growth resembles the apple tree, it will sometimes be found beneficial." (See *Gard. Mag.*, vol. II. p. 325; and vol. III. p. 175.)

4855. *Pruning and training wall trees.* As a wall tree or espalier, the pear is always trained in the horizontal manner on account of its luxuriant growth. Harrison trains most pear trees in this way, and proceeds exactly as he does in training the apple tree. (4832.) But, "when it occurs that a tree trained after this method still continues unfruitful for several years after planting, the branches must be trained in a pendulous manner, and more or less so, according to the luxuriance of the tree, but always commence the training in the horizontal method, and afterwards change the direction of the branches as required." (*Tr. on Fruit Trees*, p. 144.) The ordinary distance at which he trains the side shoots is nine or ten inches, but the jargonelle he lays in at twelve inches, so as to have room for laying in side shoots from the spurs, for one or more years. This he finds checks the luxuriance of the tree, and keeps it in full bearing. (*Tr. on Fruit Trees*, p. 159. See *Gard. Mag.*, vol. II. p. 257.)

4856. *Forsyth*, in training a young pear tree, shortens the leading shoot in March, and when the shoots it produces are very strong, he says, "I cut the leading shoot twice in one season: by this method I get two sets of side shoots in one year, which enables me the sooner to cover the wall. The second cutting is performed about the middle of June." (*Tr. on Fruit Trees*, p. 195.)

4857. *Established wall trees and espaliers* will require a summer and winter pruning, and the following are Abercrombie's directions:—

4858. *Summer pruning.* While the shoots are young and soft, but not until the wood shoots can be dis-

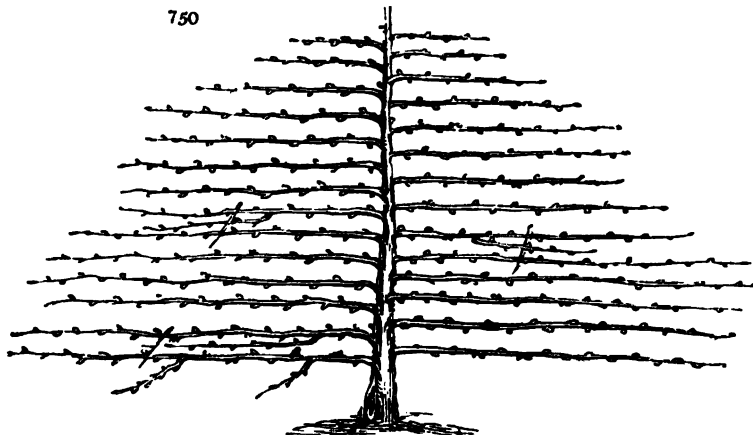
tinguished from spurs, rub off the fore-right, and superfluous shoots of the year, rather than let them grow woody, so as to adjust the strength of the roots to the required branches. Retain some of the most promising well placed shoots, always keeping a leader to each main branch, if the space will permit. Leave the greater number on young trees not fully supplied with branches. Train in these at their full length, all summer, in order to have a choice of young wood in the winter pruning. Occasionally on old trees, or others, where any considerable vacancy occurs, some principal contiguous shoot may be shortened in June to a few eyes, for a supply of several new shoots the same season.

4859. The winter pruning may be performed any time from the beginning of November until the beginning of April. If on young trees, or others, a farther increase of branches is necessary to fill up either the prescribed space, or any casual vacancy, retain some principal shoots of last summer, to be trained for that purpose. As, however, many young shoots will have arisen on the wood-branches and bearers, of which a great part are redundant and disorderly, but which have received some regulation in the summer pruning, we must now cut these out close to the mother branches, while we are preserving the best in the more open parts. Examine the parent branches, and if any are very irregular, or defective in growth, either cut them out close, or prune them to some eligible lateral to supply the place; or if any branches be over-extended, they may be pruned in to such a lateral, or to a good fruit-bud. Cut out the least regular of the too crowded; also any casually declined bearers; with decayed, cankered, and dead wood. The retained supply of laterals and terminals should be laid as much at length as the limits allow, in order to furnish a more abundant quantity of fruit-buds. During both courses of pruning, be particularly careful to preserve all the orderly fruit-spurs emitted at the sides and ends of the bearers: if, however, any large, rugged, projecting spurs, and woody barren stumps or snags occur, cut them clean away close to the branches, which will render the bearers more productive of fruit-buds, and regular in appearance. As each tree is pruned, nail or tie the branches and shoots to the wall or trellis. If afterwards, in consequence of either pruning out improper or decayed wood, or of former insufficient training, there are any material vacancies or irregularities in the arrangement, un-nail the misplaced and contiguous branches, and lay them in order.

4860. *Knight's mode of training the pear tree* is as follows:—"A young pear-stock, which had two lateral branches upon each side, and was about six feet high, was planted against a wall early in the spring of 1810; and it was grafted in each of its lateral branches, two of which sprang out of the stem, about four feet from the ground, and the other at its summit in the following year. The shoots these grafts produced, when about a foot long, were trained downwards, the undermost nearly perpendicularly, and the uppermost just below the horizontal line, placing them at such distances that the leaves of one shoot did not at all shade those of another. In the next year, the same mode of training was continued, and in the year following I obtained an abundant crop of fruit. An old St. Germain pear tree, of the spurious kind, had been trained in the fan-form against a north-west wall in my garden, and the central branches, as usually happens in old trees thus trained, had long reached the top of the wall, and had become wholly unproductive. The other branches afforded but very little fruit, and that, never acquiring maturity, was consequently of no value; so that it was necessary to change the variety, as well as to render the tree productive. To attain these purposes, every branch which did not want at least twenty degrees of being perpendicular, was taken out at its base; and the spurs upon every other branch, which I intended to retain, were taken off closely with the saw and chisel. Into these branches, at their subdivisions, grafts were inserted at different distances from the root, and some so near the extremities of the branches, that the tree extended as widely in the autumn, after it was grafted, as it did in the preceding year. The grafts were also so disposed, that every part of the space the tree previously covered, was equally well supplied with young wood. As soon, in the succeeding summer, as the young shoots had attained sufficient length, they were trained almost perpendicularly downwards, between the larger branches and the wall to which they were nailed. The most perpendicular remaining branch, upon each side, was grafted about four feet below the top of the wall, which is twelve feet high; and the young shoots, which the grafts upon these afforded, were trained inwards, and bent down to occupy the space from which the old central branches had been taken away; and therefore very little vacant space any where remained in the end of the first autumn. A few blossoms, but not any fruit, were produced by several of the grafts in the succeeding spring; but in the following year, and subsequently, I have had abundant crops, equally dispersed over every part of the tree."

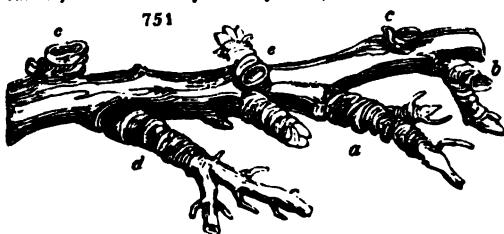
4861. *Heading down and pruning old pear trees.* "The method of pruning pear trees," Forsyth observes, "is very different from that practised for apple trees in general. The constant practice has been to have great spurs, as big as a man's arm, standing out from the walls, from a foot to eighteen inches or upwards." The constant cutting of these spurs, he says, brings on the canker, and the fruit produced is small, spotted, and kernelly. Forsyth's practice with such trees was, to cut them down, and renew the soil at their roots; and he refers to a beurré pear (fig. 750), restored from an inch and a half of bark, which, in 1795, bore 450 fine large pears, &c.

750



4862. *Harrison* and various other gardeners adopt the mode of keeping only short spurs, by which much larger fruit is produced. According to this plan, each spur (fig. 751. a) bears only once, when it is

cut out, and succeeded by an embryo-bud (*d.* at its base. This bud at the end of the first season, is no



more than a leaf-bud (*c.*); but at the end of the second summer, it has become a blossom-bud (*b.*), and bears the third summer (*a.*) Some useful observations on the management of pear trees, in correspondence with Harrison's practice, will be found in different parts of the *Caledonian Horticultural Memoirs*, vol. i.

4863. *Forsyth* says, "The constant practice has been to leave

great spurs, as big as a man's arm, standing out from the walls, from

one foot to eighteen inches and

upwards. The constant pruning of

these brings on the canker; and by the spurs standing out so far from the wall, the blossom and fruit are

liable to be much injured by the frost and blighting winds, and thus the sap will not have a free circula-

tion all over the tree. The sap will always find its way first to the extremities of the shoots; and the

spurs will only receive it in a small proportion, as it returns from the ends of the branches." (*Tr. on*

Fruit Trees, 187.)

4864. *Setting the fruit.* In a very curious paper on this subject, by the Rev. G. Swayne, he informs us

of a pear tree which had for twenty years never borne fruit, but which he induced to bear by cutting

off all the blossoms of each corymb of flowers, excepting the lower three, on the same principle as

gardeners top hons. This succeeded to a certain extent on one tree, but not on another; the selected

blossoms of the other he rendered fruitful by cross-impregnation. He says, "I fancied likewise that the

pointal was fit for impregnation before the anthers were ripe, and even before the petals expanded; and

be in a proper state as soon as it became exposed to the sun and air; I therefore concluded that there

might possibly be a chance of obtaining fruit by depriving the blossoms of their petals before they

expanded, and enclosing with each floret, in this state, within a paper envelope (as is my mode of effecting

artificial impregnation), a ripe blossom, viz. one that had just begun to diffuse its farina, either one of

its own, or, preferably, of some other variety of pear." (*Hort. Trans.*, vol. v. p. 210.) He tied up twenty

seven envelopes on the 27th of March, and took off the papers on the 15th of April: a number succeeded,

and produced ripe fruit, specimens of which were sent to the Horticultural Society, and found unusually

large and handsome. The rev. experimenter concludes his paper by observing, "whether the result of

the above-detailed experiments be such as to authorise an expectation that artificial assistance in vegetable

fecundation will hereafter become of so much importance to gardeners, in the instance just alluded to,

as in those at present recognised, of the cucumber, the melon, the early bean, and the hautbois straw-

berry, must be left to futurity to ascertain." (*Hort. Trans.*, vol. v. p. 212.)

4865. *Harrison* appears to have adopted a similar practice. He says, "It is very general to see healthy

pear trees, which produce an abundance of bloom, but set a very small proportion of fruit; this is more

particularly the case with the tenderest kinds. The reason of such barrenness is in some cases from

the stamina being destitute of farina, and in others from the farina having been dispersed before the

stigma had arrived at a proper state for its reception. To remedy such defects, I adopt the following

practice. As soon as the florets have expanded and the pistillum is in a proper state of maturity, I

impregnate six upon each corymb of blossom. The florets which I choose for this operation are those

situated nearest the origin of the spur, for when pears set naturally, it is very generally such florets. The

time I choose for this operation is calm dry days, and if possible when the sun is not very hot upon the

trees. Immediately after performance, I give each tree about eighteen gallons of manure water, or soft

pond water, at the roots. The trees should never be washed over the tops for a considerable time after

this impregnation has been effected." (*Tr. on Fruit Trees*.)

4866. *Insects, diseases, &c.* The pear tree is liable to the attacks of the same insects as the apple tree;

and the fruit of the summer kinds, when ripe, is liable to be eaten by birds, wasps, &c., which must be

kept off by nets, hanging bottles of sweetened water, and other usual preventives. (*See Gard. Mag.*

vol. v. p. 52 and 54.)

SUSSEX. 3. Quince.—*Pyrus Cydonia* L., *Cydonia vulgaris* W. en.; *Icos. Di-Pa-*
tag. L. and *Rosacea J.* *Coignassier*, Fr.; *Quittenbaum*, Ger.; *Kweeper*, Dutch,
Cotogno, Ital.; and *Membrillo*, Span.

4867. *The quince tree* is of low growth, much branched, and generally crooked and distorted. The leaves are roundish or ovate, entire, above dusky-green, underneath whitish, on short petioles. The flowers are large, white, or pale-red, and appear in May and June; the fruit, a pome, varying in shape in the different varieties, globular, oblong, or ovate; it has a peculiar and rather disagreeable smell and austere taste. It is a native of Austria and other parts of Europe; is mentioned by Tusser, in 1753; but has never been very generally cultivated.

4868. *Use.* The fruit is not eaten raw; but stewed, or in pies or tarts along with apples, is much esteemed. In confectionery, it forms an excellent marmalade and syrup. When apples are flat, and have lost their flavour, Forsyth observes, a quince or two, in a pie or pudding, will add a quickness to them. In medicine, the expressed juice, repeatedly taken in small quantities, is said to be cooling, astringent, and stomachic, &c. A mucilage prepared from the seeds was formerly much in use, but is now supplanted by the simple gums. In nursery-gardening, the plants are much used as stocks for the pear.

4869. *Varieties.* Miller enumerates—

1. *The oblong or pear quince*; with oblong ovate leaves, and an oblong fruit, roughened at the base.
2. *The apple quince*; with ovate leaves and a rounder fruit.
3. *The Portugal quince* (*Lang. Penn. t. 75.*); with broad cordate leaves, and an

oblong fruit, which is more juicy and less harsh than the others, and therefore the most valuable. It is rather a shy bearer, but is highly esteemed for marmalade, as the pulp has the property of assuming a fine purple tint in the course of being prepared.

This is the best sort for working the pear tree upon, its wood swelling more in conformity with that of the latter, than the harder wood of the other sorts.

4. *The mild or mistle quince*; less austere and astringent than the others.

4870. *Propagation.* Generally by layers, but also by cuttings, and approved sorts may be perpetuated by grafting. In propagating for stocks, nothing more is necessary than removing the lower shoots from the larger, so as to preserve a clean stem as high as the graft; but for fruit-bearing trees, it is necessary to train the stem to a rod, till it has attained four or five feet in height, and can support itself upright.

4871. *Soil and site.* The quince prefers a soft moist soil, and rather shady, or, at least, sheltered situation. It is seldom planted but as a standard in the orchard, and a very few trees are sufficient for any family.

4872. *The time of planting, the mode of bearing, and all the other particulars of culture, are the same as for the apple and pear.*

SUBJECT. 4. Medlar. — *Mespilus germanica* L. (*Eng. Bot.* 1523.); *Icos. Di-Pentag.* L. and *Rosacea* J. Neffier, Fr.; *Mispelbaum*, Ger.; *Mispelboom*, Dutch; *Nespolo*, Ital.; and *Nespero*, Span.

4873. *The medlar is a small or middle-sized branching tree; the branches woolly, and covered with an ash-coloured bark, and, in a wild state, armed with stiff spines. Leaves oval-lanceolate, serrate, towards the point somewhat woolly, on very short channelled petioles. Flowers produced on small natural spurs, at the ends and sides of the branches. Bracte as long as the corolla; calyxes terminating, fleshy; petals, white; fruit, a turbinated berry, crowned with five calycine leaflets; pulp thick, mixed with callose granules, and containing five gibbous wrinkled stones. The tree flowers in June and July, and the fruit is ripe in November. It is a native of the south of Europe; but appears to be naturalised in some parts of England, where it has been sown in copses by birds.*

4874. *Use.* The fruit is eaten raw in a state of incipient decay; its taste and flavour are peculiar, and by some much esteemed.

4875. *Varieties.* Those in common cultivation are —

- | | | |
|---|--|---|
| 1. <i>The Dutch medlar</i> (<i>Pom. Franc.</i> 2. p. 45. t. 2, 3.); a crooked, deformed, low tree, with very large leaves, antho, and downy on the under side. The flowers and fruit are very large; | the latter approaching to the shape of an apple. | |
| | 2. <i>The Nottingham medlar</i> ; with fruit of a quicker and more poignant taste. | 4. <i>The wild medlar</i> ; a smaller tree, with smaller leaves, flowers, and fruit than any of the former sorts, and the fruit is pear-shaped. |
| | 3. <i>The stoneless medlar</i> ; with small obovate fruit without stones or seeds. | |

4876. *Propagation.* By seeds, by layers, and cuttings, or by grafting on seedlings of their own species, or on any other species of *Mespilus*, or of *Cydonia*, or *Crataegus*. Miller observes, that if the stones are taken out of the fruit as soon as it is ripe, and immediately planted, they will come up next spring, and make good plants in two years. He prefers raising from seed to grafting on the *Crataegus*. Forsyth says, "those who wish to keep the sorts true, should propagate them by grafting on their own stocks." The plant is rather difficult to strike by cuttings.

4877. *Soil.* The soil in which the medlar thrives best is a loamy rich earth, rather moist than dry; but not on a wet bottom.

4878. *Final planting.* The medlar, like the quince, is usually grown as a standard or espalier; the former may be planted from twenty to thirty, and the latter from fifteen to twenty feet apart.

4879. *Mode of bearing.* On small spurs at the ends and sides of the branches.

4880. *Pruning.* Forsyth recommends the same sort of treatment as for the quince. Cut out all the dead and cankered wood, and keep the tree thin of branches when it is desired to have large fruit. Care is requisite to train standards with tall stems. Espaliers will require a summer and winter pruning, as in the apple-tree.

SUBJECT. 5. True-Service. — *Sorbus domestica* L., *Pyrus Sorbus* Gært. (*Pyrus domestica*, *Eng. Bot.* 350.); *Icosúndria Di-Pentag.* L. and *Rosacea* J. Alizier, Fr.; *Elleberbaum*, Ger.; and *Loto*, or *Bagolaro*, Ital. (*fig.* 752.)

4881. *The true-service-tree is a native of France and Italy; it has also been found wild in England, but very sparingly. At present it is very little cultivated, and indeed plants of it are seldom to be found in the British nurseries. (Gard. Mag., vol. ix. p. 481.) In the garden of the Horticultural Society at Chiswick, there are two service trees, an apple-fruited, and a pear-fruited, which bear abundantly every year. There are also trees of the same varieties, which bear annually, in Messrs. Lodiges's arboretum at Hackney; and in our garden at Bayswater. There is a tree of the wild variety, in full bearing, in the arboretum of P. B. Webb, Esq., at Milford, in Surrey.*

4882. *Use.* The fruit, which ripens about the same time as that of the medlar, has a peculiar acid flavour, and is eaten, when mellowed, like that fruit, to which it is deemed inferior. In Italy, it is esteemed good in dysentery and fluxes. The wood,

which is very hard, is held in repute for making mathematical rulers, and excisemen's gauging-sticks. In France it was formerly much used for the formation of screws for wine presses. (*Gard. Mag.*, vol. iv. p. 487.)

4883. *Varieties.* In Italy they have many varieties obtained from seeds; but those generally known here are only three; the pear-shaped, apple-shaped, and berry-shaped.

4884. *Propagation.* By seeds, cuttings, or layers; or, which is preferable for plants intended to form good-sized and early-bearing trees, by grafting on seedlings of their own species. It may also be inarched on the *Pyrus*, *Mespilus*, or *Crataegus*, or the common mountain-ash. On the latter tree it produces blossoms the third or fourth year, while seedlings seldom blossom before they are twenty-five or thirty years of age. (*Ibid.* p. 487.)

4885. *Soil.* The best is a strong clayey loam.

4886. *Culture.* The tree is recommended by Forsyth and Abercrombie to be grown as a standard at twenty or thirty feet distance, and to be pruned and otherwise treated like the apple and pear.

4887. *Gathering the crop.* It is late in autumn before this operation can be performed. Wipe the fruit dry, and lay it on dry wheat-straw, spread on the open shelves of the fruit-room. In about a month it will become mellow and fit for use.



SECT. II. Stone Fruits.

4888. *Of stone fruits* the most esteemed is the peach tribe, and next the apricot; both the trees natives of Persia, but acclimated in Britain, and remarkable for the early appearance and lively colours of their blossoms. The peach is one of the most delicious of summer fruits. Besides the peach, nectarine, and apricot; the almond, plum, and cherry, are comprehended in this section.

SUBJECT. 1. *The Peach and Nectarine.*—*Amigdalus Persica* L. and *A. c. var. Nectarina* (Black. t. 101.), *Persica vulgaris* Mill., and *P. la'vis* Dec.; *Icos. Monog. L.* and *Rosaceæ J.* *Malus Persica* of the Romans; *Pêcher*, Fr.; *Pfirschnbaum*, Ger.; *Persikkboom*, Dutch; *Persico*, Ital.; and *Alberchigo*, Span.

4889. *The peach tree* in its natural state is under the middle size of trees; of quick growth, and not of long duration. Sickler considers Persia as the original country of the peach, which, in Media, is deemed unwholesome; but, when planted in the alluvial soils of Egypt, becomes pulpy, delicious, and salubrious. The peach also, according to Columella, when first brought from Persia into the Roman empire, possessed deleterious qualities; which Knight concludes to have arisen from those peaches being only swollen almonds (the *tuberes* of Pliny), or imperfect peaches; and which are known to contain the Prussic acid, which operates unfavourably in many constitutions. The flesh of the almond is at this day, in some parts of the Continent, considered poisonous. The tree has been cultivated from time immemorial in most parts of Asia; when it was introduced into Greece is uncertain: the Romans seem to have brought it direct from Persia, during the reign of the emperor Claudius. It is first mentioned by Columella, and afterwards described by Pliny. The peach was introduced into England about the middle of the sixteenth century, where it is always cultivated against walls or under glass. The nectarine is merely to be considered as a variety of the peach.

4890. *Use.* They are desert fruits of the first order, and make delicious preserves. In Maryland and Virginia, and also in some parts of France, a brandy is made from them. The leaves, in consequence of their containing Prussic acid, when steeped in gin or whiskey, communicate a flavour resembling that of noyau.

4891. *Criterion of a good peach or nectarine.* A good peach or nectarine possesses these qualities: the flesh is firm; the skin is thin, of a deep or bright red colour next the sun, and of a yellowish-green next the wall; the pulp is of a yellowish colour, full of high-flavoured juice; the fleshy part thick, and the stone small.

4892. *Varieties.* Linnaeus divides the *A. Persica* into two varieties; that with downy fruit or the peach, and that with smooth fruit or the nectarine. There are various instances on record (*Gard. Mag.*, vol. i. p. 471.) of both fruits growing on the same tree, even on the same branch; and one case has occurred of a single fruit partaking of the nature of both. (*Gard. Mag.*, vol. iv. p. 63.) The French consider them as one fruit, arranging them in four divisions: the *pêches*, or free-stone peaches, the flesh of whose fruit separates readily from the skin and the stone; the *pêches lisses*, or free-stone nectarines, or free-stone smooth peaches; the *pesvies*, or cling-stone peaches, whose flesh is firm, and adheres both to the skin and stone; and the *brugnons*, or nectarines, or cling-stone smooth peaches. Knight (*Hort. Tr.*, vol. iii. p. 1.), Robertson (*Hort. Tr.*, vol. iii. p. 892.), and various botanists, consider the peach and almond as one species.

4893. *The flat peach of China* (*Hort. Trans.*, vol. iv. pl. 15.) is a curious flattened fruit, sweet and juicy, and with a little noyau flavour. Knight has fruited it, and considers that from the early habits of the tree it will prove a valuable acquisition. He has "found excitability of habit to be hereditary in the seedling offspring of plants, and to be transferable by the pollen;" and, therefore, imagines "there will be no difficulty in obtaining from the flat peach other varieties of similar habits, free from the deformity which has recommended it to the Chinese." (*Hort. Trans.*, vol. v. p. 372.) Mr. Thompson states that "it may be fruited in pots, even by the time that other peaches can be brought into blossom." Its natural habits are nearly those of an evergreen, as it keeps growing, on the open wall, throughout the winter, when the weather is not too severe.

4894. *There are many fine varieties of the peach:* Tusser, in 1573, mentions peaches white and red; Parkinson, in 1629, enumerates twenty-one; and Müller, in 1750, thirty-one varieties. In the garden of the Luxembourg, at Paris, are seventy varieties; and above double that number of names are to be found in the catalogues of our nurseries. Several distinguished and ingenious attempts have been made to class the varieties of peaches and nectarines, by the leaf and flower as well as the fruit; one is by Poiteau, in the *Bon Jardinier*; another by Count Lelieur, in his *Pomme Française*; and third by Robertson, nurseryman, of Kilkenny, whose arrangement is founded on the glands of the leaves. The most complete, however, is that by Mr. George Lindley, published in the *Transactions of the Horticultural Society*, vol. v., and again, with some additions and corrections, in his excellent work, the *Guide to the Orchard and Kitchen Garden*. On nearly the same principles of classification as those above mentioned, the following synoptical table of peaches and nectarines has been constructed by Mr. Thompson, who precedes it by the following introductory remarks:—

4895. "This table," he says, "it is presumed, will be found the most concise and simple of any that has yet been published on the subject; whilst at the same time it exhibits, at a glance, all the principal sorts of these fruits arranged in the respective divisions, to which they belong in the classification. The following is an explanation of its divisions and subdivisions. The two principal divisions are peaches and nectarines. Between these the distinction is so well known as to render the notice of it unnecessary in this place. Each of these divisions consists of *melters* and *cling-stones*, which accordingly form the subdivisions, or classes.

Melters, or *Free-stones*, are those peaches and nectarines which, when properly ripened, part readily from the stone. In these the stone has deeper fibres than in the cling-stones, with large processes, through which fibres issue into the flesh. If a transverse section be made in a fruit of this sort, the top part may be easily twisted off, leaving

the upper part of the stone clear of flesh, and with only some broken fibres remaining. (See the section of the *Chamoisier* Peach in *Bon. Mag.*, t. 61.) Peaches of this texture are called by the French *Pêches à chair tendre* et *seigne*; and they designate the melting nectarine by the name of *Pêches lisses*.

Cling-stones, or *Perses*, are such as cannot possibly be separated from the stone like the free-stones; the flesh being so firmly attached to every part of the surface of the stone, as to render it necessary to be sliced off with a knife. (See section of the *Catherine* Peach in *Bon. Mag.*, t. 9.) The process of the melting or free-stone peaches, though

deeply fissured, have, nevertheless, the sides of the fissures tolerably smooth, and occasionally almost polished. In the clings-stones, although the fissures are by no means so deep, yet there is a sort of roughness pervading the whole surface, from every point of which the densely united mass of fibrous substance which composes the flesh may be observed to radiate, and to which it will be found to adhere till decomposition takes place. The peaches of this class are the *Paves* of the French, and the nectarines their *Bergams*; hence the application of the latter term to melting nectarines, as is often done by people in this country, is improper.

The leaves of the peach tree furnish the characteristics of three divisions:—

1. Leaves serrated and glandless (fig. 753. a).
2. Leaves crenated or serrulated with globose glands (b).
3. Leaves crenated or serrulated with reniform glands (d).

The serrated glandless leaves (a) cannot be mistaken.

The leaves with globose glands (b) are also easily recognised for the most part. In some cases they are not so conspicuously developed, and require careful inspection to distinguish them from reniform glands, also imperfectly developed. It will, therefore, be necessary to examine several leaves on different parts of the shoots, and also

to bear in mind that the globose glands are somewhat pedicellate.

Reniform glands (c) when situated on the petiole, have sometimes nearly a globose appearance; but all doubts may be easily removed, by inspecting leaves where the reniform glands are also on the base of the leaf, and there they will be found indented in the margin; whereas the globose glands, on the contrary, are always somewhat pedicellate in a similar situation.

The flowers afford two subdivisions:—

1. Flowers large; with the petals deep-coloured at the centre, and of a pure pale bluish towards the margin (g).

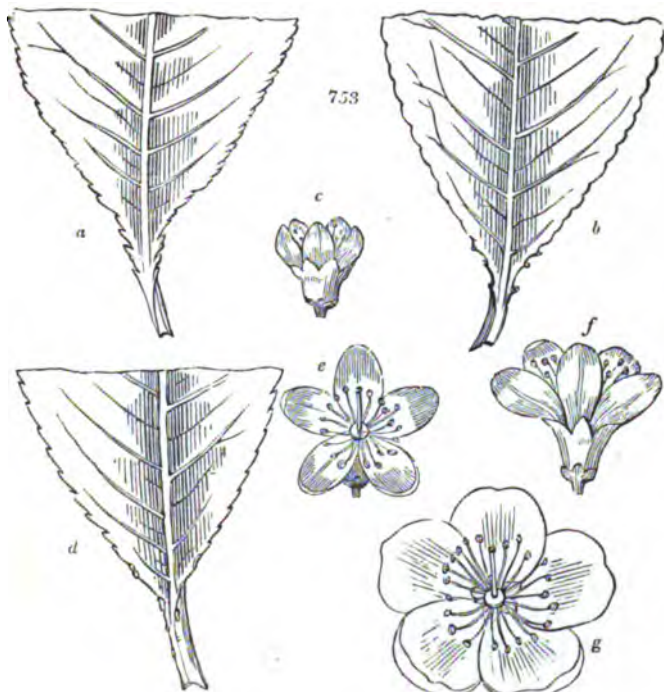
2. Flowers small; with petals oval or obovate, deeper coloured at the margin than on the disc (e, f, f').

It has been thought better to form only two subdivisions from the flowers according to the above definition, than to adopt a third by the introduction of middle-sized flowers; for subdivisions consisting of large, middle-sized, and small flowers, have been found objectionable, owing to the difficulty of assigning limits to such subdivisions. All flowers are liable to vary, in some degree, according to circumstances; and supposing limits fixed for the respective divisions, the flowers will vary as far as to expand from the largest of those reckoned small within the limits of the middle-sized; and, on the contrary, the smallest of those accounted

large will be sometimes in a state so diminished as to be within the scope of the middle-sized, or even small. It is, therefore, better to form two definite subdivisions than three, which would be indefinite, as those must be where size is the only criterion. The Royal Charlotte peach is called by some authors, *Mademoiselle rouge à moyennes fleurs*, ou à *petites fleurs*, a proof that these divisions are not well agreed upon. In order that no difference of opinion may exist as to which of the two subdivisions now formed any flower may belong, the following remarks are given.

Large flowers (g) have petals of a different form and colour from those of small flowers; they are more expanded and dilated, in general imbricating each other. They are deeply coloured near the centre, and fade to a pale bluish towards the margin, where sometimes they are almost white when much exposed to the sun.

Small flowers (e, f, f') have petals oval or obovate, less spreading or dilated, not imbricating each other when the flower is fully expanded; their tips are generally a little rolled in or cucullate. Their colour is deepest towards the margin, instead of being so near the centre, as in the large flowers; in some sorts they are bright, in others dingy; but, unlike the large flowers, they become not a pure bluish, but rather a pallid red.



Of the three degrees of small flowers above delineated, the smallest, c, may be exemplified in the Late admirable, and Morrisiana pound, Peaches; and in all the Nectarines included in the sections of small flowers in the following tables, § 4897. and § 4900. The largest form of small flowers, f, is to be found in the Royal Charlotte, Bellegarde, Yellow Alberge, and Chancellor, Peaches. Gardeners and nurserymen may be recommended to draw out, on a scale sufficiently large for containing their collections, the tables, § 4896. and § 4897.; and in these insert their sorts according as the examination of the leaves, flowers, &c. will direct. By comparing these leaves and flowers with all the particulars in the following arrangements, § 4896. and § 4897., and with the Descriptive Catalogues, § 4898. and § 4900., the chance of possessing a sort with the wrong name, without detection, will be rendered next to impossible.

4897. A TABLE OF NECTARINES, arranged according to their leaves and flowers, with all their Synonyms, as determined by Mr. THOMSON, at the Garden of the London Horticultural Society, in 1833.—The numbers preceding the names refer to the Table § 4900., which shows the order of their ripening, &c.

CLASS I. — MELTERS.

Div. 1. Leaves serrated, glandless.		Div. 2. Leaves crenated, or serrulated, with <i>globose glands</i> .		Div. 3. Leaves crenated, or serrulated, with <i>reniform glands</i> .	
Sect. 1. Flowers large.	Sect. 2. Flowers small.	Sect. 1. Flowers large.	Sect. 2. Flowers small.	Sect. 1. Flowers large.	Sect. 2. Flowers small.
	1. Hunt's tawny Hunt's early tawny	8. Pitmaston orange		5. Old white 6. New white Narcis white Flanders Emmenton's new white Crimson white Large white 12. Late yellow Jaune lisse tardive Jaune lisse Madras	4. Violette hative Violet Early violet Lord Islay's Erange Lampoon's heart Lampoon's New scarlet Vermah (of some) Vermah violet hative 3. Erange Common Erange Clarendon Vermah (of some) 2. Downton 13. Peterborough Late green Vermah

CLASS II. — CLING-STONES.

9. Newington Old Newington Smith's Newington Rough Roman Rough Roman Anderson's Anderson's round Anderson's Rough Roman Newington New early Newington New early Newington New dark Newington Early black Newington Black Early black Jacobine's black Lucasine's seedling				10. Roman Red Roman Old Roman Roman Roman striped Roman violet striped	11. Golden Fine gold-fashed Orange
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4998. A DESCRIPTIVE CATALOGUE OF PEACHES, cultivated in BARRAN; arranged in the order of their ripening. By referring to the same numbers in the Table § 4896., the whole of the synonyms will be found.

No.	Name.	Synonymes.	How, when, and where, originated, procured, or introduced.	Where figured.	Size.	Form.	Colour.	Ripens.	Colour of flesh and flavour.	Prover.	Characteristics of the tree, and general reputation of the fruit.
1.	Red nutmeg	- Brown, n. &c.	- Old French sort	- Duhamel, t. 3.	- Small	- Roundish	Mottled, deep red with red	End July begin-Aug. B. m. Aug.	Flesh white, red at the stone; rich and tender and good	Mod.	Valuable for its early maturity
2.	Early Anne	- White avant, &c.	- - - - -	- Brookshaw, t. 24.	- Below med.	- Roundish	Pale, slightly tinged with red	- - - - -	Flesh white, slightly red at the stone; very good and tender	Mod.	A handsome little peach
3.	Petite mignonne	- Double de Troyes, &c.	- Old French sort	- Duhamel, t. 4.	- Small	- Depressed globose	Pale yellow and dark purplish red	B. m. Aug. M. e. Aug.	Flesh white, red at the stone; rich and vinous	Good	Requires a good situation
4.	Pourpre blâve	- Early avant	- Ditto	- Duhamel, t. 11.	- Medium	- Round	Pale yellow and red, E. Aug.	- - - - -	Flesh white, red at the stone; rich and vinous	Very good	Hardly tree
5.	Acton Scot	- - - - -	- By Knight, from noblese and from the same Old French sort	- Hort. T. t. 10.	- Medium	- Flatly globose	Greenish yellow and M. Aug. deep purplish red, b. Sept.	- - - - -	Flesh white, red at the stone; rich and good	Good	Persons well, and not subject to mildew
6.	Grosse mignonne	- French m., &c.	- - - - -	- Brookshaw, t. 26.	- Large	- Roundish	Pale yellow, slightly tinged with red, not dotted	E. Aug. b. Sept.	Flesh white, red at the stone; rich and delicate	Good	Requires a good situation
7.	Hemskirke	- - - - -	- - - - -	- Brookshaw, t. 24.	- Medium	- Round	Pale yellow and red, b. Sept.	- - - - -	Flesh white, red at the stone; rich and delicate	Good	Healthy tree
8.	Red Magdalen	- French M., &c.	- Old French sort	- Pom. Mag. t. 30.	- Medium	- Round	Pale yellow and red, E. Aug. dotted	- - - - -	Flesh white, red at the stone; tender and rich	Good	Tree apt to mildew
9.	Spring Grove	- - - - -	- By Knight at Downton, from noblese and red nutmeg Old French sort	- Pom. Mag. t. 97.	- Medium	- Round	Pale yellow and red, E. Aug. dotted	- - - - -	Flesh white, rayed with red at the stone; rich and excellent	Very good	Pear plum stock; very similar to the following
10.	Royal George	- Milliet's mignon, n. &c.	- - - - -	- Pom. Mag. t. 119.	- Medium	- Roundish	Whitish and dotted, deep red	E. Aug. b. Sept.	Flesh greenish white to red at the stone; rich and excellent	Good	Good for forcing
11.	Double montagne	- Montauban, &c.	- - - - -	- Lindley, No. 5.	- Large	- Roundish	Pale greenish yellow b. Sept. clouded with darker	- - - - -	Flesh greenish white to red at the stone; rich and excellent	Very good	Tree hardly, fruit bears carriage well
12.	Noblese	- Vanguard, &c.	- - - - -	- Pom. Mag. t. 95.	- Large	- Roundish	Pale greenish yellow b. Sept. and red, clouded with darker	- - - - -	Flesh greenish white to red at the stone; rich and excellent	Very good	Hardly tree; succeeds as a standard in good situations
13.	Malta	- Belle de Paris, &c.	- - - - -	- Pom. Mag. t. 15.	- Large	- Depressed globose	Pale greenish yellow, E. Aug. clouded with red	- - - - -	Flesh white, rayed with red at the stone; rich and excellent	Very good	Curious on account of its white blossoms and white fruit
14.	Yellow allonge	- Golden mignonne, &c.	- - - - -	- Duhamel, t. 5.	- Below med.	- Roundish	Dark red	- - - - -	Flesh white, rayed with red at the stone; rich and excellent	Very good	
15.	Bradick's red	- - - - -	- Seedling by Bradick	- - - - -	- Large	- Round	Pale yellow and dark red, dotted	- - - - -	Flesh white to the stone; rich and excellent	Good	
16.	White blossomed incomparable	- White blossomed	- - - - -	- - - - -	- Large	- Roundish oval	Quite pale	E. Aug. b. Sept.	Flesh white to the stone; rich and excellent	-	
17.	Madame de Bellevue	- - - - -	- Belflower on the Upper Rhine	- - - - -	- Large	- Roundish	Pale yellow and dark red, dotted	- - - - -	Flesh white, rayed with red at the stone; very good	-	

18. Old Newington	-	-	-	-	-	-	-	Round	Pale and finely clouded with the olive green; sometimes partly smooth	B. Sept.	Flesh firm, white to the stone; greenish yellow at the stone	Good
19. Mountaineer	-	-	-	-	-	-	-	Roundish oval	Pale green and sometimes smooth	B. Sept.	Flesh pale green, slightly red at the stone; juicy, with somewhat of a musky flavour	Hardy tree; fruit sometimes partakes of the muskiness and flavour of its nectarine parent
20. George the Fourth	-	-	-	-	-	-	-	Roundish	Pale yellow and dark red, dotted	B. Sept.	Flesh yellowish-white, raved with red at the stone; rich and excellent	Excellent when forced
21. Royal Charlotte	-	-	-	-	-	-	-	Roundish oval	Pale yell. and deep red, clouded with darker red	B. m. Sept.	Flesh white, raved with red at the stone; rich and good	Very good
22. Flat peach of China	-	-	-	-	-	-	-	Flattened	Pale greenish yellow and red	B. m. Sept.	Flesh greenish yellow, raved with red at the stone; tolerably good	Good
23. Bellegarde	-	-	-	-	-	-	-	Round	Deep red, clouded with darker	B. m. Sept.	Flesh white, raved with red at the stone; excellent	Very good
24. Barrington	-	-	-	-	-	-	-	Roundish	Pale yellow and fine red	M. Sept.	Flesh white, raved with red at the stone; very good	Very good
25. Chancellor	-	-	-	-	-	-	-	Roundish oval	Greenish yellow & dark red	M. Sept.	Flesh greenish white, raved with much purple; rich and vinous	Good
26. Late admirable	-	-	-	-	-	-	-	Roundish	Greenish yellow, clouded with red	M. e. Sept.	Flesh white, raved with red at the stone; excellent	Good
27. Marrianna pound Hoffman's, &c.	-	-	-	-	-	-	-	Round	Greenish yellow and dull red	M. e. Sept.	Flesh greenish white; very good	One of the very best late peaches
28. Lemon cling-stone	-	-	-	-	-	-	-	Lemon shaped	Orange yellow and red	E. Sept.	Flesh orange, purplish at the stone; excellent	Requires a warm situation
29. Melting saucin-gole	-	-	-	-	-	-	-	Roundish	Pale purplish red, which makes its hoary down very apparent	E. Sept. b. Oct.	Flesh in colour like best-root; good preserved	Excellent preserved
30. Catherine	-	-	-	-	-	-	-	Round	Pale yellow and bright red	E. Sept. b. Oct.	Flesh firm, yellowish white, red at the stone; sweet	Requires a warm situation
31. Heath	-	-	-	-	-	-	-	Roundish	Cream-coloured and red	B. Oct.	Flesh firm, pale yellow to the stone; sweet; excellent preserved	One of the best late cling-stones
32. Cardinal de Plessberg	-	-	-	-	-	-	-	Roundish	Dull violet	M. Oct.	Flesh red like best-root	Best used as a preserve

1899. *Section of sorts.* Mr. Thompson says: — "in forming a collection of peach trees, say of twenty-four trees, of the very best sort, and which will ripen their fruit in succession, the proportions may be: — Early Anne 1, Gross mignonne 3, Royal George 2, Double montagne 2, Noblese 2, Malta 1, Royal George 3, Royal George 4, Barrington 3, Late admirable 4. Should any of these, Charlotte 2, Bellegarde 4, Barrington 3, be required more be required at any particular season, then the proportions may be varied, or some others introduced; such as the Acton Scot, Spring Grove, and Mountaineer, which may probably be found hardier. The best varieties for forcing are, the Bellegarde, Grosse mignonne, Royal George, and Barrington." Abercrombie says, "Except the situation be completely favourable as to climate, aspect, and shelter, forbear to plant very early or extremely late fruit; the frost will almost inevitably cut off the former when blossoming and setting; and the latter will hardly ripen under the declining heat of autumn."

4900. A DESCRIPTIVE CATALOGUE OF NECTARINEÆ, cultivated in HAVANA; arranged in the order of their ripening. - By referring to the same numbers in the Table § 4807., will be found the whole of the Nomenclature.

No.	Name.	Synonym.	How, when, and where originally procured, or obtained.	Where figured.	Size.	Form.	Colour.	Ripens.	Colours of flesh and bones.	Characteristics of the fruit, and general reputation of the fruit.
1.	Hunt's away	Hunt's early law- ny	Seedling by Knight	Landley, No. 6.	Large seed.	Rounded	Pale orange and red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
2.	Devon	Clarendon, &c.	"	Perm. Mag. t. 48.	Medium	Rounded	Pale green and violet red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
3.	Elrigo	Clarendon, &c.	"	Perm. Mag. t. 48.	Medium	Rounded	Pale green and violet red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
4.	Violet hâive	Hampton Court, &c.	"	Perm. Mag. t. 48.	Medium	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
5.	Old white	"	"	"	Medium	Rounded	White tinged with red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
6.	New white	Plandem, &c.	By Neale, near London, from seed of the old white hâive (1811)	Landley, No. 3.	Medium	Rounded	White tinged with red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
7.	Early Nottingham	Black, &c.	"	Landley, No. 4.	Large	Rounded	White tinged with red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
8.	Princeton orange	"	"	Landley, No. 5.	Large	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
9.	Nottingham	Anderson's, &c.	By Williams of Princeton, from seed of King's Nottingham (1811)	Landley, No. 6.	Large	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
10.	Roman	Red Roman, &c.	"	Landley, No. 7.	Large	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
11.	Golden	Orange, &c.	"	Landley, No. 8.	Medium	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
12.	Late yellow	Jaune late, &c.	"	Landley, No. 9.	Small	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.
13.	Peartree	Late green, &c.	"	Landley, No. 10.	Medium	Rounded	Pale green and dark red	M. & Aug.	Flask orange, later, and pale green, slightly pink at the stem; skin green, smooth, and tender and delicious.	Perfection of the colour of the flesh, and the texture of the stone, are the chief attributes of the fruit.

4901. For the chief supply of Nectarines, none are so good as the Elrigo and Violet hâive. Hunt's tawny may be recommended as one considerably earlier than these; and for a very late sort, one hitherto little known in this country, the Late yellow, deserves notice. In a warm soil and favourable situation, the New white nectarine will produce fruit which will not only form a beautiful contrast in the desert, but will likewise be esteemed for its flavour.

4902. The sorts of Peaches and Nectarines in these Tables are selected as the very best; and those of the highest merit among them being now pointed out the whole may remain as standards of excellence whereby to try others that may either now exist, or be hereafter raised. Let the comparison be made with those of a corresponding season of maturity. There is, perhaps, must room for improvement among the very early sorts; for instance, if one be found harder than the Early Anne, and of equal or superior quality, then let that name be set aside, and the new sort introduced instead.

4908. *Propagating to procure new sorts.* The peach is raised from the stone ; and this mode is pursued in America, even for procuring trees for common purposes. The peaches in the table, mentioned as produced by Knight, were thus originated ; the parent trees were dwarf planted in large pots ; these being brought into a state of vigorous health, the pistils of the blossom of one sort were impregnated with the pollen of another ; only three peaches were suffered to remain on each tree ; and from sowing the stones of these, the Acton Scot, the Spring grove, and other varieties, were produced.

4904. Knight has some remarkable observations on this subject in various papers published in the *Hort. Trans.* ; but especially in *Observations on the Method of producing new and early Fruits, and on some Varieties of the Peach.* (vol. i.) In the latter paper he thus concludes : — " I entertain little doubt that the peach tree might, in successive generations, be so far hardened and naturalised to the climate of England and Ireland, as to succeed well as a standard in favourable situations. The peach does not, like many other species of fruit, much exercise the patience of the gardener, who raises it from the seed ; for it may always be made to bear within three years old. I will not venture to decide whether it might not possibly produce fruit even at the end of a single year. In prosecuting such experiments, I would recommend the seedling peach trees to be retained in pots, and buds from them only to be inserted in older trees ; for their rapid and luxuriant growth is extremely troublesome on the wall, and pruning is death to them." He afterwards succeeded in producing blossom buds the first year : the means used were, leaving on the laterals near the extremities of the shoots, and exposing the leaves as much as possible to the sun, in order to promote the growth and ripening of the wood.

4905. *Propagation to perpetuate varieties and training in the nursery.* The peach is generally budded on damson plum stocks, and some of the more delicate sorts on apricot stocks, or old apricot trees cut down, or on seedling peaches, almonds, or nectarines. Knight recommends growing almond stocks for the finer kinds of nectarines, and apricots, as likely to prevent the mildew, and as being allied to the peach. He says, " almond stocks should be raised and retained in the nursery in pots, as they do not transplant well." Dubreuil recommends the plum as a stock for a clayey soil, and the almond for such as are light, chalky, or sandy. The same opinion is held by the Montreuil gardeners, who use almond stocks where the soil is dry, and plum stocks where it is strong and black. The Flemish nurserymen graft both the peach and the nectarine on the Mirabelle plum. (See *Gard. Mag.*, vol. i. p. 384., and vol. ii. pp. 167, 168.) " Perform the budding in July or August, in the side of the stock, one bud in each, inserted near the bottom, for principal wall trees ; and at the height of three, four, or five feet, for riders. The bud will shoot the following spring, and attain the length of three or four feet in the summer's growth. After the budded trees have ripened the first year's shoot, they may either be planted where they are to remain, or be trained in the nursery for two, three, or four years, till in a bearing state. Whether the plants be removed into the garden at a year old, or remain longer in the nursery, the first shoots from the budding must be headed down, either early in June the same year, to gain a season, or in the March following, to four, five, or six eyes, to produce lateral shoots, with one upright leader, to begin the formation of the head in a fan-like expansion: the second year's shoots should also be shortened to a few eyes at the return of June or March ; and those also of the third year in such degrees as may seem expedient." Cameron sows kernels of peaches, nectarines, or apricots, under the walls, where they are to remain, and either buds them in the August of the same year, or grafts them in the March of the year following. He prefers grafting, and finds the operation most successful when the action has a quarter of an inch of two years old wood at its lower extremity. Trees thus raised bear the second year from the graft, while the fruit is of a superior flavour to that produced by trees budded on plum stocks. When budding is employed, the point of the shoot produced by the bud, is pinched off after it has grown six or eight inches in length, and only five buds are allowed to push ; the five shoots produced by these buds are shortened with the finger and thumb to five or six inches in length, and these being disbudded, so as to admit of only two shoots from each, a complete fan-shaped tree is produced in one season. Further details of this very excellent plan will be found in *Gard. Mag.*, vol. ii. p. 149. Mr. M^r Martin, an excellent kitchen-gardener, has inserted buds of the peach in the branches of Moorpark apricots, and found the fruit far superior to that produced by peaches budded on plum stocks. (*Gard. Mag.*, vol. vii. p. 195.)

4906. *Soil.* A good soil for peach trees, according to Abercrombie, " is composed of three parts mellow unexhausted loam, and one part drift sand, moderately enriched with vegetable mould, or the cooler dung. Forryth says, " Peaches require a lighter soil than pears and plums, and a light mellow loam is best." Harrison prefers a loamy soil, somewhat adhesive, as do most of the experienced gardeners of the present day. The depth of such a soil may vary from eighteen inches to two feet, according to the climate ; the object being to adjust the depth to the penetrating influence of the sun's rays during summer. A shallow loamy soil with a dry bottom, will produce short-jointed and well-ripened wood ; a deep, rich soil, the contrary. Many gardeners do not manure their peach borders for some years after they have been made, in order to prevent the trees from running too much to wood.

4907. *Choice of plants.* Most authors agree in recommending the choice of trees, two, three, or four years trained. Forryth says, " they should be procured in the latter end of October, or beginning of November, as soon as the leaf begins to fall." Some gardeners prefer maiden trees, and a few recommend sowing the stones where the tree is finally to remain, in Mr. Cameron's manner. (4905.)

4908. *Final planting.* The peach is almost universally planted against walls in Britain ; in some few warm situations they have been tried as dwarf standards, and Knight (*Hort. Trans.*, vol. ii. p. 219.) " thinks they may be grown, in some cases, as low as espaliers ; but this is very problematical, unless in the warmest parts of the south of England."

4909. *Mode of bearing.* " All the varieties of the peach and nectarine bear the fruit upon the young wood of a year old ; the blossom buds rising immediately from the eyes of the shoots. The same shoot seldom bears after the first year, except on some casual small spurs on the two years' wood, which is not to be counted upon. Hence, the trees are to be pruned as bearing entirely on the shoots of the preceding year ; and a full supply of every year's shoots must be trained in for successional bearers the following season." (Abercrombie.) It is to be remarked by Mr. Thompson, that the peach tribe in the climate of Britain, in order to exist in vigour for any length of time in the open ground, must have their shoots shortened every winter. This, by increasing the power of the roots relatively to the branches, occasions vigorous shoots the following season ; and thus the tree is kept in an active state : whereas if it were allowed to expend all the power of its accumulated sap every year, it would soon exhaust itself, and die of old age, as the standard peach trees do in a few years in the unpruned American orchards, and also in the orchards of Italy.

4910. *The summer pruning.* " In May and June, and occasionally in the succeeding months, is to regulate the shoots of the same year, and to prevent improper growths by disbudding. Pinch off fore-right buds or shoots ; and pinch off or cut out ill-placed, very weakly, spongy, and deformed shoots, and very strong luxuriant growths ; retaining a plentiful supply of good lateral shoots in all parts of the tree ; and leaving a leader to each branch. Let them mostly be trained in at full length all summer, about three inches asunder, for next year's bearers ; and direct them of any lateral twigs, to prevent thicket-like intricacy, and to promote a healthy fruitful growth in the shoots themselves. In the course of the summer regulation, if any partial vacancy occurs, or should a young tree under training want an additional supply of wood, shorten some convenient-placed strong shoot in June to a few eyes, to furnish a supply of laterals the same season."

4911. *The winter pruning* may be performed at the fall of the leaf, and thence, according to some professional writers, at any time in mild weather until spring. It should be completed in February, or early in March, before the blossom-buds are considerably advanced, which are distinguishable by being round, plump, and prominent, while the leaf and shoot buds are oblong and narrow. There is some advantage in pruning when the blossom buds can be certainly known. Retain, in all parts of the tree, a

competent supply of such regular-grown shoots of last year as are apparently fruitful in blossom buds. Most part of these should be shortened, not indiscriminately, but according to their strength and situation; the very strong shoots should be left longest, being topped about one fourth, or one third; shoots of middling vigour reduce one third or one half; and prune the very weak to two or three buds. Always cut at a shoot-bud, to advance for a leader; sometimes a shoot bud lies between a twin blossom bud; cut a quarter of an inch above the bud. A very good rule which the French observe, says Mr. Thompson, is to commence as low as the point of the bud on the opposite side to it, and slope through to about a quarter of an inch above it. As many new shoots as will lie from three to six inches asunder may be deemed a competent supply for next year's bearers. Cut out quite close the redundant, irregular, and other improper shoots; remove or reduce some part of the former bearers of the two preceding years, cutting the most naked quite away, and others down to the most eligible younger branch or well-placed shoot. Also take out all diseased and dead wood: retaining young, where necessary, to fill a vacancy.

4912. *A mode of pruning adapted to cold and late situations* is recommended by Knight as calculated to obtain fruit-bearing spurs on the peach, and these spurs he finds best calculated, in such situations and late seasons, to generate well-organised and vigorous blossoms. "Instead of taking off so large a portion of the young shoots, and training in a few only to a considerable length, as is usually done, and as I should myself do to a great extent, in the vicinity of London, and in every favourable situation, I preserve a large number of the young shoots, which are emitted in a proper direction in early spring by the yearling wood, shortening each, where necessary, by pinching off the minute succulent points, generally to the length of one or two inches. Spurs which lie close to the wall are thus made, upon which numerous blossom buds form very early in the ensuing summer; and upon such, after the last most unfavourable season, and in a situation so high and cold that the peach tree, in the most favourable seasons, had usually produced only a few feeble blossoms, I observed as strong and vigorous blossoms in the present spring, as I have usually seen in the best seasons and situations; and I am quite confident that if the peach trees, in the gardens round the metropolis, had been pruned in the manner above described, in the last season, an abundant and vigorous blossom would have appeared in the present spring. I do not, however, mean to recommend to the gardener to trust wholly, in any situation, for his crop of fruit to the spurs produced by the above-mentioned mode of pruning and training the peach tree. In every warm and favourable situation, I would advise him to train the larger part of his young wood according to the ordinary method, and in cold and late situations only, to the mode, to great extent, of management above suggested. A mixture of both modes, in every situation, will be generally found to multiply the chances of success; and, therefore, neither ought to be exclusively adopted, or wholly rejected, in any situation. The spurs must not be shortened in the winter or spring, till it can be ascertained what parts of them are provided with leaf buds."

4913. *Harrison*, in a very elevated and cold situation, prunes and nails his peach and nectarine trees in December and January, taking away two thirds of the young shoots; and in two hand-dressings, in May and July, he leaves the lowest and weakest shoots for a succession in the year following, pinching off the leading and other shoots. (*Hort. Trans.*, vol. ii. p. 14; *Harrison's Tr. on Fr. Trees*, ch. xiv.)

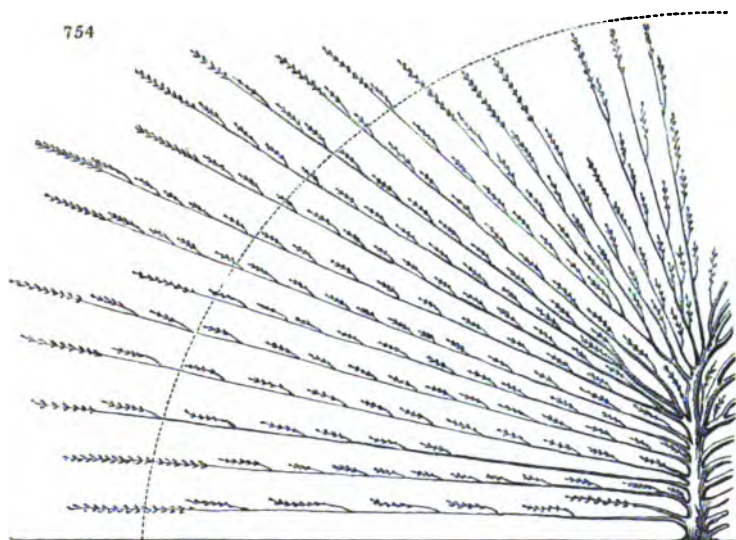
4914. *The French method of treating the peach tree* differs considerably from the British practice, and in one respect appears greatly superior to it. We allude to their mode of disbudding in spring and summer, and pinching off with the finger and thumb in the latter season, instead of leaving the young shoots to become woody and afterwards using the knife; and also pinching off the blossom-buds, instead of allowing more blossoms than are wanted to set their fruit, and afterwards thinning it out. In this way the strength of the tree is husbanded, and the labour in managing it economised, to a degree which British gardeners can hardly form an idea of. We recommend the young gardener to study what is said on this subject in the *Gard. Mag.*, vol. iii. p. 56.

4915. *Training*. The peach is almost universally trained in the fan manner, though some allege that it bears better in rich soils when leading branches are trained nearly horizontally, and the bearing shoots trained upwards from those, thus combining horizontal and upright training. Hayward suggests the wavy-fan manner, as likely to answer better than the common mode of fan-training, and Mr. Seymour has practised a mode which is more systematic, and is considered by many gardeners as greatly preferable to any other. As we have already described this mode (1866), we need here do little more than recommend it. Various discussions will be found respecting it in *Gard. Mag.*, vol. vi. p. 434, and p. 436; also vol. vii. p. 241; and in the *Horticultural Register*, vol. i. p. 381., and vol. ii. pp. 140, 308, 399, and 538.

4916. *The great advantage of Seymour's mode is its definiteness*. The system, whether the tree be intended to be large or small, high or low, is the same; easily understood, and capable of being carried into execution mechanically. There is a distinct and sufficient reason why every side shoot, and every lateral proceeding from it, should be precisely where it is, and nowhere else; and this reason is of that practical kind, that it may always be determined by admeasurement. To give an idea of the appearance of a tree trained in this manner, we give (*fig. 784.*), from the *Forster's Record*, which is a portrait of half a nectarine, now growing in the gardens, under Mr. Seymour's management, of Carleton Hall, Yorkshire. The fruit is produced from the laterals, and generally not more than one on each. From the base of every lateral in spring, a second lateral is produced to take the place of the other at the winter pruning. Thus none of the laterals are ever more than a year old. They are cut closely off by the leading shoots in order to prevent the appearance of unsightly spurs. After a certain number of years, these leading shoots, being no longer able to produce laterals freely, are cut entirely out, and their place supplied from some lateral close to the main stem. When an entire branch or side shoot of a tree of this description happens to die, it is cut out, and the position of those adjoining is altered so as to supply its place.

4917. *The summer management of Mr. Seymour's trees* is thus given by his son:—"In the spring, as soon as the young shoots have grown to about an inch long, we begin to disbud or thumb-prune them, by taking off all the young shoots where there is no blossom or fruit, except the lowest one upon the bearing branch, and that at the extreme point of it: this end shoot is allowed to grow about three inches, and is then stopped; and the buds by the fruit all broken off to about four of their bottom leaves, so as to make a cover for the young fruit until the time of thinning, when those little spurs are taken away with the fruit that is not wanted, and the others are retained along with the fruit that is left. By so doing, we are only growing the shoot that we shall want next year for bearing fruit, which gives our trees an opportunity of extending themselves, and making good wood. Instead of taking off the summer laterals or water shoots, (as they are sometimes called), as is generally done, we lay them in at regular distances, the same as we should a natural spur not bear; so that if they do not bear in the next summer, they will produce the bearing wood for a future year; so that we have not to shorten those strong shoots, but let them in their whole length for secondary leading branches, as we have at this time shoots laid in above six feet long, of last year's growth, with fruit upon their laterals. When the young shoots at the base of the fruit-bearing ones, or the extending part of the leading branches, have grown four or five inches, they are tied down to the other branches as close as they will admit without breaking or pinching them, and kept close to the wall through the summer. By this means they will get perfectly ripe and firm, and not be so luxuriant as when permitted to grow from the wall almost wild; and the fruit must, of course, be larger when the wood is thin, than when it is permitted to grow twice as large as is necessary. There will be found, when disbudding, at the base of the shoots, small buds that are not likely to make a shoot that season; but they must be retained, as they will produce a shoot in a future year, and then bring the young wood nearer home. (*Gard. Mag.*, vol. vi. p. 436.)

4918. *Mason's mode of training peach trees* is as follows: in the course of the winter he cuts over the young tree above the graft, leaving four or five buds to produce as many branches. In July following, he cuts out, close to the main stem, all other branches than those absolutely needed for furnishing the tree. He trains regularly to the right and left; but the weaker branches receive less inclination, or are placed



more upright than the stronger ones, that this more favourable position may give them energy, and bring them to an equality of vigour with the stronger branches which are laid in horizontally. At the first regular forming or cutting in, about a year and a half after planting, the branches are reduced to two on each side; and at the next pruning, one branch is removed on each side, leaving the tree to be formed only of two principal branches, and those the most equally balanced as to general form and promise. If the first year's growth do not yield two sufficiently good leading branches, they are sought from the growth of the second year; the best branch of the former year is now, with this view, trained upright as a stem, and two leading branches or arms are derived from it in the succeeding season. In subsequent years the pruning is conducted on similar principles. It is a common rule to leave two secondary arms, of nearly equal strength, and about two feet apart, on each side. In trees managed in the way now described, the sap seems to be equally distributed; at least, the trees exhibit, upon the whole, a great equality of branches, both as to size or strength, and as to furniture of twigs, leaves, and fruit. Continued care is exercised to keep both sides of the tree equally balanced as to vigour. If one principal arm become stronger than the other, a few robbers are allowed to push for a time on the weak arm, with the view of drawing an increase of sap to that side of the tree, till the equilibrium be restored; or, the weak arm is altogether raised a little more towards the vertical, while the stronger is depressed more to the horizontal, and thus an equality is gradually accomplished. The *lambourdes*, or robbers, it may be added, with due management, frequently afford the healthiest and best wood. They are cut down to a foot and a half, leaving one or two buds as near as possible to the trunk of the tree; the resulting shoots are laid in, and form good fruit-bearing wood the next season. The annual shoots are left of different lengths, according to the vigour of the tree, from one foot to three feet. There are two kinds of shoots, such as are the produce both of the early spring and of the summer flow of sap, and such as result from the latter only. The former are preferred, and are called *ramosseaux*; the latter are distinguished as *ramilles*. When the tree reaches the top of the wall, the cutting in is discontinued, and the pruning extends only to shortening the leading shoots, or, in some cases, bending them till they be confined about two or three inches below the coping of the wall. In this way the equable distribution of the sap in the central parts of the tree is promoted. In the regular course of pruning, all branchlets that show fruit buds only, or are thought to contain no others, are sacrificed without mercy. This would appear absurd to any one not a horticulturist, but if such branchlets do exist, their excision is quite prudent; for wood buds or shoots are like pumps, to draw sap towards the branchlets; and if they be wanting, the blossom on the twig commonly falls to set; or if the fruit form, it soon falls off, or, at all events, is deficient in size and flavour. From four to eight flower-buds are left on each twig, according to its strength, and a wood-bud at the extremity, when it can be there had or between two flower-buds near the extremity. When this wood-bud expands into a shoot, the shoot is shortened to an inch or so in length, and this remains as the pump for drawing sap to the four or eight fruit-buds of the twig. Other wood shoots, as they are called, which may appear below the fruit-bud, or nearer to the main branches, are cut down to one or two eyes. Mosaicard likewise resorts to disbudding, although little or no notice is taken of that practice in his work. (*Hort. Tourn.* p. 452.)

4919. *Sioulle*, gardener at Vaux Prastin, adopts, for the first two years, a different mode of training and pruning from that of Mosaicard. The distinguishing characteristics of *Sioulle's* method are applicable only to very young peach trees, in their first and second years. In the first years he does not at all cut or shorten the two original or principal branches, called the *mère* branches. The young tree has only to be fixed to the wall or trellis, requiring no other treatment till the fall of the leaf. By leaving these *mère* branches at full length, and only disbudding late in the autumn, the vigour of the young tree is greatly promoted. He trains these principal branches to a much wider angle than the Montreuil gardeners, perhaps 60° or 65°, instead of 45°. At the approach of winter he practises *rébourgeonnement* &c., leaving only four buds on each branch, and removing the rest neatly with a sharp knife. At Montreuil the *mère* branches are cut in or shortened in the first year, and disbudding is delayed till the leaves be developed in the following year. By disbudding at this season, the young tree not only suffers an unnecessary check or injury, but the consequence is, that the buds left, instead of forming good shoots, develop themselves into numerous *brindilles*. Late in the autumn of the second year, *Sioulle* cuts in, to the extent of one third, the four lateral branches produced on each of his *mère* branches. In the following year, he disbuds the lateral branches to the extent of one half; and in the future management he practises winter disbudding greatly in place of pruning; a practice long ago strongly recommended by Nicol in his horticultural writings. By *Sioulle's* method, Du Petit Thouars remarks, the young tree is more quickly brought to fill its place on the espalier; it is afterwards much more easily kept in regular order: many poorer flower-buds are allowed to unfold themselves, but the necessity of thinning the fruit is thus in a great measure superseded, and the peaches produced are larger and finer. (*Hort. Tourn.* p. 479.)

4920. *Thinning the fruit.* According to the ordinary practice, the blossoms often set more fruit than they can support, or than have room to attain full growth; and if all were to remain, it would hurt the trees in their future bearing; therefore they should be timely thinned, when of the size of large peas or half-grown gooseberries. There should be a preparatory thinning before the time of stoning, and a final thinning afterwards; because most plants, especially such as have overborne themselves, drop many of their fruit at that crisis. Finish the thinning with great regularity, leaving those retained at proper distances, three, four, or five, on strong shoots, two or three on middling, and one or two on the weaker shoots; and never leaving more than one peach at the same eye. The fruit on weakly trees thin more in proportion. (*Abercrombie.*)

4921. *Renovating old decaying trees.* Head down, and renew the soil from an old upland pasture; and, if the bottom of the border is moist, or if the roots have gone more than two feet downwards, pave the bottom, or otherwise render it dry and impervious to roots at the depth of twenty inches or two feet from the surface. In general, however, it will be found preferable to plant new trees, as peach trees, when recently cut, are apt to exude gum to an injurious degree.

4922. *Protecting blossoms.* This may require to be done by some of the various modes already enumerated. (3094. to 3098.) Forryth recommends old netting as the best covering. In the garden of the Horticultural Society woollen netting has been used, and also Scotch gauze and bunting, and both with the greatest success.

4923. *Harrison* protects his trees from the frost, in the month of January, by branches of broom: these are previously steeped in soap-suds, mixed with one third of urine, for forty-eight hours, in order to clear them from insects, and, when dry, disposed thinly over the whole tree, letting them remain on only until the trees begin to break into leaf. At the time of the blooming and setting of the fruit he applies cold water in the following manner; viz.:—If, upon visiting the trees, before the sun is up, in the morning, after a frosty night, he finds that there is any appearance of frost in the bloom or young fruit, he waters the bloom or young fruit thoroughly with cold water, from the garden-engine; and he affirms, that even if the blossoms or young fruit are discoloured, this operation recovers them, provided it be done before the sun comes upon them. He farther says, that he has sometimes had occasion to water particular parts of the trees more than once in the same morning, before he could get entirely rid of the effects of the frost. Dr. Noehden remarks (*Hort. Trans.*, vol. II.) "that this operation of watering before sunrise, in counteracting the frost, seems to produce its effect in a manner analogous to the application of cold water to a frozen joint or limb, which is injured by the sudden application of warmth." Harrison discovered this method by the following accident:—"In planting some cabbage plants, among the rows of some kidneybeans, very early in the morning, after a frosty night, in spring, before the sun was high enough to come upon the frosted beans, he split some of the water upon them which he used in planting the cabbage-plants; and to his surprise, he found that the beans began immediately to recover." "Cold water," Mr. Thompson observes, "may be applied with some good effect, when the vegetable tissue is not too far injured, or ruptured by the frost; but it will not prove a remedy for any thing beyond a very slight affection. It will, however, be of considerable service, not only as a medium by which the thawing is more gradually accomplished, but also in consequence of the moisture it supplies; for evaporation operates in a most powerful degree in clear weather in spring; and at that season, when there is no canopy of clouds, such weather is most likely to occur."

4924. *Ripening peaches on leafless branches.* Whenever the part of the bearing branch, which extends beyond the fruit, is without foliage, the fruit itself rarely acquires maturity, and never its proper flavour and excellence. This Knight conjectured to be owing to the want of the returning sap which would have been furnished by the leaves; and he proved it experimentally, by lancing a small branch immediately above the fruit. The fruit, in consequence, acquired the highest degree of maturity and perfection. (*Hort. Trans.*, vol. II. p. 26.)

4925. *Summary of culture.* The following is from an admirable paper on the culture of the peach and nectarine, by Mr. Callow, in the tenth volume of the *Gardener's Magazine*:—"Although so much has been written on the pruning, training, and management of peach trees, all that is necessary to be known may be reduced to a very few words, and carried into effect by any person who will attend to the following short directions:—Use a strong loam for the border; never crop it; add no manure; keep the trees thin of wood by disbudbing and the early removal of useless wood; shorten each shoot according to its strength at the spring pruning; elevate the ends of the leading branches so that they may all form the same curvilinear inclination with the horizon; and, what is of the utmost importance in the culture of the peach, at all times keep the trees in a clean and healthy state." Mr. Callow's mode of training will be understood from *fig. 745.* (*See Gard. Mag.*, vol. x. p. 37.)

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4926. *Gathering.* Use the peach-gatherer, and gather one day or two before the fruit is to be used, and before it be dead-ripe, laying it on clean paper in a dry airy part of the fruit-room. See Chap. IV. Sect. III. and Chap. V. Sect. X.

4927. *Insects.* The leaves of the peach, nectarine, and apricot are very liable to be attacked by the acarus, or red spider, which is their greatest enemy, and also by a particular species of aphid, known among some gardeners as the cherries, which causes the leaves to rise into unsightly red tubercles. They are also liable to the attacks of the common green aphid, a black species, and the cocoon, or scale. The latter pest should be washed off with soft soap, made into a strong lather, and applied with a hard brush, and the different species of aphid may be destroyed by watering the trees, and afterwards dusting them with powdered tobacco leaves. Mr. Jamieson destroyed the aphid on his peach trees against walls, by first watering the tree over the leaves, and then burning gas tar in a vessel at the bottom of the wall, in a mild day, moving it backwards and forwards so as to involve the leaves in a cloud of black fetid smoke. (*Gard. Mag.*, vol. VIII. p. 580.) Mr. Thompson destroyed ants which he found attacked the blossoms of his peach trees, by a powder composed of dry wheaten bread, fine loaf sugar, and oxide of arsenic, in equal weights, intimately mixed together. (*Gard. Mag.*, vol. VII. p. 314.) Earwigs and woodlice are very troublesome to peach and nectarine trees, especially when the fruit is ripening, and they are to be collected by bundles of bean stalks

or reeds, or by the earwig trap. (fig. 480. § 3272.) The common wasp and the large blue fly, which are also great enemies of these fruits, may be caught by bottles of sweet water, or some of the methods described, § 2273.

4926. *The diseases of peach and nectarine trees* are, the honey-dew, mildew, gum, and canker, which are chiefly to be kept under by regimen: dusting with sulphur has been found to destroy the mildew (*Robertson*, in *Hort. Trans.*, vol. v. p. 184.); but the only certain way of removing it is by a renewal of the soil, which will commonly be found old mould long in use and too rich; and by abundance of air. J. Kirk (*Caled. Hort. Mem.*, vol. iv. p. 169.) has tried renewing the soil for fifty years, and always found it an effectual remedy for the mildew.

4929. *The Montebreal peach growers* pick off wrinkled, blotched, and mildewed leaves, and cut out canker and gum, and cover the wound with *onguent de St. Flacre*, i. e. cow-dung and loam. (For remedies for the mildew, see § 1715., and *Gard. Mag.*, vol. iii. p. 119.; iv. pp. 261. 380.; v. p. 107.; vii. p. 87.; viii. pp. 40. 720.; and ix. p. 331.)

4930. *Black spots or blotches* are very apt to appear and spread on the young wood of the peach tree; and these Kinnel proved to be produced by over-rich soil. He says, "Some time in the beginning of winter, 1811, I collected together a rich compost heap (No. 1.), consisting of one third light loam, one sixth strong clay, one twelfth lime, one sixth hot-bed dung, one sixth vegetable mould, and one twelfth pigeon dung. At the same time, I collected another heap (No. 2.), much less rich, consisting of one half light loam, one fourth strong clay, one eighth earth from scourings of ditches, one sixteenth lime, and one sixteenth hot-bed dung. These heaps I turned over occasionally, in order that they might be well mellorated by the frosts. About the middle of March, 1812, I planted the trees, and applied to the roots of a few of them the rich compost of No. 1.; but the greatest number of them were planted with the compost No. 2. About the latter end of June, I examined the young trees all over: the shoots that they had made were nearly all of the same size; but I was no way disappointed when I found those I had planted with the rich mould sadly infested with black spots; while those planted with No. 2. remained whole and sound; there being only the few which were planted with No. 1. infested with the black spots. With my knife I cut the blemishes entirely out; and about the latter end of September I found the wounds completely whole. Early in the spring, 1813, I cleared off the rich mould entirely from their roots, and supplied the vacancy with No. 2.; and at the end of last season I had the happiness to see them succeed to the utmost of my wishes, free of black spots." (*Caled. Hort. Mem.*, vol. ii. p. 79. 80.)

4931. *Forcing, and the use of hot-vents.* The peach tree forces well under glass (See Chap. VII. Sect. III.), and its ripening may be accelerated in the open air, when planted against a hot-wall, by the application of gentle fires in cold moist weather, in August and September. This will ripen the fruit and wood, but attempts to accelerate the blossoms early in spring are very dangerous, as without the protection of glass they are almost certain of being cut off. Some very instructive discussion on the subject of peach and nectarine trees will be found in the first seven volumes of the *Gardener's Magazine*, by Hiver, Newington, Errington, Craig, Kendall, Seymour, Smith, and others. The great value of these discussions is, that they point out numerous errors in culture, which gardeners are apt to fall into, and assign the proper reasons for the injurious results. The most important truths are thus presented with the greatest force by being opposed to their corresponding errors.

SUBJECT. 2. *Apricot.* — *Prunus Armeniaca* L., *Armeniaca vulgaris* P. S. (*Lam. III. t. 431.*); *Icos. Di-Pentag. L.* and *Rosacea J.* *Malus Armeniaca* of the ancients; *Abricotter*, Fr.; *Aprikosenbaum*, Ger.; *Abrikoos*, Dutch; *Albercocco*, Ital.; and *Albarico-queira*, Span.

4932. *The apricot* is a low tree, of rather crooked growth, and generally supposed to have originated in Armenia; but Regnier and Sickler assign it a parallel between the Niger and the Atlas; and Pallas states it to be a native of the whole of the Caucasus, the mountains there, to the top, being covered with it. Thunberg describes it as a very large, spreading, branchy tree in Japan. Grossier says that it covers the barren mountains to the west of Pekin, that the Chinese have a great many varieties of the tree, double-blossomed, which they plant on little mounts for ornament, and dwarfs in pots for their apartments. It appears from Turner's *Herbal*, that the apricot was cultivated here in 1562; and in Hakluyt's *Remembrancer*, 1582, it is affirmed, that the apricot was procured out of Italy by Wolfe, a French priest, gardener to Henry VIII. The fruit seems to have been known in Italy in the time of Dioscorides, under the name of *Præcocia*, probably, as Regnier supposes, from the Arabic, *Berkock*; whence the Tuscan, *Bacocche* or *Albicocco*; and the English, *Apricock*; or, as Professor Martyn observes, a tree, when first introduced, might have been called a *præcox*, or early fruit; and gardeners, taking the article *a* for the first syllable of the word, might easily have corrupted it to *apricocks*. The orthography seems to have been finally changed to *apricot* about the end of the last century; as Justice, in 1764, writes *apricock*; and Kyle, of Moredun, in 1782, *apricot*.

4933. *Use.* The fruit is used in a raw state at the dessert, and is esteemed next to the peach; it is also made into marmalades, jellies, and preserves. Grossier says, that lozenges are made by the Chinese, from the clarified juice, which, dissolved in water, yield a cool refreshing beverage: oil may be extracted from the nut, and the young shoots yield a fine golden cinnamon-colour to wool.

4934. *Varieties.* Parkinson, in 1629, enumerates six; Rea, 1720, seven; the Luxemburg catalogue, in 1800, fifteen; and the British catalogues enumerate about the same number. The following arrangement is by Mr. Thompson, of the Horticultural Society's Garden, as given in the *Hort. Trans.*, second series, vol. i. p. 86.

I. *KERNING, BUTTER.*

* *Fruit small, round, early.*

1. Red masculine.
2. White masculine.

** *Fruit large.*

† *Channel of the Stone closed up.*

- ‡ *Flesh parting from the Stone.*
- § *Large early.*
- 4. *Rosam.*

5. *Blotched-leaved Roman.*

6. *Royal.*
7. *Brussets.*
8. *Shipley's.*
9. *Almond.*

¶¶ *Flesh adhering to the Stone.*

10. *Montgomet.*

†† *Channel of the Stone pervious.*

11. *Moorpark.*
12. *Hemskirke.*

II. *KERNING, SWEET.*

* *Flesh parting from the Stone.*

13. *Breda.*
14. *Angoumois.*
15. *Muscat Musch.*
16. *Turkey.*

** *Flesh adhering to the Stone*

17. *Orange.*

4935. *Selection of the sorts* enumerated in the preceding arrangement: the following are most to be recommended for cultivation:—

1. *Red maculifera*, Masculine, Early. Red maculifera, Brown maculifera, Abricot précoce, Abricot hâif musqué (Dup. t. 1., Hort. Traité, 3d series, t. 161.) small, semi-spherical, bell-shaped at the base; brownish-red; chiefly esteemed for its sweetness; ripens about the end of June or beginning of July.
2. *Large early*, Abricot précoce, Abricot de St. Jean, Abricot gros d'Alexandre (Fem. Mag., t. 142., Hort. Traité, 3d series, t. 60.) large, somewhat oblong, compressed, bright orange, red next the sun, elsewhere pale orange; flesh juicy and rich; ripens about the middle of July. The earliest large sort of apricot.
3. *Rejet* (Fem. Mag., t. 2., Hort. Traité, 3d series, t. 63.) large, roundish-oval, resembling the Moorpark in appearance and resembling it in richness of flavour, but differs in ripening about ten days earlier, and having no previous channel along the edge from the point of the stone; ripens about the end of July or beginning of August; a valuable sort.
4. *Moorpark*, Annon's Dunscombe, Dun-

more's Breda, Temple's, Imperial Annon's, Pasch, Abricot pêche, Abricot de Nancy (Hooker's Pom. Lond. t. 1., Hort. Traité, 3d series, t. 66.) large, roundish, brownish-orange, interspersed with ferruginous spots; flesh very rich and juicy; stone peculiarly perforated, so that a pin may be introduced from the base to the apex; ripens beginning or middle of August.

5. *Breda*, Brussels or Breda, Abricot de Hollande, Annon's Avallin, Annon's (Fem. Mag., t. 146., Hort. Traité, 3d series, t. 69.) rather small, roundish, or almost four-sided, deep brownish-orange; flesh deep orange, juicy, rich, and high-flavoured; ripens from the beginning to the middle of August on walls, and as it will succeed as a standard, it may be obtained from such at a much later period of the season; the fruit, of course, will be smaller in this way, but it is still richer and sweeter well for preserving; and as it generally bears over a great part of the year ground when the season is favourable for its setting, it requires and deserves a little shearing and thinning of the shoots as winter pruning.

6. *Orange*, Early orange, Royal orange, Royal Orange, D'Orange (Hort. Traité, 3d series, t. 74.) rather small, roundish, deep orange yellow; flesh bright orange, adhering to the stone; in some seasons juicy, but not very rich; ripens beginning of August; a good bearer; and chiefly used for preserves.
7. *Turkey*, Large Turkey (Fem. Mag., t. 15., Hort. Traité, 3d series, t. 75.) small, roundish, deep yellow, with brownish orange-red spots; flesh pale yellow, juicy and rich; ripens end of August or later.
8. *Black*, Black Abricot d'Alexandre (Hort. Traité, 3d series, t. 72. t. 1.) small, round; pale next the wall, deep orange and red next the sun; flesh tender and sweet; ripens end of July or beginning of August; grown in Upper Egypt, where the fruit is deemed as an article of commerce. On this account it is here noticed, rather than with a view to recommend it for cultivation, as it is doubtful whether it is of this class it would in any way deserve a place, in comparison of quality, with those above mentioned.

4936. *Propagation*. New varieties are procured from the seed as in the peach, and approved sorts are perpetuated by budding, generally on muske or plum stocks. The Brussels and Breda, when intended for standards, are budded on the St. Julian plum, which produces a strong clean stem; but for the rest, any stock will do, provided it be free and thriving. Knight (Hort. Traité, vol. ii. p. 19.) recommends budding the Moorpark on an apricot stock, which he has found prevents the trees of this sort from becoming diseased and debilitated, which they generally do on plum-stocks. Budding apricots is generally performed early in the season, from the middle of June to the end of July. For dwarfs, the bud is inserted six or eight inches from the ground; and the sorts are sometimes twice budded, or one variety budded on another, which is said to keep the trees in a more dwarf state. For riders or standards, they are budded on plum stocks four or five feet high. Miller prefers half standards, budded about three or four feet from the ground; the trees so produced being less liable to suffer from high winds.

4937. *Choice of the plants*. Abercrombie prefers trees of two or three years' growth from the bud, and fit for immediate bearing. Forsyth makes choice of those plants which have the strongest and cleanest stems; and if he can, such as have been headed down, of two or three years' growth, as they will bear and fill the walls much sooner than those which have not been so treated. He says, "Make choice of trees with one stem; or, if they have two, one of them should be cut off; for by planting those with two stems, the middle of the tree is left naked, and, of course, one third of the wall remains uncovered."

4938. *Season of planting*. Abercrombie says, the best season is from the fall of the leaf until February or March. Forsyth says, the best time is in August, when the leaf begins to fall.

4939. *Final planting*. The Breda and Brussels are occasionally planted as standards, or espaliers, in warm situations; and in these states, in fine seasons, produce more highly flavoured fruit than on walls. The other varieties are generally planted on walls, which, Miller and Forsyth say, should have an east or west aspect; for, if they are planted full south, the great heat causes them to be mealy before they are eatable. The borders should not be less than six or eight feet wide, and two or two and a half feet deep. The soil a light rich loam, perfectly dry below. Forsyth says, "the borders may be three feet deep." "Standard apricots," Abercrombie observes, "do not come into bearing under a considerable number of years, sometimes ten or twelve; but then the fruit, in a congenial situation, is abundant and of the finest flavour. So when the prevailing fault of a particular sort is meanness, and yet it cannot be expected to ripen on a dwarf standard, the medium course of training the plant to a trellis almost touching a south wall, will improve the flavour."

4940. *Mode of training*. The fan method is very generally adopted with this tree: Forsyth prefers the horizontal manner, and Harrison also trains horizontally, but "so as to let the branches have an elevation to their extremities of 30 degrees, varied, however, according to the luxuriance or weakness of the tree." With young trees he proceeds to fill the wall by heading down, twice a year, in the same manner as with the apple and pear. The result produces a tree (fig. 756.) not essentially different from Forsyth's engraving. (Tr. on Pr. Tr., chap. xxiv.)

4941. *Mode of bearing*. The varieties of the apricot, in general, bear chiefly upon the young shoots of last year, and casually upon small spurs rising on the two or three-year-old fruit branches. The Moorpark bears chiefly on the last year's shoots, and on close spurs formed on the two-year-old wood. The bearing shoots emit the blossom-buds immediately from the eyes along the sides; and the buds have a round and swelling appearance.

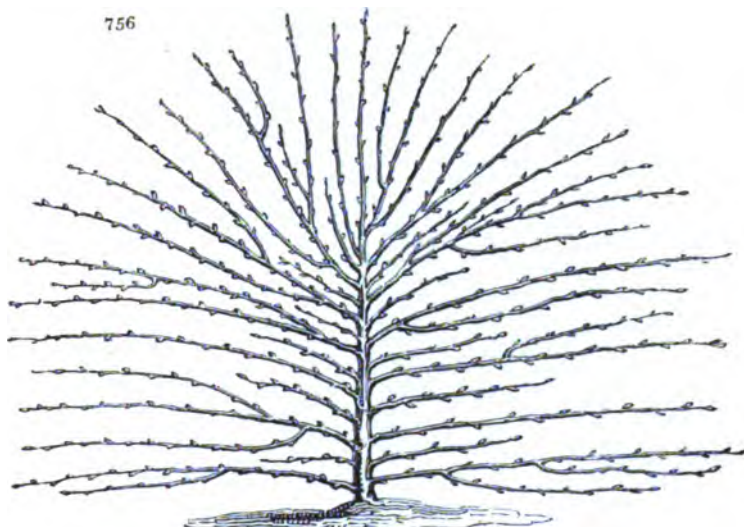
4942. *Pruning wall trees*. The general culture of the wall apricots comprehends a summer and winter course of regulation by pruning and training.

4943. *Summer pruning*. Begin the summer pruning in May or early in June, and continue it occasionally in July, August, &c. This pruning is principally to regulate the young shoots of the same year. In the first place, take off close all the fore-right shoots, and others, that are ill placed or irregular, or too luxuriant in growth; taking care to retain a competent supply of choice, well-placed, moderately growing side shoots, with a good leader to each mother branch. Continue these mostly at their full length all summer, regularly trained in close to the wall, to procure a sufficiency to choose from in the general winter pruning, for new bearers next year. If the summer regulation commence early, while the shoots are quite young, and as it were, two, three, or four inches long, they will be more proper to be retained may be detached with the finger and thumb; but when of firmer growth, they must be removed with the knife. If any very strong shoot rise in any casually vacant part, it may be topped in June, which will cause it to produce several laterals the same year of more moderate growth, eligible for training in to supply the vacancy.

4944. *Disbudding* is as much to be recommended in regard to the apricot, as it is in the case of the peach and nectarine, and it should be conducted on the same principles: viz. commence in good time, but at first very sparingly; steal, as it were, a sprinkling from the fore-right buds, and after the remainder has assisted to put the fluids of the tree in a more active state, take off a few more. (R. T.)

4945. *Thinning the fruit*. Sometimes the fruit are much too numerous, often growing in clusters; in which case, thin them in May and the beginning of June, in their young green state; leaving the most promising fruit singly, at three or four inches' distance, or from about two to six on the respective shoots, according to their strength. The apricots so thinned off, and the first principal green fruit, are esteemed very fine for tarts.

4946. *Winter pruning*. This may be performed either at the fall of the leaf, or in mild intervals from that time until the beginning of March. When it is deferred until the buds begin to swell, the promising shoots can be better distinguished. It comprehends a general regulation both of the last year's shoots and the older branches. A general supply of the most regular-placed young shoots must be every where



retained, for successional bearers the ensuing year. Cut out some of the most naked part of the two last years' bearers, and naked old branches not furnished with competent supplies of young wood, or with fruit-spurs, either to their origin, or to some well-directed lateral, as most expedient, to make room for training a general supply of the new bearers retained; and cut away all decayed wood and old stumps. Generally observe, in this pruning, to retain one leading shoot at the end of each branch; either a naturally-placed terminal, or, where a vacancy is to be furnished, one formed into a proper leader by cutting. Let the shoots retained for bearers be moderately shortened: strong shoots reduce in the least proportion, cutting off one fourth or less of their length; from weak shoots take away a third, and sometimes half. This shortening will conduce to the production of a competency of lateral shoots the ensuing summer, from the lower and middle-placed eyes; whereas, without it, the new shoots would proceed mostly from the top, and leave the under part of the mother branches naked, and the lower and middle parts of the tree unfurnished with proper supplies of bearing wood. Never prune below all the blossom buds, except to provide wood, in which case cut nearer to the origin of the branch. As, in these trees, small fruit spurs, an inch or two long, often appear on some of the two or three years' branches furnished with blossom buds; these spurs should generally be retained for bearing; but when any project fore-right far from the wall, cut them in accordingly; for spurs projecting above three inches, though they may set their fruit, seldom ripen it, unless the season and situation are both favourable. The thick clusters of spurs which are apt to form on aged trees, ought also to be thinned. As each tree is pruned, nail it, laying in the branches and shoots from three to six inches' distance, straight and close to the wall.

4947. *Pruning espaliers.* As directed for wall trees.

4948. *Pruning standards.* Half standards will require only occasional pruning to regulate any branches which are too numerous, too extended, or cross-placed; and to remove any casually unfruitful parts and dead wood. (*Abercrombie.*) The apricot, like all other stone fruits, will be best preserved in vigour by a judicious shortening of the young shoots. (*R. T.*)

4949. *Renovating old decaying trees.* Forsyth had the greatest success in this department of fruit-tree culture, by cutting down to within a foot or eighteen inches, or more, of the ground, and then renewing the soil of the border. He says, "it has been the general practice to train apricot trees on walls in the fan form, which occasions the sap to rise too freely to the top, leaving the lower part almost naked; so that scarcely one quarter of the wall is covered with bearing wood." His remedy for this evil is to "cut down the whole of the tree, as near to the place where it was budded as possible; remembering always to cut it to an eye or joint. If there should be any young shoots on the lower part of the tree, it will be proper to leave them, training them horizontally, which will check the flow of the sap, and thereby render them much more fruitful." (*Tr. on Fr. Tr., ch. 1.*) Harrison says, "Apricots are very susceptible of injury from pruning away any strong branches." Instead of heading down old peach, apricot, or plum, or even cherry trees, he generally prefers rooting them out and planting young ones.

4950. *Gathering.* The fruit is apt to become mealy, if left on the tree till over ripe; it should be gathered while moderately firm.

4951. *Insects, diseases, &c.* As the fruit ripens early, it is very liable to be attacked by wasps and large flies, which should be kept off by a net, stretched a foot or more apart from the wall or trellis. The other insects, and the diseases of this tree, are the same as in the peach; but it is not nearly so subject to their attacks, probably owing to the comparatively hard nature of its bark, and wood, and coriaceous leaves.

4952. *The apricot does not force well;* but a few are sometimes tried in pots, and placed in the peach house. See Chap. VII. Sect. III.

SUBSCR. 3. *Almond.*—*Amygdalus L.*; *Icos. Monog. L.* and *Rosaceae Amygdalinea Lindl.* (*Flenc. Ic. t. 385.*) *Amandier, Fr.*; *Mandelbaum, Ger.*; *Amandelboom, Dutch*; *Mandorlo, Ital.*; and *Almendro, Span.*

4953. *The common or sweet almond* is the *A. communis L.*; and the *bitter almond* is the *A. amara L.* (*Blackw. t. 195.*) Both will grow to the height of twenty feet, with spreading branches. They are natives of Barbary, China, and most eastern countries. The *tuberes* of Pliny, Knight considers as swollen almonds, and the same with the *amandier p  cher*, or almond-peach, described by Duhamel: having raised a similar variety from dusting the stigma of the almond with the pollen of the peach, which produced

a tolerably good fruit. (*Hort. Trans.*, vol. iii. p. 4.) The almond is mentioned by Turner in 1548, and, though scarcely worth cultivating in England as a fruit tree for profit, yet it is a very satisfactory thing to produce almonds of one's own growing at the dessert.

4954. *Use.* The kernel of the stone is the only part used; it is tender, and of a fine flavour. The sweet almond and other varieties are brought to the dessert in a green, or imperfectly ripe, and also in a ripe or dried state. They are much used in cookery, confectionery, perfumery, and medicine. "Sweet almonds used in food," Professor Martyn observes, "are difficult of digestion; and afford very little nourishment, unless extremely well comminuted. As medicine, they blunt acrimonious humours; and sometimes give instant relief in the heartburn."

4955. *Varieties and species in cultivation.* Miller enumerates three species, DuRoi seven: the number of sorts at present grown in the nurseries is as follows:—

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| <p>1. <i>Tender-shelled</i>, Beltane (Duk. n. 2. and <i>For.</i> 1.); small size.</p> <p>2. <i>Sweet</i>, Common sweet (Duk. n. 5. and <i>For.</i> 3.); large size; bitter almonds sometimes found on the same tree.</p> <p>3. <i>Bitter</i>, Common bitter (<i>Pom. Frane.</i> 1. 67. and <i>For.</i> 3.); large size; sweet almonds sometimes found on the same tree.</p> | <p>4. <i>Sweet Jordan</i> (<i>Amgd. delide</i> of Miller) (<i>Pom. Frane.</i> 1. 67. and <i>For.</i> 4.); tender shell, and large sweet kernel; leaves broad, short, and creaseless.</p> <p>5. <i>Hard-shelled</i>, (<i>For.</i> 5.)</p> <p>6. <i>Dwarf</i>, (<i>Duk.</i> n. 8. and <i>For.</i> 6.)</p> <p>7. <i>Peach Almond</i>, <i>Amarant. pacher</i> (Duk. n. 2. t. 4. and <i>Hort. Frane.</i> 3. t. 1.); produces some fruits; pulpy</p> | <p>and of tolerably good flavour; and others more almonds; some perhaps of both nature.</p> <p>8. <i>Pistache</i>, <i>Almond Pistache</i> (Miller, 4.); very small size.</p> <p>9. <i>Amigdalus communis macrocarpa</i> is deserving of cultivation on account of its splendid and very large blossoms.</p> |
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4956. *Selection of sorts.* The tender-shelled is in the greatest esteem; and next the sweet and Jordan. 4957. *Propagation.* The almond is propagated, like the peach, by seed, for varieties, or for stocks; and by budding on its own or on plum stocks, for continuing varieties. Plum stocks are preferred for strong moist soils, and peach or almond stocks for dry situations. "Peach stocks are not to be so much recommended as almond stocks in this country; for it is probable that peach stocks, when worked with the almond, will fall in a few years, in the same way as they do when used as stocks for peaches and nectarines." (*R. T.*)

4958. *Final planting.* Almond trees are generally planted as standards in shrubberies, and these will sometimes in good seasons ripen their fruit; but when fruit is the object, they should be trained against a west or east wall, like the peach.

4959. *Mode of bearing and pruning.* The almond tree bears chiefly on the young wood of the previous year, like the apricot and peach; and in part upon small spurs on the two-year-old, three-year-old, and older branches: it is therefore pruned or disbudded like those trees.

4960. *Gathering and preserving the crop.* A part may be gathered when nearly ripe daily for some weeks before gathering the whole crop. This operation generally falls to be performed in September, when a part may be laid in the fruit room, and a part thoroughly dried and bedded in sand in the fruit cellar, for keeping through the winter.

SUBJECT. 4. Plum. — *Prunus domestica* L. (*Eng. Bot.* 1783.); *Icos. Di-Pentag. L.* and *Rosacea Amygdalinea* Lind. *Prune*, Fr.; *Pflaumenbaum*, Ger.; *Pruniboom*, Dutch; *Prugno*, Ital.; and *Ciruelo*, Span.

4961. *The plum tree* rises to the height of fifteen or twenty feet, branching into a moderately-spreading head. It is a native, or naturalised in Britain, being frequently found in hedges; but its original country is supposed to be Asia Minor; and, according to Pliny, it was brought from Syria into Greece, and thence into Italy.

4962. *Use.* The best varieties are esteemed a delicious dessert fruit; and the others are used in pies, tarts, conserves, and sweetmeats. A wholesome wine is also occasionally made from them, with or without other fruits and ingredients. "Plums," Professor Martyn observes, "when sufficiently ripe, and taken in moderate quantity, are not unwholesome; but in an immature state, they are more liable to produce colicky pains, diarrhoea, or cholera, than any other fruit of this class. Considered medicinally, they are emollient, cooling, and laxative, especially prunes, and what are called in England French plums (brignoles), which are peculiarly useful in costive habits. The wood of the plum is used in turnery, cabinet work, and in making musical instruments."

4963. *Varieties.* Tussler enumerates ten; Parkinson, sixty; Miller, only thirty sorts. In the Luxembourg catalogue are sixty-eight; nearly a hundred names are to be found in the catalogues of our nurseries, of which those in the following table, composed by Mr. Thompson, are deemed the best. It may be remarked, that the green gage, perdrigons, and more especially Coe's golden drop, although classed in this table as dessert fruit, are also proper for preserving.

4964. *Selection of sorts.* The following are recommended by Mr. Thompson for a small garden:—Drap d'or, green gage, Kirke's, Washington, Reine Claude Violetta, Coe's golden drop, blue Imperatrice, Coe's fine late red, early Orleans, Shropshire damson, diamond and white magnum bonum.

4965. *A still more limited selection*, if required, may consist of the green gage, Washington, purple gage, Coe's golden drop, and Orleans.

4966. *The sorts most deserving of walls* are the green gage, Kirke's, Washington, Reine Claude violetta, Coe's golden drop, and blue Imperatrice.

4967. *Propagation.* Most of the varieties are propagated by grafting or budding on the musc, St. Julien, magnum bonum, or any free-growing plums, raised from seed, or from suckers; but seedlings are preferable stocks for a permanent plantation. The common baking plums, as the damson, bullace, Wentworth, &c., are generally propagated by suckers, without being either budded or grafted. Plum-grafting is performed in July or March; budding in July or August. Miller prefers budding, because plums are very apt to gum wherever large wounds are made on them. The mirabelle, a small plum, shaped like a cherry, and resembling a May duke when half ripe, is planted to form hedges about Ghent, and used by the Flemish nurserymen as stocks for both nectarines and peaches. (*Neill*, in *Hort. Tour.*)

4968. *Soil.* Plums, Miller says, should have a middling soil, neither too wet and heavy, nor over light and dry, in either of which extremes they seldom do well. Abercrombie recommends any mellow fertile garden or orchard ground; and where a soil is to be made, "one half fresh loam, one fourth sharp sand, one sixth road-stuff, and one twelfth vegetable remains, or decomposed dung or animal matter."

4969. *Site.* The plum is cultivated like other indigenous fruit trees: the harder sorts, as standards; and the finer varieties against walls. It is sometimes forced; but the blossom, like that of the cherry, is difficult to set, and on the whole, it is a fruit not well adapted for forcing. The finer varieties are almost always planted against walls, which, Miller says, should have an east or south-east aspect, which is more kindly to these fruits than a full south aspect, on which they are subject to shrivel and be very dry; and many sorts will be extremely mealy, if exposed too much to the heat of the sun; but most sorts will ripen extremely well on espaliers, if rightly managed. Some, he adds, plant plums for standards, in which method some of the ordinary sorts will bear very well; but then the fruit will not be near so fair as those produced on espaliers, and will be more in danger of being bruised or blown down by strong winds. Abercrombie says, "have some choice sorts against south walls for earlier and superior fruit; others on east and west walls, and espaliers, to ripen in succession, with full and half standards in the orchard."

4970. A DESCRIPTIVE CATALOGUE OF PLUMS, cultivated in Britain, arranged as Desert and Kitchen Fruit.

DESSERT PLUMS, arranged in the order of their ripening. (In the column "Shoots," D stands for downy, S for smooth.)

No.	Name.	Synonyms and varieties.	How, when, and where, originated, preserved, or abundant.	Where figured.	Described.	Size.	Shape.	Colour.	Ripens.	Flesh and Flavour.	Borer.	Shoots.	Character of the tree, and general reputation of the fruit.
1.	Jeune blonde	Whitepiedmontian	-	Dub. t. 61.	Lindley, No. 90.	Medium	Oval	Yellow	End July	Sep. fr. stone, indiff. flav.	Good	D	Chiefly esteemed for its earliness
2.	Morocco	Reine Claude	-	Reine Claude	Lindley, No. 54.	Medium	Round	Purple	Begin. Aug.	Adhering, very good	Good	D	May deserve a well on account
3.	Morocco	Early damask	-	Pom. Mag. t. 103.	Pom. Mag. 105.	Medium	Round	Purple	Begin. Aug.	Adhering, rich	Good	D	of its earliness
4.	Nectarine	Prune pêche	-	Pom. Mag. t. 148.	Pom. Mag. 148.	Large	Roundish	Purple	Begin. Aug.	Adhering, rich	Great S	D	Succeeds as a standard; fruit
5.	Drap d'or	Mabelle grosse	-	Brooksb. Pom. t. 16.	Lindley, No. 47.	Small	Round	Yellowish-green	Mid. Aug.	Separating, rich, and excellent	Good	D	A very excellent sort, which preserves the green gage in ripeness
6.	Green gage	Reine Claude	-	Hook. Pom. t. 38.	Lindley, No. 10.	Medium	Round	Yellowish-green	Mid. Aug.	Separating, the richest of plums	Good	S	Extensively well known and cultivated, and most desirably so
7.	Blue perdrigon	Bigonne violette	-	Brooksb. Pom. t. 17.	Forsyth, No. 11.	Medium	Oval	Purple	End Aug.	Adhering, very good	Mod. D	D	This is a fine sort, which furnishes the most beautiful plum
8.	White perdrigon	Brigogne	-	Brooksb. t. 18.	Lindley, No. 44.	Medium	Oval	Pale yellow	End Aug.	Adhering	Mod. D	D	with the above. Bragons plum
9.	Virgin	-	-	-	-	Medium	Roundish	Purple	Begin. Sept.	Separating, rich	Good S	D	Succeeds as a stand. fr. resembling the early equals Reine Claude
10.	White impératrice	Impératrice blanche	-	Pom. Mag. t. 38.	Pom. Mag. 38.	Medium	Obovate	Pale yellow	Begin. Sept.	Sep. trans., juicy, sweet	Mod. S	S	Succeeds as a standard; a very handsome fruit
11.	Drapée rouge	Mimus	-	Dub. ed. nov. t. 55.	Dub. ed. nov.	Large	Obovate	Reddish violet	Begin. Sept.	Separating, good	Great S	S	Fruit bears resemblance to that of Reine Claude violette
12.	Kirke's	-	-	Pom. Mag. t. 111.	Pom. Mag. 111.	Large	Roundish	Purple	Begin. Sept.	Separating, very rich	Good	D	Very good; succeeds well as a standard
13.	Washington	Bolmer's Washington	America - before 1800	Pom. Mag. t. 16.	Pom. Mag. 16.	Large	Roundish	Yellow	Sept.	Separating, excellent	Good	D	A great and constant bearer
14.	D'Agen	Reine Claude	-	Pom. Mag. t. 129.	Pom. Mag. 129.	Medium	Obovate	Purple	End Sept.	Sep., rich, and juicy	Great S	S	Believed to be the richest purple
15.	Reine Claude	Purple gage	-	-	-	Medium	Roundish	Purple	Sept.	Adhering, very rich	Good S	S	A most valuable late dessert
16.	Coe's golden drop	Coe's imperial	Bury St. Edmunds, say	1798 Pom. Mag. t. 57.	Pom. Mag. 57	Large	Oval	Yellow	Sept. Oct.	Adhering, very rich	Good S	S	Fruit as well as for preserving
17.	Blue impératrice	Impératrice	-	Pom. Mag. t. 33.	Pom. Mag. 33.	Large	Obovate	Purple	Oct.	Adhering, rich	Good S	S	Hangs long on the tree
18.	Coe's fine late red	-	Bury St. Edmunds	-	-	Medium	Round	Purple	Oct.	Separating, rich	Good	S	Hardy tree; succeeds as a stand.
19.	Early Orleans	Monsieur hildie	-	-	Lindley, No. 16.	Medium	Round	Purple	Be. m. Aug.	Separating, subacid	Good	D	An extraordinary bearer
20.	Gisborne's	Gisborne's early	-	-	-	Medium	Obovate	Yellow	Mid. Aug.	Separating, moderate quality	Good	D	Highly esteemed for preserving
21.	Mabelle	Reine Claude petite	-	Dub. t. 14.	Lindley, No. 51.	Small	Roundish	Pale yellow	Mid. Aug.	Separating	Good	D	Very early, and a constant bearer
22.	Orleans	Red damask	-	Brooksb. Pom. t. 14.	Lindley, No. 25.	Medium	Round	Purple	Mid. Aug.	Separating	Good	D	A very handsome fruit, larger and better than that of the
23.	Diamond	-	Brenchley in Kent	Gard. Mag. ill. t. 13.	-	Large	Oval	Purple	Begin. Sept.	Separating, good	Good	D	The best of the damasks for preserving
24.	Shropshire damson	Prune damson	-	Brooksb. Pom. t. 30.	Lindley, No. 8.	Small	Obovate	Purple	Mid. Sept.	Adhering, smart, juicy	Good	D	Much as an excellent preserve, which will keep one or two years
25.	Wine sour	Rotherham	Yorkshire	Brooksb. Pom. t. 19.	Lindley, No. 42.	Med. med.	Roundish	Purple	Mid. Sept.	Adhering, subacid	Great D	D	The best of the damasks for preserving
26.	Red magnum	Imperial rouge	-	Brooksb. Pom. t. 17.	Lindley, No. 33.	Large	Oval	Purplish red	Sept.	Separating, subacid	Good S	S	Excellent for sweets
27.	White magnum bonum	White Mogel	-	Brooksb. Pom. t. 17.	Lindley, No. 39.	Large	Oval	Yellow	Sept.	Adhering	Good S	S	
28.	Saint Catherine	-	-	Hook. Pom. t. 34.	Lindley, No. 52.	Medium	Oval	Yellow	Mid. Sept.	Adhering, rich	Good S	S	

KITCHEN PLUMS, arranged in the order of their ripening.

4971. *Choice of plants.* Miller recommends trees of not more than one year's growth from the bud; for if they are older, they are very subject to canker; or, if they take well to the ground, commonly produce only two or three luxuriant branches. Abercrombie and Nicol take plants from one to five years old. Forsyth chooses "clean straight plants with single stems, and of two or three years' growth."

4972. *Final planting.* Miller says, it is common to see plum trees planted at the distance of fourteen or sixteen feet, so that the walls are in a few years covered with branches; and then all the shoots are cut and mingled with the knife so as to appear like a stumped hedge, and produce little fruit; therefore the only way to have plum trees in good order, is to give them room, and extend their branches at full length. Abercrombie directs full and half standards to be planted at forty, thirty, twenty-five, and twenty feet distance; dwarfs generally twenty feet apart, and wall-trees or espaliers fifteen, twenty, or twenty-five feet from stem to stem. Forsyth says, plums and cherries thrive best by themselves; and he prefers a wall for each, placing plums on walls ten feet high, eight yards apart; and at seven yards' distance on twelve-foot walls. Patrick, finding that plums generally grow too luxuriantly, seldom manures the soil in which they are planted; and if it is naturally rich, he does not trench it deep. (*Gard. Mag.*, vol. ix. p. 526.)

4973. *Mode of bearing.* "All the sorts produce their fruit on small natural spurs, rising at the ends and along the sides of the bearing shoots of one, two, or three years' growth. In most sorts, new fruit-branches are two years old before the spurs bear. The same branches and spurs continue fruitful in proportion to the time which they take to come into bearing."

4974. *Mode of training.* Forsyth and Harrison decidedly prefer the horizontal manner, and both head down the leading upright shoot twice in a year. Forsyth says, "if the leading shoot be very strong, you may top it twice in the summer, as directed for pears, and at the same season (spring or winter pruning, and June); repeating the same every year till the wall is filled to the top." (*Tr. ch. H.*)

4975. *Pruning.* After the formation of the head is begun, it takes from two to six years before the different sorts come into bearing. Miller trains horizontally, and is against shortening the branches of plum trees, since, the more these trees are pruned, the more luxuriant they grow, until their strength is exhausted, and then they gum and spoil; therefore the safest method to manage these trees is to lay in their shoots horizontally, as they are produced at equal distances, in proportion to the length of their leaves, pinching off the points of young shoots where lateral branches are desired, and displacing fore-right and irregular shoots, or such as shade the fruit. By thus carefully going over the trees in the growing season, there will be but little to do to them in the winter.

4976. Abercrombie agrees with Miller in not shortening fruitful branches. Standards, he says, must be allowed to "expand in free growth, occasionally pruning long rambling, and cross-placed, or other irregular branches. Thin crowded parts, cut away worn-out bearers, also decayed and cankered wood."

4977. Forsyth says, "Never cut the stems of young plum trees when first planted, but leave them till the buds begin to break; then you may head them down to five or more eyes, always observing to leave an odd one for the leading shoot: remember to cut sloping towards the wall, and as near to an eye as possible; thus managed, the shoots will soon fill the wall with fine wood. If you find that some of the shoots are too luxuriant, you may pinch the tops off with your finger and thumb, about the beginning of June, in the first year after planting; by doing which you will obtain plenty of wood to fill the bottom of the wall. A great deal depends on the first and second year's management of your trees."

4978. *Renovating decaying trees.* Proceed as directed for the peach; but observe that the plum tree, when cut down, is very apt to run to wood; therefore the new soil must neither be very rich, nor laid on in a very deep stratum.

4979. *Protecting blossoms.* This is sometimes done with the tenderer sorts, in the same way as for peaches and apricots.

4980. *Taking the crop.* The different sorts of the plum ripen in succession for about three months in summer and autumn. Some early sorts begin to ripen in July; the main varieties reach full maturity in August and September; late sorts continue ripening till the end of October or beginning of November. Each kind should be brought to table presently after being gathered, as they will not, in general, keep long in a natural state, excepting the blue Imperatrice, and Coe's Golden Drop; the latter, if wrapped in paper, may be kept in a dry room for months.

4981. *Forcing the plum.* Plums may be forced in pots, or otherwise, like other fruit trees. Grange and Alton have forced them both ways: the latter thus describes his practice:—"The sorts generally preferred for forcing are the following, *Précocé de Tours*, green gage, blue gage, white perdrigon, Orleans, New Orleans, and Morocco. Some others have been tried, as *la royale*, *Silimienne*, and blue perdrigon, but are found objectionable, the first two producing fruit void of flavour, and the latter has a tendency to crack and gum."

4982. *When an early crop is desired*, plums are best forced in large pots or tubs, as this method admits of their removal at pleasure into different degrees of temperature, as occasion may require; but for a general crop to ripen by the end of May, or beginning of June, it is preferable to have the trees planted in the forcing-house, and if they are intended to be forced in the first year, proper trees for the purpose furnished with well-branching wood, should be selected and planted early in the autumn, that they may establish themselves before the winter sets in. The soil to be preferred is a moderately rich loam, without mixture of manure.

4983. *For a crop to ripen in the second week in May*, the house must be covered in early in January, commencing with a temperature of 49° of Fahrenheit, for the first fortnight, after which the heat may be gradually raised to 55° at which it may continue until the flowers make their appearance; during this time frequent changes of air must be admitted, to strengthen the bloom, and the crop will be rendered more certain by keeping the trees in blossom as long as possible, by light shading, where necessary; and when the petals begin to fall, gentle dews may be raised from the surface of the mould. As the fruit forms, the thermometer should be raised to 58°; this must be done gradually, as the consequence of a rapid rise may be a casting of the fruit; during the progress of stoning, great care must be taken against sudden variations of the temperature, water very sparingly used, and every check by fumigation be given to the various insects which will be particularly active at this period. When the fruit is safely stoned, a moderate dressing of rotten manure may be spread on the surface of the mould; the heat increased to 68°, and a more liberal supply of water given. After the fruit has attained a full size, and approaches maturity, air may be freely admitted, and water should be given in less quantities, and finally discontinued, a few days before gathering.

4984. *Insects, diseases, &c.* See Peach. The gum and canker are the most common diseases, and, as in almost every other case, the acarus is the most noxious insect. As a remedy for the former, Abercrombie directs to head down. The insects are destroyed by the common means. The gages, or *Besse Claudes*, when nearly ripe, are very apt to be eaten by wasps.

SUBSECT. 5. *Cherry*. — *Cerasus darácina*, and *caproniæna* L. (*Eng. Bot.* 706.); *Icos. Di-Pentag.* L. and *Roadceæ*, J. *Cerisier*, Fr.; *Kirschenbaum*, Ger.; *Karsboom*, Du.; *Ci-iegio*, Ital.; and *Cerezo*, Span.

4985. *The cultivated cherry* was brought to Italy by the Roman general Lucullus, in 73 A. C., from a town in Pontus in Asia, called *Cerasus*, whence its specific name, and was introduced to Britain 120 years afterwards. Some suppose that the cherries introduced by the Romans into Britain were lost, and that they were reintroduced in the time of Henry VIII. by Richard Haines, the fruiterer to that monarch. But though

we have no proof that cherries were in England at the time of the Norman conquest, or for some centuries after it; yet Warton has proved, by a quotation from Lidgate, a poet who wrote about or before 1415, that the hawkers in London were wont to expose cherries for sale, in the same manner as is now done early in the season. The tree is now very generally cultivated both as a wall and standard fruit, and has been forced for upwards of two centuries.

4986. *Use.* It is a refreshing summer fruit, highly grateful at the dessert, and affording pies, tarts, and other useful and elegant preparations in cookery and confectionery. Steeping cherries in brandy qualities and improves its strength and flavour; a fine wine is made from the juice, and a spirit distilled from the fermented pulp, known in Germany as *Kirschwasser*. Directions for its preparation will be found in the *Gardener's Magazine*, vol. iv. p. 179. The gum which exudes from the tree is equal to gum arabic; and Hasselquist relates that more than 100 men, during a siege, were kept alive for nearly two months, without any other sustenance than a little of this gum taken sometimes into the mouth, and suffered gradually to dissolve. Cherry-wood is hard and tough, and is used by the turner, flute-maker, and cabinet-maker.

4987. *Varieties.* The Romans had eight kinds; red, black, tender-fleshed, hard-fleshed, small bitter flavoured, and a dwarf sort. Tusser, in 1573, mentions cherries red and black. Parkinson mentions thirty-four sorts. Ray twenty-four, and Miller has eighteen sorts, to which he says others are continually adding, differing little from those he has described. The catalogue of the Luxembourg garden contains forty-two sorts, and those of our nurseries exceed that number of names. For the following arrangement, descriptive catalogue, and selected lists, we are indebted to Mr. Thompson:—Cherries are usually divided by French authors into five classes viz.; *Merisiers*, *Guisquiers*, *Bigarreauxiers*, *Cerisiers*, and *Griottiers*. There is considerable difference of opinion with regard to the characters of these divisions; and, consequently, also to the varieties referred to them. As these designations are, however, closely connected with the nomenclature, it will be necessary to state what is most generally understood by them.

4988. The *Merisiers* are like the wild cherries of the woods. The fruit is small, with little flesh, which contains, even in its fullest maturity, enough of bitterness to justify the name of *Merise*; formed, as it is said to be, from the words *amere* and *cerise*. From this appellation has probably arisen that of *Merries*, which is given to wild cherries in many parts of England. The merry cherry of Cheshire, mentioned by the late Sir James E. Smith, in his *English Flora*, would be ranked by the French among the *Merisiers*.

4989. The *Guisquiers*. Partly in this division, and partly in the following, are included the heart cherries of this country. The fruit is heart-shaped, with rather tender, juicy, sweet flesh; and its colour is chiefly black.

4990. The *Bigarreauxiers*. Formerly those cherries only which were two-coloured, or of a pale waxy white on the one side, and red on the other, were included in this class. Poiteau, in *Dukamel*, ed. nov., mentions, that those cherries only, which have the skin, and sometimes the flesh, *stiquete*, or *bigarrée*, with different colours, were, at one time, called *Bigarreaux*; but at length the signification of the name was neglected, and, according to custom at the present time, all the heart-shaped cherries which have the flesh firm and *croquant* are arranged under the head of *Bigarreaux*.

4991. The *Cerisiers*. These include the cherries which have a tender aqueous pulp, more or less acid. The *May duke*, and *Kentish* or *Flennish*, being well-known sorts, may be instanced as typical of the *Cerisiers*.

4992. The *Griottiers*. Formerly these were called *Agriottiers*, probably from the sharpness of their juice, a quality which prevails in all of them. The morello tribe chiefly composes this division. In *Noisetie's Manuel* it is headed *Cerisiers du Nord*, or *Griottiers*.

4993. *Classification in the Trans. of Hort. Soc. by Mr. Thompson.* The following is the mode of classification adopted in a "Report upon the principal Varieties of the Cherry cultivated in the Garden of the Hort. Society," published in the *Hort. Soc. Transactions*, second series, vol. i. p. 248:—

4994. The first class, which may be called firm-fleshed cherries, consists of cherries, of which the bigarreau and black heart may be instanced as typical of the better kinds. The leaves are generally large, pendent, waved on the margin, with sharp prominent veins beneath, coarsely serrated, of thinner texture, and of a more yellowish green than those of the second class; buds pointed; flowers large, proceeding from wood of not less than two years' growth; petals loosely set, not forming a compact, well-expanded cup-shaped flower, like those of the *May duke*, *Kentish*, &c.; stamens slender and irregular in length, some being longer and others shorter than the style.

4995. The second class is composed of aqueous cherries, such as the *May duke*, *Kentish*, and morello. The leaves are generally smaller than those of the preceding class, and have their margins plane, with the veins beneath, as they approach the margin, almost buried in the parenchyma, which is thicker than in the other class. The petioles support the leaves erect, or at least from hanging loosely and pendent; the latter are deep green. The flowers expand widely, and the petals hang not loose, but form a regular cup-shaped flower, with strong stamens, generally shorter than the style.

4996. The subdivisions of the first class are taken from the form and colour of the fruit; those of the second, from the form of the fruit, the sweetness or acidity of its flesh, and the colour of the juice. It may be remarked that in the latter class no white, nor white and red, fruit have yet been found; consequently on divisions from external colour can be formed, as in the first class. The following table exhibits a general summary:—

CLASS I. LEAVES WAVED ON THE MARGIN.			
† Fruit heart-shaped, or oval.			
* Colour uniform, dark red or black	- Sect. 1	a. Juice pale	- Sect. 7.
** Colour pale yellow and red	- Sect. 2.	b. Juice purple	- Sect. 8.
*** Colour uniform, pale yellow	- Sect. 3.	** Flesh acid.	
		a. Juice pale	- Sect. 9.
		b. Juice purple	- Sect. 10.
†† Fruit round or oblate.		†† Fruit round or oblate.	
* Colour uniform, dark red or black	- Sect. 4.	* Flesh sweet.	
** Colour pale yellow and red	- Sect. 5.	a. Juice pale	- Sect. 11.
*** Colour uniform, pale yellow	- Sect. 6.	b. Juice purple	- Sect. 12.
		** Flesh acid.	
		a. Juice pale	- Sect. 13.
		b. Juice purple	- Sect. 14.
CLASS II. LEAVES WITH THE MARGIN PLANE.			
† Fruit roundish, heart-shaped.			
* Flesh sweet.			

4997. An arrangement of the different varieties of cherries, to the number of fifty-seven, on which certain information has been obtained, is exhibited by Mr. Thompson in the following table, which is constructed according to the preceding classification. Although no varieties are at present known to be referable to sections 5, 6, 8, and 9, still it has been thought better to retain them, as it is possible that there may be some hereafter found to belong to them. The number of sections being in all fourteen, any unknown sort in question may be traced so many times easier to its name, if its place has been previously found in the table of subdivisions, or to its analogy, if a new variety. These fifty-seven varieties are exclusive of a number, known to be comparatively worthless; and, again, in the Descriptive Catalogue (§ 5002.), the selection is brought down to twenty-three of the best, arranged in the order of their ripening, from the beginning of June till September, so that a successional supply for nearly four months, if desirable, may be easily obtained.

CLASS I.—LEAVES WAVED ON THE MARGIN.

Div. 1. Fruit heart-shaped or oval.			Div. 2. Fruit round or oblate.		
Sect. 1. Colour uniform dark red or black.	Sect. 2. Colour pale yellow and red.	Sect. 3. Colour uniform pale yellow.	Sect. 4. Colour uniform dark red, or black.	Sect. 5. Colour pale yellow and red.	Sect. 6. Colour uniform pale yellow.
Black heart Bismarck's black heart Kronberg black heart Tradescant's bl. heart Black Tartarian Knight's early black Waterloo Black eagle Warden's early black heart Early purple guigne Dorsetian	Bigarron B. gros monstreux Bigarron rouge Bigarron Napoléon B. à gros fruit blanc B. couleur de chair Bigarron tardif de Hildesheim Eiton Downton Florence Adam's crown Bouyer's early heart White heart Chinese heart Churchill's heart Gascogne's heart Guigne grise Mancos Tilley's white heart Amber gem Hungarian gem White Hungarian gem Tobacco-leaved	White Tartarian Lady Southampton's yellow Bismarck's yellow Golden knob	Marie petite ronde		

CLASS II.—LEAVES WITH THE MARGIN PLANE.

Div. 1. Fruit roundish, heart-shaped.				Div. 2. Fruit round or oblate.			
Flesh sweet.		Flesh acid.		Flesh sweet.		Flesh acid.	
Sect. 7. Juice pale.	Sect. 8. Juice purple.	Sect. 9. Juice pale.	Sect. 10. Juice purple.	Sect. 11. Juice pale.	Sect. 12. Juice purple.	Sect. 13. Juice pale.	Sect. 14. Juice purple.
Late duke			Morello	Carnation Belle de Cholay	May duke Jeffrey's duke Willow-leaved May duke Royal duke Orléans de Klapperg Corbis de Bois-sous	Kentish Pitcair English preserve All- saints Cluster	Ochstein Ratons Wild morello Early May

4996. *Selected lists.* The following selected lists will be found suitable for different purposes and situations:—

<i>For standards.</i> May duke, Royal duke, Late duke, Black eagle, Eiton, Downton, Knight's early black, Black Tartarian, Morello, Kentish. <i>For a south wall.</i> Early purple guigne, May duke, Knight's early black, Eiton, Royal duke.	<i>For a north wall.</i> Morello. <i>For an east or west wall.</i> May duke, Royal duke, Black Tartarian, Eiton, Florence, Bigarron. <i>For overcracking.</i> Kentish, Morello. <i>The earliest cherries are</i>—Early purple	guigne, Warden's early black heart, May duke, Knight's early black, Bouyer's early heart. <i>The latest cherries are</i>—Late duke, Florence, Bigarron tardif de Hildesheim, Morello.
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4999. *Propagation.* Varieties of the cherry are continued by grafting or budding on stocks of the black or wild red cherries, which are strong shooters, and of a longer duration than any of the garden kinds. Some graft on the morello for the purpose of dwarfing the tree, and rendering it more prolific; but the most effectual dwarfing stock is the mahaleb, which, however, will not succeed in the generality of soils in Britain. Dubreuil of Rouen recommends the wild cherry for clayey and light soils, and the mahaleb for soils of a light, sandy or chalky nature. The stones of the cultivated cherry are commonly, but improperly, substituted for those of the wild sort, as being more easily procured. New varieties are procured by propagating from seed, and some valuable fruits will be found in the table, so raised by Knight. "The cherry," this gentleman observes (*Hort. Trans.*, vol. ii. p. 138.), "sports more extensively in variety, when propagated from seeds, than any other fruit which I have hitherto subjected to experiment; and this species of fruit is therefore probably capable of acquiring a higher state of perfection than it has ever yet attained. New varieties are also much wanted; for the trees of the best old kinds are every where in a state of decay in the cherry orchards; and I am quite confident that neither healthy nor productive trees will ever be obtained from grafts and buds of the old and expended varieties of this or any other species of fruit tree." Cherry-stones, whether for stocks or new varieties, are sown in light sandy earth in autumn; or are preserved in sand till spring, and then sowed. They will come up the same season, and should not be removed till the second autumn after sowing. They may then be planted out in rows three feet apart, and the plants one foot asunder in the row. The succeeding summer they will be fit to bud, if intended for dwarf; but if for standards, they will require to stand one or more seasons, generally till four years old. They should be budded or grafted near six feet from the ground; the usual way is to bud in summer, and graft those which do not succeed the following spring.

5000. *Soil.* The cherry delights in a dry sandy soil and elevated situation; but some sorts, as the May duke, will thrive in all soils and aspects, and all the varieties may be planted in any common mellow garden or orchard ground. In Kent the tree prospers in a deep loam incumbent on rock. Miller says, the soil which cherries thrive best in, is a fresh basel loam; if it be a dry gravel, they will not live many years, and will be perpetually blighted in the spring.

5001. *Site.* To obtain fruit early, some sorts, as the May duke, are planted against walls; but all the varieties will do well as dwarfs or espaliers in general situations, and most of them as standards. The May duke, Nicol observes, does well as a standard; but against a south wall the fruit becomes considerably larger, and, contrary to what happens in other fruits, it seems to acquire a higher flavour. The morello is much improved in flavour when planted against a wall of good aspect. Abercrombie says, "Allot to the finest of the early kinds south walls for fruit in May and June; train others against west and east walls, for supplies in succession; and some on north walls for the latest ripeners, particularly the morello, which so situated will continue in perfection till September and October; but it is also proper to plant some trees of this sort on south walls, to have the fruit ripen earlier, with improved flavour."

5092. A DESCRIPTIVE CATALOGUE OF CHERRIES, cultivated in Britain, arranged in the order of their ripening.

No.	Name.	Synonym.	How, when, and where originated, or abounding.	Where Acquired.	Described.	Size.	Figures.	Colour.	Ripe in	Flask and Season.	Bearer.	Characteristics of the tree, and general reputation of the fruit.
1.	Early purple pudra	Early purple	-	Hort. Trans. 2d ser. t. 4.	Hort. Trans. 1. 144, 259.	Large	Heart-shap- ed	Dark purple	B. m. June	Purple, tender, rich	-	Leaves with long petioles; very hand- some fruit
2.	Warden's early black heart	Warden's early black heart	-	before 1794	Hort. Tr. 1. 259.	Large	Obs. heart- shaped	Black	B. m. June	Purplish red, firm, juicy, rich	-	Disagreed from the preceding by better petioles
3.	May Duke	Royal native	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Rounded	Dark red	End June	Red-tender, juicy, rich	Good	Branches erect
4.	Jeffrey's Duke	Jeffrey's Duke	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Rounded	Dark red	End June	Red-tender, juicy, rich	Good	Compact growth
5.	Brown's early heart	Jeffrey's Duke	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Amber mottled with red	End June	White, soft, juicy,	Good	One of the earliest of light-coloured cherries.
6.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	A very handsome and excellent fruit
7.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Success well as a standard
8.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Estimated the richest pale cherry
9.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Branches pendulous
10.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Second as a standard
11.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Height of the tree resembling that of May Duke
12.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Resolves to have the branches trained widely apart
13.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Shore drooping.
14.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	More upright than the preceding
15.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	These dwarf, born on the young wood
16.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	A very handsome and much cultivated fruit, particularly for the London market
17.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Does not bear well when young, but improves as the tree gets older
18.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	The latest of pale-coloured cherries
19.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	Bears on the one-year-old wood; excellent for preserving, and for brandy
20.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	
21.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	
22.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	
23.	Black eagle	Black eagle	-	Hook. P. t. 26.	Hort. Tr. 1. 281.	Large	Obs. heart- shaped	Black	End June	Purplish and rich	Good	

The references made in the column headed "Described," in the above table, to the Horticultural Transactions, are all to the second series.

5003. *Final planting.* "Plant full standards from twenty to thirty feet apart; small standards, fifteen, eighteen, or twenty feet. The proper season for planting is from the middle or end of October, or any time in November or December, if open weather, till February or March." Miller says, never plant standard or rider cherry trees over other fruits; for there is no sort of fruit that will prosper well under the drip of cherries. He allows forty feet square for standards in orchards, for the same reason.

5004. *Mode of bearing.* "Cherry trees in general produce the fruit, upon small spurs or studs, from half an inch to two inches in length, which proceed from the sides and ends of the two-year, three-year, and older branches; and as new spurs continue shooting from the extreme parts, it is a maxim, in pruning both standards and wall trees, not to shorten the bearing branches where there is room for their regular extension. The morello is in some degree an exception."

5005. *Mode of training.* Forsyth and Harrison train in the horizontal manner, and practise shortening the leading shoots, as in the plum, apple, &c. For the morello Harrison adopts the horizontal or half-fan method, "the horizontal method when the tree grows very vigorous, and the half-fan method when weaker." (*Tr. on Fr. Tr.*, ch. xxiii.) The morello in its mode of growth resembles the peach, and may be pruned and trained in the same manner as practised with that tree by Mr. Seymour. (1866. and 4915.) The details of the application of Seymour's mode of pruning the peach to the morello cherry will be found in *Gard. Mag.*, vol. ix. p. 73.

5006. *Pruning cherry trees in general.—Standards.* Give only occasional pruning, to reform or remove any casual irregularity from cross-placed or very crowded branches; and take away all cankered and decayed wood.

5007. *Wall trees.* A summer pruning, to commence in May or June, is necessary to regulate the shoots of the year. Disbud the superfluous and fore-right shoots; or, if they have been suffered to spring, pinch or cut them off, with such as are disorderly. Retain a competent supply of some of the best well-placed side and terminal shoots, to remain for selection at the winter pruning. Nail or lay in the reserve close to the wall, at their full length, and so train them all summer. The winter pruning may be performed at the fall of the leaf, or at any time in moderate weather till February or March. It comprises a regulation both of the old and young wood. Carefully preserve the sound productive branches and bearers in their full expansion; and reduce or remove such as are only irregular in growth, too crowded, unfruitful, decayed, or cankered. Any branches extending out of bounds, prune in to some good lateral shoot or fruit-bud. According to the time the bearers have already lasted, look to some promising shoots, for successors to those which may first wear out. To fill immediate vacancies, retain select shoots of last year, and the year before, with uniformly a leader to the advancing branch where there is room, and with lateral shoots in any open or unproductive space near the origin of the branch, to be trained as bearers between the main branches. Some cut superfluous fruit-shoots clean away; others leave a sprinkling of short stubs, cut very short if fore-right. The new laterals and terminals are to be trained in at full length, as far as room will permit. They will come into bearing the first and second year. In pruning cherry trees in general, be careful to preserve the small clustering fruit-spurs, except where in wall trees any old spurs project considerably, and assume a rugged disorderly appearance; cut such clean out smoothly.

5008. *Pruning the morello.* Sect. 10. of the preceding arrangements and its affinities, those included in Sect. 13, 14. Of these the morello more especially "bears principally on the shoots of last year, the fruit proceeding immediately from the eyes of the shoots; and bears but casually, and in a small degree, on close spurs formed on the two-year-old wood, and scarcely ever on wood of the third year. Therefore, both in the summer and winter pruning, leave a supply of last year's shoots on all the branches, from the origin to the extremity of the tree, for next year's bearers; cutting out past bearers to make room. It is plain that the morello ought to have no stubs left with a view to spurs, and all fore-right shoots ought to be disbudded while young. To leave a convenient space for young wood, train the present bearers six inches apart; lay in between each of these one young shoot for bearing next year, which will make the promiscuous distance three inches."

5009. *Underwood* (*Calcd. Mem.*, vol. i. p. 427.) has often observed, when the branches of cherry trees are laid in too near to one another, or are crossed by branches of the same kind, or by plum tree branches, as is sometimes the case, that although there be abundance of blossom, yet there is no crop, even in good seasons. On examining the blossom produced on such crowded shoots, he found that in fifty flowers there were not above two styles; of course, no fruit could be expected. By not laying in the branches so close, and by removing all superfluous summer shoots, more light and air were admitted; and he had, in consequence, plentiful crops. Disbudding early in spring, leaving only such blossom buds as were considered to be sufficient for producing a crop, would obviously contribute to the same purpose. In all young trees the blossoms are for some years comparatively weak, and therefore the number removed by disbudding ought to be great in proportion.

5010. *Renovating old or decayed trees.* Proceed as in renovating the plum.

5011. *Protection from birds.* Abercrombie says, "As cherries in a ripening state are frequently attacked by birds, it is advisable to have choice wall trees or espaliers defended with large nets in due time. Old fishing-nets may also be spread over the branches of dwarf standards. To protect other standard trees, let scarecrows and clap-boards be put up *in terrorem*." The employment of cats for the purpose of frightening birds has been recommended by a correspondent of the London Hort. Soc. These animals were fastened by means of a collar, slight chain, and ring, to a brass wire, which was stretched along the ground, and were found to answer the purpose most completely. Cherry plantations should never be either straggling, or in few but extended rows: they should, on the contrary, be in as concentrated a form as possible, consistent with the proper distance for the admission of abundance of sun and air.

5012. *Gathering the fruit.* Use the hand, taking hold of the fruit-stalk, in gathering from the wall, and the cherry-gatherer, in gathering from distant branches of high standards.

5013. *Insects, diseases, &c.* Wall cherry trees are often infested with the red spider, but standards are generally not much injured by insects. Nalamith says, "Our cherry trees, both in the open air and on the natural walls, particularly the tops of the young shoots, are much attacked with a small black insect, provincially called the black beetle. The remedy I have found most effectual for their destruction is a mixture of pitch with one sixteenth part of powdered orpiment, one sixteenth part of sulphur, dissolved over a slow fire in an earthen pipkin, until they are well incorporated; when cold, divide it into small pieces, about the size of a hen's egg, and burn it under the trees with damp straw, directing the smoke as much as possible where the insects are most numerous. In an hour afterwards (if the state of the fruit will admit) give the trees a good washing with the garden-engine, which generally clears off the half-dead beetles, and prevents the spreading of the red spider." (*Calcd. Mem.*, vol. ii. p. 9.) Washing with tobacco water and soft soap early in the morning or late in the evening will destroy every insect which infests the cherry tree. (See *Gard. Mag.*, vol. i. p. 464.)

SECT. III. Berries.

5014. *Of the cultivated berries* the gooseberry is the most useful species in Britain, in which it is grown in far greater perfection than in any other country; next to the gooseberry is the currant, valuable as affording wine; besides these are included the mulberry, raspberry, strawberry, berberry, and elderberry.

SUBJECT. 1. *Black, or Garden, Mulberry.*—*Morus nigra* L. (*Blackb.* t. 126.); *Mona'cia Tetrándria* L. and *Urticea* J. *Mûrier*, Fr.; *Maulbeerbaum*, Ger.; *Moerbease boom*, Du.; *Moro*, Ital.; and *Morol*, Span.

5015. *The black mulberry* is a middle-sized tree, a native of Persia, supposed to have been brought to Europe by the Romans. Pliny mentions two varieties. It will not live in the open air in several parts of Sweden, and is treated as a wall tree in the north of Germany. It is mentioned by Tusser in 1573, and was cultivated by Gerarde, in 1596. In some of the old kitchen-gardens near London, there are trees of a very great age, which are very healthy and fruitful. The mulberry is remarkable for putting out its leaves late, so that, when they appear, which is generally in May, with the leaves of the common ash tree, the gardener may take it for granted that all danger from frost is over.

5016. *Use.* The fruit is brought to the dessert, and recommends itself by its highly aromatic flavour, and abundant subacid juice. It is very wholesome, cooling, and rather laxative. Like the strawberry, it does not undergo the acetous fermentation, and therefore may be safely eaten by gouty and rheumatic persons. An agreeable wine is made from the juice; a syrup is obtained from the unripe berries, which is used as a gargle in cases of sore throat; and the bark of the tree is a vermifuge.

5017. *Varieties.* Only one variety of the black is mentioned by Miller, with palmate leaves and smaller fruit.

5018. *Propagation.* By seed, layers, cuttings, or grafting. The first is the least advisable mode, unless for stocks to march upon.

5019. *By layers.* These will generally take root sufficiently the first year to bear separating from the parent tree, and should then be planted in a nursery, and trained up with single stems. In four years they will be fit to plant out where they are to remain. They should be planted at a proper distance to admit the sun and air, as the fruit, when the trees are too close, is very apt to turn mouldy; they should also be sheltered from the east, north, and west winds." Knight lays parts of the bearing branches of old trees in pots raised to these branches upon poles. Wood of any age will do, and the plants afford fruit the second or third year.

5020. *By cuttings.* In raising mulberries from cuttings, choose the former year's shoots, having one joint of the two-year-old wood. Plant them in autumn, if fine weather, or in the month of March, in rows nine inches apart, and at the distance of two inches in the rows, leaving only two or three buds above ground: mulch the ground with leaves or dung well rotted, to keep it moist, and the plants will require little watering. If they succeed well, they may, next season, be transplanted into a nursery, and treated as directed for layers. These young trees, while they remain in the nursery, should be transplanted every three or four years. Miller says, mulberry cuttings will also strike well if planted on a hot-bed in spring. In Spain and India, as Townsend and Tenant inform us, the white or silkworm mulberry is always propagated by cuttings, three or four being planted together, so as to grow up into a bush.

5021. *By truncheons.* The wood of the mulberry will strike root at any age, and that which is old more readily than that which is young. Any branch with the smaller shoots removed, and firmly inserted in the ground like a post, will shoot luxuriantly the first year, and in three or four years afterwards produce abundance of fruit. It appears that by placing such truncheons or branches on the ground, and allowing them to remain there some months in a horizontal position, they will succeed better when afterwards planted upright. (See *Gard. Mag.*, vol. v. p. 63.)

5022. *By suckers.* Mulberry trees, as well as most others so propagated, are longer of coming into bearing than those raised in any other way but by seed. The plants of this tree, raised from bearing branches, have entire heart-shaped leaves, but those obtained from suckers or seeds present deeply divided or half-winged leaves.

5023. *By grafting.* Knight having planted some young mulberry trees in pots, raised them to the bearing branches of old trees, and grafted them by approach. The young grafts bore fruit the third year, and continued annually productive. This tree succeeds very ill by the common mode of independent grafting. (*Hort. Trans.*, vol. i. p. 60.) At Munich, where the white mulberry is propagated extensively for feeding the silkworm, the finer varieties are grafted on the common seedlings, in the fute manner. (17952.) (See *Gard. Mag.*, vol. vii. p. 485.)

5024. *Soil.* The tree, Miller observes, delights in a rich light earth, and where there is depth of soil, as in most of the old kitchen-gardens about London. In a very stiff soil, or on shallow ground, whether of clay, chalk, or gravel, the trunk and branches are commonly covered with moss, and the little fruit produced is small, ill-tasted, and ripens late. Abercrombie says, the mulberry thrives well in a deep sandy loam, and will succeed in any fertile mellow ground, having a free situation in the full sun.

5025. *Site.* The mulberry is generally grown as a standard or half standard, sometimes as espallers, dwarfs, or wall-trees. A single young plant does not afford much fruit; but one full-grown and healthy will afford more than is sufficient for the supply of a large family. Miller recommends planting in a situation defended from the strong south and north-west winds, in order to preserve the fruit from being blown off; but at the same time to keep them at such a distance from trees or buildings, as not to keep off the sun, for where the fruit has not the benefit of his rays to dissipate the morning dews early, it will turn mouldy and rot upon the trees. The nurseries, and especially those at Paris, afford large standard trees of five or six years' growth, which come into bearing the year after removal. Those are in general to be made choice of in preference to raising the tree from cuttings or inarching. In orchards they may be planted thirty or thirty-five feet from other trees, and twenty feet apart on walls or espallers; dwarfs may be planted fifteen feet apart, and in each case temporary fruit trees may be introduced between.

5026. *Properly* recommends planting mulberries in grass orchards and pleasure-grounds, because, as the finest of the fruit, when ripe, frequently drops, it can be picked up without receiving any injury. Another reason for planting these trees on lawns or in orchards is, that, when full-grown, they are too large for a kitchen-garden. Abercrombie adds, "so nice is the criterion of perfect ripeness, that berries falling without damage are superior to those gathered. Besides, a grass surface harmonises best with trees of magnitude, and increases the beauty of a rural scene."

5027. *Williams* experienced, that the fruit might be much improved in size and flavour by training the trees against a south or west wall. "The standard mulberry," he says, "receives great injury by being planted on grass-plots with a view of preserving the fruit when it falls spontaneously. No tree, perhaps, receives more benefit from the spade and the dung-hill than the mulberry; it ought, therefore, to be frequently dug about the roots, and occasionally assisted with manure. The ground under the tree should be kept free from weeds throughout the summer, particularly when the fruit is ripening, as the reflected light and heat from the bare surface of the soil is thus increased; more especially if the ends of the branches are kept pruned, so as not to bow over too near to, and shade, the ground. The fruit is also very fine if the tree is trained as an espaller, within the reflection of a south wall or other building. If a wooden trellis were constructed with the same inclination as the roof of forcing-house, fronting the south, and raised about six feet from the ground, leaving the soil with the same inclination as the trellis, a tree trained on it would receive the solar influence to great advantage, and would probably ripen its fruit much better than a standard." (*Hort. Trans.*, vol. ii. p. 92.)

5028. *Knight* concurs with *Williams* as to the advantages of planting the tree against a south wall in cold

situations, adding, that "it affords an exception to all, or almost all, other fruits, to which the wall gives increased bulk and beauty, at the expense of richness and flavour." (*Hort. Trans.*, vol. iii. p. 86.)

5029. *Mode of bearing.* "The mulberry produces its fruit chiefly on little shoots of the same year, which arise on last year's wood, and on spurs from the two-year-old wood, in both stages, mostly at the end of the shoots and branches."

5030. *Pruning.* Miller and Forsyth agree in saying there is no occasion to prune standards farther than to thin out irregular crossing branches, and never to shorten the young wood, on which the fruit is produced.

5031. *Pruning wall trees and espaliers.* "Cut so as to bring in a partial succession of new wood every year, and a complete succession once in two years : taking the old barren wood out, as may be necessary. In the winter pruning, lay in the reserved branches and shoots at six or seven inches distance."

5032. *Season for pruning.* "As the blossom-buds of the mulberry tree cannot be readily distinguished from others in the winter, the best period for pruning is when the blossoms first become visible in the spring. Pinch off every barren shoot which is not wanted to cover the wall, and stop every bearing shoot, under similar circumstances, at the third or fourth leaf. Williams has correctly stated, that the bud immediately below the point, at which a bearing or other branch is pinched off, usually affords fruit in the following year." (*Knight, in Hort. Trans.*, vol. iii. p. 63.)

5033. *Renovating old mulberry trees.* Miller, Forsyth, and Knight, agree that this may be done with trees of almost any age, by removing part of the branches ; or by completely heading down, and renewing the soil by fresh mould enriched by dung.

5034. *Taking the crop.* "The most forward berries attain maturity about the end of August ; and there is a succession of ripening fruit on the same tree for about a month or six weeks ; the ripening berries gradually change from a reddish to a black colour, and should be gathered accordingly for immediate use : this delicate fruit will not keep good off the tree above a day or two." Coke and Knight have had mulberries from wall and espalier trees in gathering from July to the end of October. (*Hort. Trans.*, vol. iii. p. 394.)

5035. *Forcing the mulberry.* Knight observes, that "the mulberry is a much finer fruit when ripened under glass, in the north of Herefordshire, than in the open air ; and in the still colder parts of England it is probably the only means by which it can be ripened at all. The culture of this fruit, by me, under glass, has been confined to plants growing in pots ; but I am not acquainted with any species of fruit tree which, under such circumstances, produces more abundantly, or which requires less care. Its blossoms set equally well in different degrees of heat, and the same continued temperature which will ripen the earlier varieties of the grape in the end of July, will afford perfectly ripe mulberries early in June ; and a tree of the latter species, when fully loaded with fruit, presents at least as agreeable an object to the eye as many plants which are cultivated as ornaments only. It is not subject, under common care, to any disease or injury, except the attacks of the red spider ; and as the foliage and growing fruit of the mulberry tree are not at all injured by being wetted every evening with clear water, the red spider can never prove a very formidable enemy." (*Hort. Trans.*, vol. ii.)

SUBJECT. 2. *Berberry.* — *Bérberis vulgaris* L. (*Eng. Bot.* 49.) ; *Hexín. Digín.* L. and *Berberidém J. Epine Vinette*, Fr. ; *Berberitzen*, Ger. ; *Berberisse*, Dutch ; *Berbero*, Ital. ; and *Berberis*, Span.

5036. *The berberry* is a native of the Eastern countries, and also of most parts of Europe, and is found in woods, coppices, and hedges in England, especially in a chalky soil.

5037. *Use.* The fruit is used for preserving, candying, and pickling, as well as for garnishing dishes ; the plant is also an ornamental shrub, both when in flower and in fruit.

5038. *Varieties.* Those most esteemed for their fruit are the following ; viz.

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| 1. <i>Red berberry</i> without stones ; which has an agreeable flavour when full ripe. It is only found without stones when the plant has attained considerable age, and is on a poor soil. | 2. <i>White berberry.</i> (<i>Poit. et Turp. Fr.</i> , t. 51.) | 152. et tab.) This is planted more for ornamental use, on account of its beautiful red berries. |
| | 3. <i>Black seed ;</i> which is the tenderest of them, and should be planted in a warm situation. | 5. <i>Purple-fruited.</i> (<i>Poit. et Turp. Fr.</i> , t. 55.) |
| | 4. <i>Common red</i> with stones (<i>Duham.</i> , i. | |

5039. *Propagation.* "All the varieties are propagated commonly by suckers, also by cuttings and layers of the young branches, and occasionally by grafting ; the common red sort is also raised by seed ; each of which methods of propagation may be performed in the spring ; that by suckers and layers may be effected also in autumn."

5040. *Soil and final planting.* The berberry prefers a light dry soil. One or two plants may be planted in a complete orchard, and trained as standards ; but where the shrubbery is the site, it may be allowed to grow as a bush or shrub. "According to the nature of the ground, plant either at any time from autumn to spring, or only in the spring ; the plants may be already furnished with a head pretty well advanced, if thought proper ; allow them square distances of from fifteen to thirty feet."

5041. *Mode of bearing and pruning.* "The berberry produces its fruit at the sides of the branches in small loose bunches : it bears both on young and old wood, chiefly toward the extremities. The branches should not be shortened, except the design be to force out new wood : permit the head to extend freely ; and give only occasional pruning, to keep it in a pretty round form, open in the middle ; cutting out weak, luxuriant, crossing, superfluous, and decayed branches ; reduce also long rambles, and trim up less stragglers, also lateral shoots on the stem, and eradicate all root-suckers."

5042. *Taking the crop.* "As a proportion of the berries ripen in the course of September, they will afford occasional gatherings for present use ; and as they will be wholly ripe in October, all that are wanted for domestic supply should be then pulled ; always pick them in bunches." (*Abercrombie.*)

SUBJECT. 3. *Elder.* — *Sambucus nigra* L. (*Eng. Bot.* 476.) ; *Pentánd. Trigín.* L. and *Caprifoliacea J. Sureau*, Fr. ; *Hollunderbaum*, Ger. ; *Ulierboom*, Du. ; *Sambuco*, Ital. ; and *Sauco*, Span.

5043. *The common elder* is a native of Britain and many other parts of Europe ; also of Africa, Japan, &c. It is common in damp woods and hedges, and is sometimes introduced in cottage gardens and plantations for the fruit, and in forest plantations, exposed to the sea air, as a nurse plant.

5044. *Use.* The fruit is in demand in many places, but especially in London and the principal English towns, for making elder wine of the expressed juice ; a powerful, warming, and enlivening article for the cottager. The tree, professor Martyn observes, is a whole magazine of physic to rustic practitioners, nor is it quite neglected by more regular ones. An excellent healing ointment is made of the green inner bark, which is also purgative in moderate, and diuretic in small doses. A decoction of the flowers promotes expectoration and perspiration, and they give a peculiar flavour to vinegar. The flowers are reported to be fatal to turkeys, and the berries to poultry in general. No quadruped will eat the leaves of this

tree; notwithstanding it has its own moth and aphid. The wood is used by the turner and mathematical-instrument maker; and is made into skewers for butchers, tops, angling rods, and needles for weaving nets.

5045. *Varieties.* Miller mentions several, but those cultivated for their fruit are chiefly the white and black. The scarlet and green berried may also be used like the black, and are very ornamental trees in the shrubbery.

5046. *Site and soil.* "As the tree will grow any where, either in open or shady situations, it may be planted in any out-ground or waste spot, in single standards or in rows, to assist in forming boundary fences. Trees planted in the hedge order, if suffered to grow up untrimmed, will produce abundance of berries for use.

5047. *Propagation and rearing.* "The elder is raised by cuttings of the last year's shoots planted in the winter, or very early in the spring, and by seed in the autumn. Select for cuttings some strong young shoots of last summer, cut into lengths of one foot, and thence to three feet or more: these may be planted either where it is intended the plants should remain, or in a nursery for a year's growth. Insert them from six to fifteen inches into the ground, according to their length; they will soon strike root; and will shoot strongly at top the same year. Train those designed for standards with a single stem from three to five feet high; and those for hedges, with branches out from the bottom. To raise this tree from seed: sow in autumn, October, or November, or later in mild weather, or soon in the spring, either for a hedge, in drills, where the plants are to remain; or in a bed or border for planting out when of one or two years' growth."

5048. *Final planting.* "Standards may be planted from ten to twenty feet apart. They should be allowed to shoot out above to form a branchy head, nearly in their natural order: in which they will soon become plentiful bearers. For hedge-planting, insert cuttings or year-old plants into the sides or tops of banks or ditches, or other suitable boundary lines, a foot asunder. Permit them to branch out from the bottom; and where they are designed for full fruiting, merely cut in the sides a little regular below, leaving them to run up above in branchy growth, for producing large crops of berries."

5049. *Taking the crop.* "The berries ripen in perfection for the purpose of making wine, about the middle and end of September, and in October, and should then be gathered in bunches." (*Abercrombie.*)

SUBSECT. 4. *Gooseberry.*—*Ribes Grossuldris* and *R. Uva-crispa* L. (*Eng. Bot.* 1292. 2057.); *Pent. Monog.* L. and *Cacti* J. *Grosseille à maquereau*, Fr.; *Stachelbeerstrauch*, Ger.; *Kruisbes*, Du.; *Uva-spino*, Ital.; and *Grosella*, Span.

5050. *The gooseberry* in Piedmont, where it is found wild, and the berries eatable, but astringent and neglected, is called *griselle*. Some derive our name gooseberry from gorseberry, or the resemblance of the bush to gorse; others, as Professor Martyn, from its being used as a sauce with young or green geese. Gerard says, it is called feaberry (feverberry) in Cheshire, and it has the same name in Worcestershire, Lancashire, and Yorkshire. In Norfolk this term is abbreviated to feabes, or, as they pronounce it, shapes. Carberry is another British name for this fruit. In Scotland it is sometimes called grozer, or grozet, doubtless a corruption of the French name *grosseille*. The gooseberry bush is a native of several parts of Europe, and abounds in the Vallis in coppeswoods, where it produces a small, green, hairy, high-flavoured fruit. In England it is naturalised in various places on old walls, ruins, and in the woods and hedges about Darlington. It is cultivated in greater perfection in Lancashire than in any other part of Britain; and next to Lancashire, the climate and treatment of the Lothians seem to suit this fruit. In Spain and Italy the fruit is scarcely known. In France it is neglected and little esteemed. In some parts of Germany and Holland the moderate temperature and humidity of climate seems to suit the fruit; but in no country is its size and beauty to be compared with that produced in Lancashire, or from the Lancashire varieties cultivated with care in the more temperate and humid districts of Britain. Happily this wholesome and useful fruit is to be found in almost every cottage garden in Britain; and it ought to be considered a part of every gardener's duty to encourage the introduction of its most useful varieties in these humble enclosures. During the hot summer months, when the gooseberry ripens, there is no other fruit so generally within the reach of all classes of the population. In Lancashire, and some parts of the adjoining counties, almost every cottager who has a garden, cultivates the gooseberry, with a view to prizes given at what are called gooseberry-prize meetings: of these there is annually published an account, with the names and weight of the successful sorts, in what is called the *Manchester Gooseberry Book*. The prizes vary from 10s. to 5l. or 10l. The second, third, to the sixth and tenth degrees of merit, receiving often proportionate prizes. There are meetings held in spring to "make up," as the term is, the sorts, the persons, and the conditions of exhibition; and in August to weigh and taste the fruit, and determine the prizes. About the middle of the eighteenth century, the culture of the gooseberry in Lancashire appears to have been in its infancy; for the heaviest berries recorded to have been produced about that time seldom exceeded 10 dwts., and even at the beginning of the present century, prize gooseberries weighing 10 dwts. were not uncommon. (*Gard. Mag.*, vol. iv. p. 482.) In the gooseberry book for 1819 is an account of 136 meetings; the largest berry produced was the Top-sawyer seedling, a red fruit, weighing 36 dwts. 17 grs. Forty-six red, thirty-three yellow, forty-seven green, and forty-one white sorts were exhibited, and fourteen new-named seedlings, which had been distinguished at former meetings, were mentioned as "going out," or about to be sold to propagators. In 1825, the largest gooseberry grown in England weighed 32 dwts.; in 1832 the largest was a green one, called Bumper, which weighed 30 dwts. 18 grs. In 1833 the largest was the Wonderful, a red gooseberry, which weighed 27 dwts. and 15 grs. (*See Gard. Mag.*, vol. i. p. 450., vol. ix. p. 421., and vol. x. p. 42.)

5061. *Use.* The fruit was formerly in little esteem; but it has received so much improvement, that it is now considered very valuable for tarts, pies, sauces, and creams, before being ripe, and when at maturity it forms a rich dessert fruit for three months; and is preserved in sugar for the same purpose, and in water for the kitchen. Unripe gooseberries can be preserved in bottles without water during winter; the bottles being filled with berries as close corked and well sealed, they are then placed in a cool cellar till wanted. By plunging the bottles, after being corked, into boiling water for a few minutes (heating them gradually, to prevent cracking), the berries are said to keep better. (*Neill*.) Wines and even brandies are made from gooseberries. For a simple and successful mode of making gooseberry brandy, see *Gard. Mag.*, vol. viii. p. 180. To make gooseberry wine, two different kinds, see *Gard. Mag.*, vol. viii. p. 181; to make champagne wine from gooseberries, see the various details with engravings of the press, crushing roller, &c., in *Gard. Mag.*, vol. viii. p. 551.

5062. *Varieties.* The gooseberry is mentioned by Turner in 1573. Parkinson enumerates eight varieties: the small, great, and long common, three red, one blue, and one green. Ray mentions only the pearl-gooseberry, but Rea has the blue, several sorts of yellow, the white Holland, and the green. Miller only says, there are several varieties obtained from seed, most of them named from the persons who raised them; but as there are frequently new ones obtained, it is needless to enumerate them. The present lists of London nurserymen contain from 80 to 100 names; but those of some of the Lancashire growers above 300. Forsyth, in 1800, mentions ten sorts as common; and adds a list of forty-three new sorts grown in Manchester. Our catalogue has been prepared by Mr. Thompson, who observes, that less confusion with regard to nomenclature has been found to exist among the varieties of gooseberries than among those of any other class of fruits, of equal extent, in the Collections of the Horticultural Society; which can only be accounted for by the great interest which the prize-growers have taken in detecting sorts which may come before them with wrong names. In the *Transactions of the Horticultural Society*, 2d series, vol. i. p. 318, there is an account of seventy sorts, selected from those fruited in the Society's Garden, and which were reckoned to possess good flavour; many of the large kinds having been rejected, their size not compensating for their coarseness. The account is prefaced by a mode of arrangement which it may be proper to notice. According to it, the varieties are formed (as in Lancashire and generally elsewhere) into *few* divisions, according to the colour of the fruit, being either *Red, Yellow, Green, or White*. Each of these are further subdivided into *three*, from the surface being either *hispid, downy, or smooth*; thus forming twelve subdivisions in the whole, as exhibited in the following Table, which contains a very good selection of both small and large sorts as far as flavour is concerned. A farther division might have been made from the fruit being *round or oblong*, as is done in the *Hort. Trans.*: but for general purposes these divisions now adopted will be found sufficient.

CLASS I.—FRUIT RED.

Div. 1. Surface hispid.	Div. 2. Downy.	Div. 3. Smooth.
1. Rough red 2. Small dark rough red 3. Scotch best jam 4. Red champagne <i>Red Turkey (of some)</i> <i>Ironmonger (of many)</i> <i>Dr. Davin's upright</i> <i>Countess of Errol</i> 5. Raspberry 6. Keene's seedling Warrington 7. Red Warrington <i>Aston</i> <i>Aston seedling</i> 8. Bratherton's lord of the manor 9. Hartshorn's Lancashire lad 10. Leigh's rifleman <i>Alcock's Duke of York</i> <i>Group's admirable</i> <i>Yates's royal Anne</i> 11. Lomas's victory 12. Boardman's British crown 13. Milling's crown bob 14. Large red oval 15. Red rose	16. Miss Bold 17. Berry's farmer's glory	18. Red Turkey 19. Wilnot's early red 20. Farrow's roaring lion 21. Rider's scented lemon.

CLASS II.—FRUIT YELLOW.

Div. 4. Surface hispid.	Div. 5. Downy.	Div. 6. Smooth.
22. Yellow champagne <i>Hairy amber</i> 23. Early sulphur <i>Golden ball</i> <i>Golden ball</i> <i>Went's seedling</i> 24. Hebburn yellow Aston 25. Dixon's golden yellow	26. Rumbullion	27. Yellow ball

CLASS III.—FRUIT GREEN.

Div. 7. Surface hispid.	Div. 8. Downy.	Div. 9. Smooth.
28. Early green hairy <i>Green maculose</i> 29. Hebburn green prolific 30. Glenton green <i>York seedling</i> 31. Lovett's Eliza 32. Hopley's Lord Crewe	33. Late green 34. Gregory's perfection 35. Parkinson's laurel 36. Collier's jolly angler	37. Fitzmaston green sage 38. Green walnut 39. Allen's glory of Ratcliff 40. Massey's heart of oak 41. Edwards's jolly tar 42. Large smooth green

CLASS IV.—FRUIT WHITE.

Div. 10. Surface blispl.	Div. 11. Downy.	Div. 12. Smooth.
43. Hedgehog	48. Early white	53. Crystal
44. White crystal	49. Woodward's whitesmith	54. White damson
45. White champagne	50. Crompton's Sheba queen	55. White honey
46. Cleworth's white lion	51. Wellington's glory	56. Cook's white eagle
47. Taylor's bright Venus	52. Saunders's Cheshire lass	

5053. *Selection of sorts.* Of the preceding catalogue, Nos. 2. 4. 6. 7. 22. 23. 28. 30. 37. 40. 47. 49. 53. deserve a place in every collection for table use. For early sorts, Nos. 2. 6. 16. 19. 23. 28. 38 and 48. may be selected; and for late ones, Nos. 7. 10. 17. 20. 27. 33. and 56. Those who prefer very large sorts, such as are cultivated for prizes, should consult the *Manchester Gooseberry Book*. The red champagne has often been confounded with the red Warrington. The former, however, grows very upright; whereas the latter is of pendulous growth, and the fruit is larger and ripens later. Taylor's bright Venus is of moderate size, and of excellent flavour. The Fitzmaurice green gage is also highly deserving of particular notice; in some seasons it will hang till it shrivels and almost candel on the tree.

5054. *Propagation.* The gooseberry may be propagated by all the modes applicable to trees or shrubs; even by pieces of the roots; but the mode by cuttings is usually adopted for continuing varieties, and that by seeds for procuring them.

5055. *By seeds.* As far as we know, the scientific mode of impregnating one variety with another has not been applied to this fruit. In general, the seed of some choice variety thoroughly ripe is taken and sown in autumn or early in spring, in beds or pots of rich light mellow earth: when the plants are a year old they are planted out in nursery rows, to be cultivated and trained there a year or two; in general they will bear the third year.

5056. *By cuttings.* Miller says the best season for planting gooseberry-cuttings is in autumn, just before their leaves begin to fall. The cuttings should be taken from bearing shoots, rather than those *goosewands* which issue from the main stem. Cut them to such a length as the strength and ripeness of the wood will bear, and cut off all the buds excepting three, or at most four at top, and train the plants with a single stem of nine inches, or a foot high, from the top of which the branches should radiate upwards at an angle of 40°, or better if 45°. Haynes advises taking off cuttings in July, when the fruit is on the tree, in order to make sure of the sorts. He says, by immediate planting, watering, and shading, as good plants are produced as from ripe wood-cuttings. (*Tr. on the Gooseberry*, &c., p. 92.) Saul observes that the best Lancashire growers tie a little moss round the lower part of the cutting, which is said to cause it to strike stronger roots. (*Gard. Mag.*, vol. iii. p. 422.)

5057. *Soil and Site.* Any good garden-soil, on a dry bottom and well manured, will suit the gooseberry. That which is soft and moist produces the largest fruit. The situation should not be under the drip of trees over-much shaded or confined, otherwise the fruit will be small, ill flavoured, and the plants apt to mildew. Forryth says, gooseberries should be dunged every year, or at least have a good coat of dung once in two years. Haynes recommends a mixture of peat and loam well manured, and a shaded situation. The last he proposes to effect by planting, among his compartments of gooseberries, rows of Jerusalem artichokes in the direction of east and west. Mr. Thompson observes, that in some cases scarlet runners might perhaps be got up in time to serve as substitutes for the Jerusalem artichokes, or at all events the stakes required to support the runners, if they consisted of tall branches, would answer as a screen. Mr. Thompson prefers the term screen to that of shade, because it carries with it the idea that a glimmering of sun's rays may pass through them to make the fruit more sugary. Saul recommends a deep, rich, marly loam moderately moist, at the bottom of a sheltering hill. (*Gard. Mag.*, vol. iii. p. 422.)

5058. *Final planting.* "The season for planting gooseberries is any time during open weather from October till March. When trees are procured from the public nurseries, choose such as are of some advanced size, about three years' growth, with pretty full heads, for immediate plentiful bearers. Let the general supply be in standard bushes, and planted principally in the kitchen-garden, in single rows, along the boundary edges of the main compartments, or outward borders, from six to eight feet apart; or some may be planted in cross rows, to subdivide extensive compartments. When the object is to raise large quantities of fruit, plantations are made in continued parallel rows, eight or ten feet asunder, by six feet in the row. It would be eligible to plant a few choice sorts against south and other sunny walls, or paling, for earlier and larger fruit; and on north walls, to ripen late in succession." (*Abercrombie*.) The best Lancashire growers for prizes not only manure the soil richly, but surround the plants with trenches of manure for the points of the roots to strike into, and form round the stem of each plant a basin, to be mulched, or manured, or watered, as may become necessary. When a root has extended too far from the stem, it is uncovered, and all the strongest leaders are shortened back nearly one half of their length, and covered with fresh marly loam, well manured. The effect of this pruning is to increase the number of fibres and spongules, which form rapidly on the shortened roots, and strike out in all directions among the fresh, newly stirred loam in search of nutriment. This practice is more especially useful in soils that are too cohesive, and which in a few years become almost impervious to roots. (*Gard. Mag.*, vol. iii. p. 422.)

5059. *Forryth* says, "The market-gardeners about London plant them in rows, from eight to ten feet apart from row to row, and six feet from plant to plant in the rows. In small gardens I would recommend planting them in a compartment by themselves, at the distance of six feet between the rows and four feet from plant to plant; or you may plant them round the edges of the compartments, about three feet from the path; you will then have the ground clear for cropping, and a man, by setting one foot on the border, can gather the gooseberries without injuring the crop."

5060. *Nell* says, "In some places gooseberry trees, on the sides of the borders, are trained to a single tall stem, which is tied to a stake: this, though six or eight feet high, occasions scarcely any shade on the border, and it does not occupy much room, nor exclude air; while, at the same time, the stem becomes close hung with berries, and makes a pleasant appearance in that state." (*Ed. Encyc. art. Hort.* § 161.)

5061. *Maker* observes (*Hort. Trans.*, vol. ii. p. 146.), that as "the crop of ripe fruit is often injured, by having the largest and earliest berries prematurely gathered, whilst green, for tarts, a sufficient number of trees of such varieties as are the earliest, should be planted in a separate compartment of the garden, and devoted exclusively to the use of the kitchen, for tarts and sauce."

5062. *Mode of bearing.* "The gooseberry produces its fruit not only on the shoots of last summer, and on shoots two or three years old, but also on spurs or snags arising from the elder branches along the sides; but the former afford the largest fruit. The shoots retained for bearers should therefore be left at full length, or nearly so." (*Abercrombie*.) Saul observes (*Gard. Mag.*, vol. x. p. 42.), that gooseberries bear their largest and finest fruit when four years old. Afterwards, the fruit becomes smaller, though it increases in quantity. For producing large show gooseberries, it is customary to take the trees from the nursery in their second year, the third they are not suffered to ripen any fruit, but in the fourth and sometimes the fifth, large-sized berries are produced. After this, the prize-grower seldom sets any value on the fruit.

5063. *Pruning.* "The bushes will require a regulating pruning twice in the year."

5064. *Summer pruning.* "Where any bushes are crowded with cross and water shoots, of the same year, shading the fruit from the sun, and preventing the access of air, thin the heart of the plant and

other tufted parts moderately, pinching off or cutting out close what spray is removed; but do not touch the summer shoots in general." Maher says, "it will greatly contribute to the perfection of the fruit, if the very small berries are taken away with a pair of scissors about the middle or end of May; and these small berries will be found quite as good for sauce or gooseberry-cream as the larger."

5065. *Winter pruning.* "You may proceed to the winter pruning any time from November until the end of February, or until the buds are so swelled that farther delay would endanger their being rubbed off in the operation. Cut out the cross shoots and water-shoots of the preceding summer, and the superfluous among crowded branches. Prune long ramblers and low stragglers to some well-placed lateral or eye; or if an under-straggler spring very low, cut it away. Of last year's shoots retain a sufficiency of the best well-placed laterals and terminals in vacant parts, to form successional bearers, and to supply the places of unfruitful and decayed old wood, which, as you proceed, should be removed. Mostly retain a leading shoot at the end of a principal branch, leaving it either naturally terminal, or where the branch would thus be too extended, pruning to some competent lateral within bounds. The superfluous young laterals on the good main branches, instead of being taken off clean, may be cut into little stubs of one or two eyes; which will send out fruit-buds and spurs. Of the supply reserved for new bearers, a small number will probably require shortening, where too extended, or curved inconveniently; leave these from eight to twelve inches in length, according to strength and situation; those of moderate extent and regular growth will require very little shortening, and many none at all. Observe, too close cutting, or general shortening, occasions a great superfluity of wood in summer: for the multiplied laterals thus forced from the eyes of the shortened branches increase to a thicket, so as to retard the growth and prevent the full ripening of the fruit: on which account it is an important part of pruning to keep the middle of the head open and clear, and to let the occasional shortening of the shoots be sparing and moderate. Between the bearing branches keep a regulated distance of at least six inches at the extremities, which will render them fertile bearers of good fruit. Some persons, not pruning the gooseberry tree on right principles, are apt to leave the shoots excessively close and tufted, while they shorten the whole promiscuously; others sometimes clip them with garden-shears to close round heads: in consequence of being pruned in these methods, the bushes shoot crowdedly, full of young wood in summer, from which the fruit is always very small, and does not ripen freely with full flavour."

5066. *Forsyth* says, "Many of the Lancashire sorts are apt to grow horizontally, and the branches frequently trail on the ground, which renders them liable to be broken by high winds, especially when they are loaded with fruit. In that case, I would recommend two or three hoops to be put round them, in which the branches may be tied, to support them, and prevent their being broken by the wind." In a communication by Mr. Saul, *Gard. Mag.*, vol. iii. p. 491, he recommends the same mode of training here hinted at by Mr. Forsyth, and illustrates it by figures; but in a subsequent article, vol. x. p. 42, he informs us that "the experience of seven years" has proved training to be of no avail, and that the best Lancashire growers do not now attempt it.

5067. *Jeeves* has tried training gooseberries on an arched trellis, in the manner of a *decumens*, or arbour-walk. For this purpose, he plants in rows, five feet and a half apart, and the plants three feet distance in the row. He chooses the strongest-growing kinds, and trains four branches, at nine inches' distance from each plant, till they meet at top. The advantages of this plan are, beauty of appearance, fruit not splashed by rain, and easily gathered, and the ground more readily cultivated. (*Hort. Trans.*, vol. iv. p. 194.) It is observed by Mr. Thompson, that if the plants were placed nearer each other, in the row, and only two branches trained from each, the arbour would be sooner covered.

5068. *Taking the crop.* "From gooseberries being useful for different purposes, both in a green and in a mature state, and from the compass of time afforded by early and late sorts, they are in season and great request four or five months in summer, from April till September. The early sorts, on south walls, come in for gathering in small green berries, for tarts, &c. in April or early in May, and attain maturity in June. From common standard bushes an abundant supply of gooseberries in a green state is yielded in May and June; and, in proportion as part is reserved to ripen, a succession, in full size and maturity, is obtained in June, July, and August. Some late kinds, either planted in shady situations, or shielded with mats from the sun in their ripening state, continue good on the tree till September."

5069. *Prolonging of the crop.* In addition to planting late sorts in shady situations, the bushes, whether standards or trained, may be matted over when the fruit is ripe, and in this way some of the reds, as the Warrington, and the thick-skinned yellow sorts, as the yellow ball, will keep on the trees till Christmas.

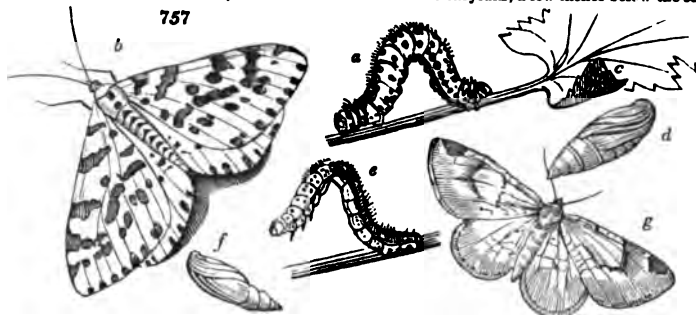
5070. *Suckling.* By preparing a very rich soil, and by watering, and the use of liquid manure, shading and thinning, the large fruit of the prize cultivator is produced. Not content with watering at noon, and over the top, the Lancashire grower, when he is growing a exhibition bush, gives a small quantity of water immediately under each gooseberry, only three or four of which he leaves on a tree. This he technically calls suckling. He also pinches off a great part of the young wood, so as to throw all the strength he can into the fruit.

5071. *Accelerating maturity.* Hunt tried ringing on half a gooseberry bush, which half produced ripe fruit a week sooner than the other, and twice the usual size. (*Hort. Trans.*, vol. iv. p. 565.)

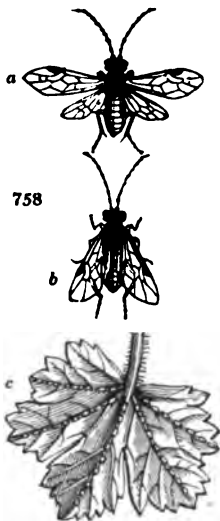
5072. *Insects.* The gooseberry is attacked, at various periods of its growth, by many insects of different species, and of different functions. The aphides, the caterpillars of moths, and those of the saw-flies, (*Tenthredinidae*) seem to be the chief of these insects, though some authors allude to a few others, obviously different in their habits from any of the preceding, one of which bores into the berry, and causes the fruit to drop off. Notwithstanding the voluminous discussions that have been printed on this subject, it still remains involved in uncertainty and obscurity. The Celestian Horticultural Society have been anxiously induced, to procure every information as to the best method of preventing or destroying the caterpillar on gooseberries; and have laudably published all the best communications that have been sent to them on the subject. Yet, after all, nothing can be clearly understood, from these reports, by a scientific naturalist, as to the animal economy, the history, or the true nature of the insects themselves: and the various methods recommended for extirpating these foes (many of which are, no doubt, excellent) are unfortunately rendered in a great degree useless, from the difficulty which exists of knowing to which species they are intended to apply. The same may be said of nearly all the receipts given for the destruction of insects by writers otherwise deservedly popular. The true nature of an insect, the time of its appearance in the perfect state, the situations in which it deposits its eggs, the period and mode of its various transformations, and its scientific name, must all be well understood, before any effectual means can be devised for its destruction. Thus, Mr. Murray's plan of pouring cow urine round the stem of the gooseberry bush may be useful at particular seasons, when certain insects may be lodged in the ground in their chrysalis state; and they may also be partially killed by disturbing the surrounding soil: but it is quite clear these processes are entirely useless when applied to those insects which do not pass their metamorphosis in the earth. It is in questions of this nature that the intelligent gardener will perceive the great advantage that results from an acquaintance with the elementary principles of entomology; not only as regards his own interest, but as to the power of making his discoveries or observations useful and intelligible to the public at large.

5073. *The caterpillar (fig. 781. a) of the gooseberry and currant moth (Abraxas grossulariella Læ.)* is easily known by its black and white colour, and by its forming an elevated loop with its body, when in motion; it is not seen after June, as the moth (b) appears in July: its eggs (c) are deposited, and its chrysalis (d) placed on or near the plant, but never in the ground; and both may be found in such situations. The larva, or caterpillar (e), of the pupa (f) of which is produced the gooseberry moth (g), likewise feeds on both trees. The grub of a small saw-fly, *Nematus ribalis* (not of the species *N. caprea* as mistakenly named in *Mag. Nat. Hist.* iii. 246.), is a worse and more destructive enemy: it is of a green colour above, marked with minute black tubercles, which it loses at its last moult. A correspondent in the *Mag. Nat. Hist.* iii. 245. has

communicated the following carefully ascertained facts on the *Nématus ribesii*, (fig. 756. a & b). "Early in March, if the weather is favourable, the first flies issue from their chrysalis, a few inches below the soil, at



the foot of the gooseberry bushes. Soon afterwards, the females deposit upon the under surface of many of the leaves, along the ribs of each leaf, a series of eggs which appear like strings of small pellucid delicate oblong beads (c). A single fly will fill up the ribs of many leaves; and as several generations are produced in one season, the destruction of a single fly, at an early period, is the prevention of some thousands of voracious successors. The following times of hatching, &c. may be relied upon as accurate. On the 9th of April the eggs were laid; on the 19th they were hatched; and, if the temperature is mild, the caterpillars grow rapidly, and from their number soon destroy the foliage of the chosen bush. They usually continue in the caterpillar state about ten days; when, dropping to the earth, they penetrate below the surface, and change into a small brown chrysalis; in which dormant state they remain from fourteen to seventeen days, and then come forth as flies, which, in a day or two, lay their respective quantities of eggs; and I (says the writer) am not aware that any limits of season act as a check, unless attended with a decrease of temperature, which, of course, puts a stop to their progress. The remedies recommended, are, diligently killing the flies in early spring, and employing children to collect the egg-bearing leaves at a certain rate per hundred: these are to be burned or scalded.



5074. *Preventives.* Hand-picking the eggs, or young larva, will be found, as a general preventive, the most efficacious mode, provided it is commenced the moment the injury is first perceived. Where there is reason to dread the ravages of insects, the method recommended by Busch (*Hort. Trans.*, vol. iv. p. 568.) of sprinkling the bushes with tar water, will, perhaps, prevent some species from laying their eggs upon the leaves; but this must be done before the fruit is large, otherwise it will taste of the tar.

5075. *Remedies.* Notwithstanding the use of preventives, there are few gardens in which the gooseberry is not attacked by the caterpillar; but, if these attacks are perceived in their commencement, they are easily defeated. The gardener, therefore, who dreads the gooseberry caterpillar, ought to examine the under sides of the leaves of his plants almost every day in the beginning of summer, and very frequently even in autumn. The moment he perceives the eggs, or the young caterpillar, he ought to apply clear lime water, throwing it on forcibly with a syringe; and making use of M'Dougal's inverted syringe (fig. 465.) in order the more effectually to wash the under sides of the leaves. Many gardeners of the old school are in despair at the appearance of the gooseberry caterpillar, alleging that, do what you will, the fruit will be rendered useless for that season; but the reason of this is, that these worthy men rarely perceive the caterpillar till it is nearly full grown, and begins to attack the upper surface of the leaves; whereas, had they examined the under side, they might have detected it in the incipient state described in § 5073. We repeat, that, in this incipient state, there is no difficulty in preventing the ravages of this caterpillar, simply by the use of clear lime water, which may be made from powdered lime in a few minutes; or, if lime be not at hand, alkaline ashes of any kind may be substituted. Neither of these remedies in the slightest degree injure the fruit, or disfigure the leaves. Where, through ignorance, neglect, or, what is more common than either, the want of hands, the gooseberry caterpillar has unfortunately attained a considerable size before it is observed, its destruction will be facilitated by first knocking it off the tree. For this purpose, Mr. Thompson directs one end of a stick to be placed against the upper part of the stem of the bush, and the other struck with a mallet, by which the greater part of the caterpillars will be shaken to the ground. In order not to injure the bark, the end of the stick may be rather broad, and covered with leather; but not so much padded as to counteract the smartness of the stroke. The first and second strokes are the most effectual; because, after the alarm is given, the caterpillars exert themselves in securing their hold. When the caterpillars are on the ground, they may be easily destroyed by sprinkling them with lime water, tobacco water, or, according to some, with a decoction of walnut-tree leaves, potato haulm, or chamomile flowers.

5076. *Forcing.* The gooseberry may be forced in pots or boxes placed in pits, or in the peach-house, or vinery. Hay plants in pots in November, removes to the peach-house in January, and has ripe fruit in the end of April, which he sends to table growing on the plants. (*Hort. Trans.*, vol. iv. p. 415.)

SUBJECT. 5. Black Currant. — *Ribes nigrum* L. (*Eng. Bot.* 1891.); *Pentán. Monog.* L. and *Cacti J.* *Grossillier à fruit noir*, or *Poirier*, Fr.

5077. *The black currant* is a native of most parts of Europe, especially the more northern parts. It abounds in the woods in the north of Russia; and in the subalpine regions of Siberia, where the branches and berries are very large and sapid. In

Britain, it is found in wet hedges, on the banks of rivers, in alder swamps, and sometimes in woods.

5078. *Use.* The fruit, which has a peculiar flavour, and disliked by some, is seldom brought to the dessert; but it is eaten in puddings and tarts, and made into jellies and wines. The Russians put the berries into brandy, and the Irish into whisky, in the same way as the English put cherries; the Russians also ferment the juice with honey, and so form a strong and palatable wine. Many cottagers, who cannot afford to mix green tea with common boba, substitute one or two dried leaves of black currant, the flavour produced by which, few persons can distinguish from that of a mixture of green and black tea.

5079. *Varieties.* In the *Horticultural Society's Catalogue of fruits* there are six varieties, besides three synonyms; but Mr. Thompson informs us that the Black Naples is the largest and best, and that the black grape is the next best. The common black, the *Cassé* of the French, comes also very fine in some situations.

5080. *Propagation.* By cuttings. See *Gooseberry*.

5081. *Soil and site.* A moist soft soil and shady situation, such as is afforded by borders of north exposure, is preferable. Miller says, "The fruit is always best when the plants are placed in an open situation, and light loamy soil."

5082. *Final planting.* As only a few plants are in general required for private gardens, these may be placed at the distances recommended for gooseberries, in the margin of a shady border, or against a wall of a north exposure. Neill says, it produces most fruit as a standard, but the largest berries when trained to a wall.

5083. *Mode of bearing.* The black currant bears chiefly on the shoots of the preceding year, and also from mags or spurs, which, however, are less abundant, and of smaller size in the black currant than in the gooseberry or red currant.

5084. *Pruning.* Attend to the general directions given for pruning gooseberries, observing to depend less on spurs than on the preceding year's wood, cutting out the old as it becomes naked and barren, to make room for the new.

5085. *Insects and diseases.* The black currant is seldom attacked by insects, though, in some situations, the *Abraxas grossulariæ* feeds as freely on its leaves as it does on those of the red currant or gooseberry.

5086. *Gathering the fruit.* See *Red Currant*.

5087. *Forcing.* The black currant may be forced in pots like the gooseberry. In Russia this is often done for the sake of the fragrance of the leaves.

SUSSEX. 6. *Red Currant.*—*Ribes rubrum* L. (*Eng. Bot.* 1289.); *Pentandria Monogynia* L. and *Cacti* J. *Groseille à grappes d'outre mer*, Fr.; *Johannisbeere*, Ger.; *Aalbe*, Du.; *Uovetta*, Ital.; and *Grosella*, Span.

5088. *The red currant* is a native of the northern parts of Europe, and found in hedges and woods in England. The berries of this shrub, in its wild state, are red; cultivation has produced white and pale-red berried varieties. Professor Martyn observes, that "the currant does not seem to have been known to the ancient Greeks and Romans, as the southern nations of Europe have not even an appropriate name to it at this day. The old French name *groseilles d'outre mer*, proclaims their having been strangers imported. Our English name of currant is evidently from the similitude of the fruit to that of the *Uva corinthiaca*, the small grape of Zante, or the common grocers' corinths, or currants." The red currant has been long cultivated in Britain, and very much improved in the size of the bunch and berry. It required only twenty-nine bunches of the largest red currants grown in 1833 to weigh a pound, and twenty-two bunches of the white currants.

5089. *Use.* The fruit is acceptable at the dessert, being of an agreeable acid taste. It is much used for jellies, jams, and wines. Forsyth says, it is the most useful of all the small fruit, either for the table or kitchen; and that it continues longer in succession than any other. According to Withering, the juice forms an agreeable acid to punch; and Professor Martyn says it was a common beverage in Paris in 1763. Its medicinal qualities are similar to those of other subacid fruits, allaying thirst, lessening an increased secretion of the bile, and correcting a putrid and scorbutic state of the fluids.

5090. *Varieties.* In the *Horticultural Society's Fruit Catalogue* are enumerated nine varieties of the red, and four of the white currant; but the best are the Red Dutch, Knight's large red, Knight's sweet red, and Knight's early red. The best white currant is the white Dutch. The Champagne is a pale red or flesh-coloured fruit, valued by some for its appearance in the dessert.

5091. *Propagation and nursery culture.* The same as in the gooseberry. With a view to obtaining improved varieties from seed, that indefatigable horticulturist, Knight, procured cuttings, in the year 1810, of the finest varieties of the red and the white currant, which he planted in pots of very rich mould and placed under a south wall, to which the trees were subsequently trained. At the end of three years, within which period the pots had been as often changed, the trees were first suffered to produce blossoms. These were, with the exception of a very small number, removed from the white currant trees, as soon as their buds unfolded; and those which remained were deprived of their stamens, whilst immature, and subsequently fertilized by the pollen of the red variety. The seeds thus obtained were sowed in pots, as soon as the fruit had become perfectly mature, and were subjected, early in the following spring, to the artificial heat of a forcing-house; by which means, and by proper subsequent attention, the plants grew more than a foot in height in the first season. At two years old, in the year 1816, several of the plants, and, in 1817, the greater part of them, produced fruit of great variety of character, and value; but, out of about 300 varieties, only three red and two white appeared to possess greater merits than their parents. (*Hort Trans.*, vol. iii. p. 88.)

5092. *Soil and site.* All the sorts are very hardy, will grow freely, and bear plentifully almost any where, alike in open and shady situations, by which the fruit may be obtained early, in June and July, and prolonged for several months in succession till October. As to soil, the currant generally does well in any common garden-ground, well tilled and recruited; it bears the greater crop in a strong loam, or improved clay, somewhat moist; the earlier in a sandy light mould, which is not poor. Previous to planting, the ground should be dug two feet deep.

5093. *Final planting.* "The season for planting on a dry soil is any time in open weather, from the fall of the leaf till February or March. Plants expected to bear the following summer are best moved in October, unless the ground be wet in winter. Allow a competent supply of standard bushes, to be planted chiefly in the kitchen-garden, in a single row round the main compartments, or in the outward borders, or some in cross rows, to divide extensive compartments. Plant them from five to ten feet distant in the row. To raise large supplies, full plantations are formed in parallel rows, with intervals between the rows of eight or ten feet, and between the trees in each row of six feet. Where convenient, have also some choicer sorts trained against walls or palings, of different aspects, to obtain early and late fruit in perfection; some against a south exposure, for early production; others on east, west, and north walls, for intermediate

succession and late fruit. Plant them at six, eight, or ten feet distance; letting them occasionally fill up the vacant spaces between other wall trees. The branches should be allowed to advance from near the bottom, and be trained in a nearly horizontal direction from three to six inches asunder. Before nailing them, cut out superabundant and irregular growths, retaining a competency of regular shoots for orderly training, among which, if any are of very considerable length, prune them to moderate extent. Some may likewise be trained as espaliers, in a detached row, in the borders or divisions of the compartments. The trees so trained may either be left to grow without support, or be tied occasionally to stakes, and the branches thus will not overpread the ground. Being kept moderately thin and regular, they will bear fine large fruit, and make an agreeable appearance.

5094. *Mode of bearing.* Current trees, in general, bear the fruit both on the young wood of one, two, and three years' growth; and on the older branches, from small spurs, and snags along the sides, which continue several years fruitful, but the fruit produced on the last year's shoot is always finest, especially when the old mother bearers have borne more than four years.

5095. *Pruning.* The chief part of the future culture is reasonable pruning. After the plants are furnished with full heads, they produce many superfluous and disorderly shoots every summer, crowding the general bearers, so as to require retrenchment and regulation, both in the young growths of the year and older wood. The season for the capital pruning is winter; but a preparatory part is performed in summer, to thin the superfluous shoots of the year where too crowded, and excluding the sun and air from the fruit. First, as to standards:—

5096. *Summer pruning.* "In May or June cut out close the most irregular shoots rising in the centre of the tree, with all the cross and water-shoots, to admit more freely the essential influence of the air and sun, and promote the growth of the fruit, and improve its flavour. Also twist off all root-suckers as they appear.

5097. *Winter pruning.* "This extends both to the old and young wood; the time for it is when the plant is at rest. Of the shoots of the preceding summer, cut out the cross-placed and the otherwise irregular, with those which are not wanted for vacancies; but superfluous good lateral shoots are to be cut down to short stubs or artificial spurs, about half an inch long, so as to leave an eye or two, in order that they may send out fruit-shoots and spurs. With regard to the old bearers, take away those which are naked, or getting unfruitful, or of which the fruit is declining in size; reduce any of excessive length, pruning in to some well-placed lateral young shoot, to preserve the head within some regular compass: cut out also any decayed or cankerous parts; retain a competency of the finest best-placed new shoots above and below vacant parts, to come in for successional bearers, or to supply the places of defective old wood; and preserve a leading shoot to the principal branches, where within order limits: shortening such terminal shoots as are of greatest length, to ten, twelve, or fifteen inches, according to their strength and situation on the branches; and leaving those of small extent mostly entire. Take care of the small natural fruit-spurs, and occasionally select short lateral roots of one, two, or three inches, for bearing fruit; or similar small shoots may be cut to short snags of an inch or two long, also for fruiting. Thin out spurs on the old branches where very thick. As the old fruit-branches decline bearing, or decay, cut them away, taking care to provide young ones in succession; and thus keep the trees always furnished with full-bearing branches, and advancing young bearers, in a regular open expansion, six, eight, or ten inches asunder at the extremities; circumscribing the general head within the height of three or four feet, or five at most."

5098. *Macdonald*, at Dalketh House, Neill observes, "raises currants of the finest quality. A good deal depends on the way in which he manages the bushes, especially during the ripening of the fruit. He prunes the bushes at the usual season of mid-winter, shortening the last year's shoots down to an inch or an inch and a half. Next summer the plants show plenty of fruit, and at the same time throw out strong shoots. As soon as the berries begin to colour, he cuts off the summer shoots to within five or six inches before the fruit. This is commonly done with the garden-shears, with which a man may go over half an acre of bushes in a day. Sun and air thus get free access, and more of the vigour of the plant is directed to the fruit: the berries are found not only to be of higher flavour, but larger than usual." It appears (*Caled. Hort. Mem.*, vol. II.) that Macdonald had used the knife for his summer pruning till within two years. We confess we regret to hear of the introduction of the shears into the kitchen-garden, and especially into that of so opulent a proprietor, who ought to set an example of order, progress, and perfection, and not of reviving random work, for the sake of economy. It would certainly be better to employ women and children.

5099. *To wall-trees, espaliers, and fan standards* without support, the same course of summer and winter pruning is applicable, with the obvious variations required by their figure. In training wall trees, two branches are kept in a horizontal direction along the bottom of the wall or trellis, perhaps half a foot from the surface of the earth, and the growth from these of all upright shoots, which will admit of being arranged at the distance of five or six inches from each other, is encouraged.

5100. *Insects, &c.* The red currant often suffers from the ravages of the black and white caterpillar (*Fig. 787*.) of the gooseberry moth (*Abraxas grossularitæ* *Lea.*); these may be eradicated by hand-picking. The shoot-tops are likewise infested by a small aphid (*A. ribes* *L.*), which causes the leaves to contract and turn red, and the fruit to lose its flavour; these may be in part destroyed by hot water, or the application of lime; but much more effectually by cutting away the top shoots.

A third enemy is the larva of the *Ægria spinifrons* *L.*, or currant clear-winged sphinx (*Fig. 788*.), and cannot be so easily removed: it perforates down to the pith, and its presence can only be known by the diminished size of the fruit. Mr. Kirby also alludes to a species of coccus, very much resembling that of the vine, which "miserably ravages" the currant: its eggs are of a beautiful pink, and are enveloped in a large mass of cotton-like web. Whenever this insect appears, it may be subdued by taking away the loose bark, and cleaning the branches with a hard brush.

5101. *Forryth* says, "As currants are very liable to be devoured by earwigs, which take shelter under their leaves and branches, bundles of bean-stalks should be hung up some time before the bushes are covered with mats or nets. If proper attention be not paid to this, the fruit will generally suffer very much from these insects. After the bushes are covered, take the mats off once in three or four days, and kill the earwigs that have got into the bean-stalk, which it will be necessary still to keep hung up. As there is a sweetness in the inside of bean-stalks which attracts the earwigs, they very readily take shelter in them from rain."

5102. *Taking the crop and preserving.* "The ripening fruit comes in for small gathering in June, advances to maturity in July, and continues in perfection till the end of August: or if trees in a full exposure are timely defended from birds and the full sun with garden-mats, or protected with nets where they grow against north walls, the fruit may be continued good till September or October." Gather in a dry state, as in rainy weather they lose their flavour. (*Abercrombie*.)

5103. *Forcing.* To obtain early currants by forcing, let some good bearing trees, in pots, be placed, as early as January or February, in any common forcing department: they will produce ripe fruit in April and May.

SUBSECT. 7. *Raspberry.* — *Rubus idæus* *L.* (*Eng. Bot.* 2442.); *Icosân. Polyg. L.* and *Rosacæ J. Francoiser, Fr.; Himbeerstrauch, Ger.; Framboos, Du.; Roco idæo, Ital.; and Frambueso, Span.*

5104. *The raspberry plant* is a native of Britain, and not uncommon in woods in low moist situations. The fruit is grateful to most palates, as nature presents it, but sugar

improves the flavour; accordingly, it is much esteemed when made into sweetmeats, and for jams, tarts, and sauces. It is fragrant, subacid, and cooling; allays heat and thirst, and promotes the natural excretions in common with other summer fruits. It is much used in distilling, to make cordial spirituous liquors. Raspberry syrup is next to the strawberry in dissolving the tartar of the teeth; and as, like that fruit, it does not undergo the acetous fermentation in the stomach, it is recommended to gouty and rheumatic patients.

5105. *The best varieties are —*

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| 1. <i>Early prolific.</i> | Burley, Late-bearing Antwerp, Kne- | 6. <i>Cornish.</i> |
| 2. <i>Barnet, Cornwall's prolific, Corn-</i> | velt's Antwerp, Franzblau's large & | 7. <i>Superb.</i> |
| wall's seedling, Cornwall's red, | gro fruit. (<i>Penn. Mag.</i> t. 54.) | 8. <i>Woodward's red globe.</i> |
| Large red, Lord Exmouth's. (<i>Penn.</i> | 4. <i>Yellow Antwerp, White Antwerp,</i> | 9. <i>Double-bearing, Red double-bearing,</i> |
| <i>Mag.</i> t. 8.) | Double-bearing yellow. | Perpetual bearing, Siberian, Late |
| 3. <i>Red Antwerp, Large red Antwerp,</i> | 5. <i>Bronze Stile.</i> | cane. |

5106. *Selection of sorts.* For a small garden Mr. Lindley recommends 2, 3, 4, 6, and 9. (*Guide*, &c. p. 476.)

5107. *Propagation.* "The varieties can be perpetuated by young sucker-shoots rising plentifully from the root in spring and summer; when these have completed one season's growth, they are proper to detach with roots for planting, either in the autumn of the same year or the next spring, in February or March, but not later than the middle of April. These new plants will bear some fruit the first year, and furnish a succession of strong bottom shoots for full bearing the second season. New varieties are easily raised from seed; and they come into bearing the second year."

5108. *Soil and site.* "All the varieties will succeed in any common mould trenched about two feet deep, and sufficiently manured; but the soil in which the raspberry bush most prospers and bears the finest fruit, is a light rich loam." Neill says, "the raspberry bush grows freely in any good garden soil; but it is the better for being slightly moist. Although the place be enclosed by trees, and even slightly shaded, the plant succeeds. In an enclosed and well-sheltered compartment, with rather a damp soil, containing a proportion of peat-moss, we have seen very great crops of large and well-flavoured berries produced; for example, at Melville House, the seat of the Earl of Leven, in Fifeshire." Haynes also recommends well-manured bog-earth, and a situation naturally or artificially shaded.

5109. *Forming a plantation.* "In order to do this," Mr. Lindley observes, "it is necessary that the respective heights should be known, to which the different varieties attain. This will enable the planter to arrange them to the greatest advantage. This will be by placing the tallest growers at the back, the middle growers next, and the shortest growers in front. By this mode of arrangement, the shorter and middle growers will receive their due proportion of sun, without being interrupted by those which attain the greatest degree of elevation. The necessity of such an arrangement as this must be obvious to those who are aware of the advantage to be derived, in wet and cloudy seasons, in having this delicate and tender fruit fully exposed to the sun, and receiving a free and plentiful admission of air. In making such a plantation as this, it will be advisable, if possible, to have the rows extend from east to west. These should be four feet at least from each other; and supposing one row only can be allotted to each sort, and that six rows are to form the extent of the plantation, then the first or north row may be planted with the Cornish, the second with Woodward's red globe, the third with red Antwerp, the fourth with yellow Antwerp, the fifth with Barnet, and the sixth with double-bearing. The stools in the first and second row should be four feet apart; those in the third and fourth, three feet and a half; and those in the fifth and sixth, three feet. In planting, young suckers should be made choice of; and if in plenty, three of these should be allowed to each stool, placing them in a triangle of six inches apart. If fruit are not wanted the first year, the plants will gain considerable strength by being cut down within six inches of the ground as soon as planted, instead of leaving them three or four feet high in order to obtain from them a crop of fruit." (*Lindley's Guide to the Kitchen Garden*, &c., p. 480.)

5110. *General treatment.* After the stools are established, if fruit of the largest size be required, care must be taken to select the strongest canes, and a few of these only from each plant, in proportion to its strength, shortening each to about four fifths of its original height; these should be supported singly by a small stake to each. For general purposes stakes are unnecessary, as three, four, five, or six canes from the same stool may be tied together on their tip ends: this may be done so as to give each cane a bowlike direction, which will give much more room for their laterals to grow, than if tied up in a more perpendicular manner. As a succession of this very favourite fruit must always be desirable in the dessert, it may be prolonged considerably beyond its usual time, by cutting down some of the stools wholly to within a few inches of the ground, instead of leaving the canes at four fifths of their length. This operation may be practised upon both the red and the yellow Antwerp, as well as upon several of the other varieties, from which good crops of fruit may be obtained in August. The double-bearing varieties should have every alternate stool cut down annually: these will furnish an abundance of fruit as late as September, and in a fine warm autumn even to a later period. As the finest and best of these fruits are, in all cases, the produce of strong and well-ripened canes, it becomes necessary that the stools should have every advantage afforded them. This may be readily effected by causing all the former year's canes to be cut down to the ground as soon as they have produced their crop, instead of allowing them to stand till the winter or spring: this removes an unnecessary incumbrance, and at a season when sun and air are of infinite importance to the young canes, consequently to the succeeding crop of fruit." (*Lindley's Guide*, &c. p. 481.)

5111. *Summer culture.* "Keep them clear from weeds during the summer by hoeing between the rows; at the same time, loosen the earth about the plants. Under this management the plants, if tolerably strong, will both yield a moderate crop the first summer, and supply young stems for bearing in greater plenty and perfection the following season; and so, from year to year, the summer culture should be repeated. As the plants get established, let all straggling suckers between the rows, or from the extreme roots of single stools, be cleared out by tying, or twisting off, to admit the air and sun freely to the fruit."

5112. *Pruning and winter dressing.* "It requisite every winter or spring to cut out the dead stems, and to thin and regulate the successional young shoots. This annual pruning may be performed any time, during open weather, from November till the beginning of April. When kitchen-garden crops are cultivated between the rows, it is most convenient to do this as soon as the old bearers begin to decay. As to pruning indiscriminately in the open weather of winter, it sometimes happens that severe frosts immediately follow, and partially kill the plants; therefore it is safer to shorten the tender young stems early in spring; but let it not be deferred till the buds are making new shoots, as that would weaken the root. Cut out all the old dead stems clean to the bottom; and having selected from the strongest young shoots on each main stool, three, four, or five, to be preserved for a succession of bearers, cut away the superabundant close to the ground. Let each of the shoots retained be pruned at top, below the weak bending part; cutting them, in the smaller plants, to about three or four feet in length, and, in the large sorts, to the length of five or six feet. If any of the stems diverge irregularly, or straggle much sideways, they may be tied together at top, and thus the strong ones will support each other; or the taller varieties may have the support of stakes. Prune plants against a wall or trellis as above; and train the shoots to rise a little diagonally. After pruning, having cleared away the cuttings, dig the ground between and about the plants. To turn in a little rich compost every year will conduce to plentiful and fine returns; lay it at the extremities of the roots, and deeper as the plantation gets older. Eradicate all straggling suckers."

5113. *New plantation.* It has been found from experience that raspberries will not thrive long in the same spot of ground. Nature, indeed, by giving them a travelling root, or spreading stool, may be said to have provided for this constitutional peculiarity; for in woods and other places where the raspberry grows wild, the strongest shoots will invariably be found in the circumference of the stool. Plantations of raspberries in gardens, therefore, ought to be renewed frequently. Abercrombie allows from three to five years; but a writer in the *Gard. Mag.*, vol. x. p. 14., considers the raspberry as exuding from its roots excretions so poisonous as to justify the renewal of the plantation on fresh ground more frequently.

5114. *To obtain fruit of a very large size.* The fruit of the raspberry may be obtained of a very large size, other circumstances being of the most favourable kind, by destroying all the suckers; but in this way, the plant being destroyed, a double plantation is wanted, one to grow only suckers, and the other fruit. In this way Kocht, at Berlin, produces plants ten and twelve feet high, with fruit larger than any we have seen in this country. (*Versuch des Weinbau.*, &c. p. 46.)

5115. *Taking the crop.* "The fruit of the different varieties comes in from the end of June or July till October or later. As it ripens, it should be timely gathered for immediate use; because, when fully ripe, it will not keep above two or three days before it moulds, or becomes maggoty, and unfit to be used." (*Abercrombie*.)

5116. *Raspberries may be forced* equally well with gooseberries and currants, and like them either planted in pots or in the soil or floor of the house. In Mr. Hope's garden at Haarlem, and at Mr. Labouchere's at Hylands (See *Gard. Mag.*, vol. iii. p. 290.), the raspberry is planted outside along the north and south sides of a pit; the shoots of the preceding year are introduced under the glass and trained to a trellis, and forced, while the suckers are left to grow upright in the open air. (*Ibid.*, vol. iii. p. 174.)

SUBJECT. 8. *Cranberry.* — *Vaccinium L.*, *Oxycoccus Pers.*; *Octúndria Monog. L.* and *Erica J. Airalle, Fr.* and *Heidelbeere, Ger.*

5117. *The American cranberry* (*Oxycoccus macrocarpus Pers.*) (*Hort. Kew.*, vol. ii. t. 7.) is a native of North America, and by the ingenuity of Sir Joseph Banks, it may be said to be now added to our cultivated fruits. The plant was known to Miller, who, of the cranberry tribe in general, observes, "they can only be cultivated for curiosity in gardens, for they will not thrive much, nor produce fruit out of their native swamps and bogs." A very interesting account of the mode adopted by the illustrious horticulturist above mentioned is given by himself in the *Hort. Trans.*, vol. i. p. 71. and of the produce, which was large and uniform. In one year, viz. 1813, from 326 square feet, or a bed about eighteen feet square, three and a half Winchester bushels of berries were produced, which at five bottles to the gallon gives 140 bottles, each sufficient for one cranberry-pie, and raised from about 2½ square feet.

5118. *Culture in moist soil.* "Wherever there is a pond," Neill observes, "the margin may, at a trifling expense, be fitted for the culture of this plant, and it will continue productive for many years. All that is necessary is to drive in a few stakes, two or three feet within the margin of the pond, and to place some old boards within these, so as to prevent the soil of the cranberry bed from falling into the water; then to lay a parcel of small stones or rubbish in the bottom, and over it peat or bog earth, to the depth of about three inches above, and seven inches below the usual surface of the water. In such a situation the plants grow readily; and if a few be put in, they entirely cover the bed in the course of a year or two, by means of their long runners, which take root at different points. From a very small space a very large quantity of cranberries may be gathered; and they prove a remarkably regular crop, scarcely affected by the state of the weather, and not subject to the attacks of insects." The cranberry will also succeed when planted as an edging to any pond, provided some bog earth be placed for its roots to run in; or if a bed of bog earth be sunk in any shady situation, so as its surface may be a few inches below the general level, for the sake of retaining water, the plant will thrive well, and, being regularly watered in the driest weather, produce abundant crops. (See *Gard. Mag.*, vol. i. p. 151.)

5119. *Culture on dry beds.* "The American cranberry," Salisbury observes (*Hort. Trans.*, vol. ii. p. 96.), "may be cultivated very successfully in situations not positively wet, if only planted in bog earth, which retains moisture longer than any other soil; for a few plants, even in pots, which had stood some time neglected under a hedge, so that their branches were matted together, produced a plentiful crop." Hallett found the cranberry and also the bilberry succeed perfectly in a dry bed of peat earth, so that it may now be cultivated in any garden where that soil can be procured. (*Hort. Trans.*, vol. iv. p. 488.) Milne also found vigorous shoots and abundant crops produced on dry beds of peat earth, even in the warm summer of 1822. He finds the American cranberry easier cultivated than the common; but some prefer the flavour of the latter. (*Hort. Trans.*, vol. v. p. 279.)

5120. *The common cranberry* (*Oxycoccus palustris Pers.*) (*Eng. Bot.* 319.) may be subjected to the same treatment. "Great quantities of this berry are gathered in upland marshes and turf bogs, both in England and Scotland. The berries are made into tarts, and have much the same flavour as the Russian imported cranberries, or those procured by cultivation." (*Neill*.) Twenty or thirty pounds' worth are sold each market-day, for five or six weeks together, in the town of Langtown, on the borders of Cumberland. (*Lightfoot*.)

5121. *The Scotch cranberry* (*Vaccinium Vitis idææ*) produces fruit quite as fit for tarts as any of the others, while it is of the easiest possible culture in either dry or moist peat, requiring, indeed, no attention for years, and is a more certain and abundant bearer than either the English or the American cranberry.

SUBJECT. 9. *Strawberry.* — *Fragaria L.*; *Icosánd. Polyg. L.* and *Rosacea J. Fraiser, Fr.*; *Erdbeerpflanze, Ger.*; *Aadbezie, Du.*; *Pianta di fragola, Ital.*; and *Fresa, Span.*

5122. *Of the strawberry* there are numerous sorts, by some botanists distinguished as species, by others considered as only varieties. Knight (*Hort. Trans.*, vol. iii. p. 207.) considers the grandiflora or pine, the chilensis or Chile, and the virginiana or common scarlet (the first supposed to be a native of Surinam, the second of Chile, and the third of Virginia), to be varieties only of one species; as all may be made to breed together indiscriminately. The fruit has received its name from the ancient practice of laying straw between the rows, which keeps the ground moist and the fruit clean. The cultivated strawberries are natives of temperate or cold climates, as of Europe and America. The fruit, though termed a berry, is, in correct botanical language, a fleshy receptacle, studded with seeds.

improves the flavour; accordingly, it is much used for jams, tarts, and sauces. It is fragrant, subacid, and promotes the natural excretions in common with other acids; it is used in distilling, to make cordial spirituous liquors; in dissolving the tartar of the teeth; and in going the acetous fermentation in the stomach, it is very useful to patients.

5105. *The best varieties are—*
- | | |
|--|--|
| 1. <i>Early prolific.</i> | Burley, Late-bearing A |
| 2. <i>Best.</i> Cornwall's prolific, Corn-
wall's seedling, Cornwall's red,
Large red, Lord Exmouth's. (<i>Pom.</i>
<i>Mag.</i> t. 8.) | vett's Antwerp, Frem-
bos fruit. (<i>Pom. Mag.</i> t. 8.) |
| 3. <i>Red Antwerp, Large red Antwerp,</i> | 4. <i>Yellow Antwerp, White</i>
<i>Double-bearing yellow.</i> |
| | 5. <i>Bromley Hill.</i> |

5107. *Propagation.* "The varieties can be perpetuated by the root in spring and summer; when these have completed roots for planting, either in the autumn of the same year but not later than the middle of April. These new plants will succession of strong bottom shoots for full bearing the second year; and they come into bearing the second year."

5109. *Forming a plantation.* "In order to do this," Mr. Woodward says, "the respective heights should be known, to which the different trees are to be arranged them to the greatest advantage. This will be the tallest growers next, and the shortest growers in front. The middle growers will receive their due proportion of sun, with the greatest degree of elevation. The necessity of such an arrangement, who are aware of the advantage to be derived, in wet and cold climates, where the fruit is fully exposed to the sun, and receiving a free and pleasant ventilation as this, it will be advisable, if possible, to have the rows four feet at least from each other; and supposing one row of trees to be the second to form the extent of the plantation, then the first row should be the second with Woodward's red globe, the third with the fifth with first, and the fourth with the double-bearing. The first row for four feet; those in the third and fourth, three feet, and the fifth, two feet. In planting, young suckers should be made choice of, and allowed to each stool, placing them in a triangle of six inches, so that the plants will gain considerable strength by being cut down and replanted, instead of leaving them three or four feet high in the ground." (*Lintley's Guide to the Kitchen Garden*, &c., p. 480.)

[illegible]

the male, have flowers
resembling the above,
but also long, but the
the fertilization is
the male.

White, Bath,

series the hantails are

generally do not depart;

depending on; the fruit

distinctions will produce

runners that may, per-

haps, be sterile, and seed-

lings, many of which

are so. The latter ought

to be carefully looked

after and at the time they

are necessary to observe,

that, in all the sorts of

hantails, which have long

stamens, to be entirely

destroyed. They may

be distinguished from

all the sorts, by their

stamens being much

longer; and from the

sort now mentioned,

in having long stamens,

by their flowers being

scarcely so large, and

the receptacle

small and imperfect."

(Hort. Soc. Cat. of Fruits,

2d edit. p. 162.) Mr.

Thompson

there is no such thing

as distinct plants of

Male and Female

hantails. Stamens

and

are found in either a

perfect or an imperfect

state in every individual

flower. Imperfection

is in the pistil, together

with the receptacle. To

see that these are sound

is all that

is needed.

Salter's, Ferns, Lowder's, Wey-

mouth (Hort. Trans., v. 215.); fruit

large, roundish, or approaching

hemispherical, reddish next the sun,

pale where shaded; seeds deeply em-

bedded; flesh greenish-white, firm,

and juicy, with the perfume

peculiar to the class; a great bearer;

ripening rather later than the pre-

ceding sort; the stamens are very

short.

They certainly retain a general character,

but con- stancy of character in varieties denominated as distinct,

is not to be depended on; the fruit will occasionally change from globular to ovate, and the contrary;

distinctions will produce runners that may, perhaps, be sterile, and seedlings, many of which

are so. The latter ought to be carefully looked after and extirpated, which can be only

in plantations newly formed whilst the plants are single, and at the time they are in

the state necessary to observe, that, in all the sorts of hantails here enumerated, there

is no such thing as distinct plants of Male and Female hantails. Stamens and

are found in either a perfect or an imperfect state in every individual flower. Imperfection

is in the pistil, together with the receptacle. To see that these are sound is all that

is needed.

Class VI. GREEN STRAWBERRIES.

is sufficiently characterised as the *Fragaria collina*, and the *Fragaria viridis* of botanists. It may be said to deserve notice for cultivation, is the green, which usually has the fruit a great bearer; but in the garden of the Horticultural Society it has almost uniformly

runners.

Given pure, Pine-

wood, given wood,

and of a tolerably

large size, roundish or depressed,

globular, of a powdery green colour,

tinged with brownish-red next the

sun; flesh solid, greenish, very juicy,

with a peculiar and somewhat pine-

apple flavour; ripens in July.

ALPINE AND WOOD STRAWBERRIES (*Fragaria semperfibrens* and *Fragaria vesca* of botanists).

The character the alpine and wood strawberries are very similar, the principal difference being in the fruit, which in the alpine is conical, and in the wood varieties roundish.

17. *White Alpine*, Des Alpes à fruit

blanc, Des Alpes de tous les mois à

fruit blanc, Des Alpes de deux saisons

à fruit blanc, Des Alpes de quatre

saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, ex-

cept in being white instead of red.

18. *Red wood*, Commun rouge, Des Bois

which are suitable) and in succession

from June till November.

17. *White Alpine*, Des Alpes à fruit

blanc, Des Alpes de tous les mois à

fruit blanc, Des Alpes de deux saisons

à fruit blanc, Des Alpes de quatre

saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, ex-

cept in being white instead of red.

18. *Red wood*, Commun rouge, Des Bois

à fruit rouge: fruit scarcely so large

as the Red Alpine, and roundish

instead of conical; and the plants

do not bear so long in succession;

the colour and flavour are much the

same.

19. *White wood*, Commun blanc, Des

Bois à fruit blanc; bears the same

relation to the White Alpine as the

Red wood does to the Red Alpine.

Summary of the preceding sorts of strawberries (with the exception of the alpine and

the exception).

No. 1. - 2. - 10. - 5. - 4.

6. Old pine - - - - - No. 11.

7. Black Roseberry - - - - - 5.

8. Prolific, or Conical hantails - 13.

9. Large flat hantails - - - - - 14.

10. Wilton's superb - - - - - 12.

11. Downton - - - - - No. 8.

12. American scarlet - - - - - 6.

13. Elton seedling - - - - - 9.

14. Coul late scarlet - - - - - 7.

15. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

16. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

17. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

18. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

19. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

20. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

21. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

22. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

23. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

24. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

25. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

26. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

27. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

28. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

29. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

30. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

31. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

32. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

33. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

34. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

35. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

36. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

37. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

38. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

39. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

40. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

41. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

42. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

fruit ressemblant le précédent, except in being white instead of red.

43. *Red wood*, Commun rouge, Des Bois à fruit rouge: fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

44. *White wood*, Commun blanc, Des Bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

45. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc:

5125. *Use.* The fruit is fragrant (whence *Fragaria*), delicious, and universally esteemed. It consists almost entirely of matter soluble in the stomach, and neither there nor when laid in heaps and left to rot, does it undergo the acetous fermentation. Hence it is very nourishing, and may be safely eaten by gouty and rheumatic persons. "In addition to its grateful flavour, the subacid juice has a cooling quality, particularly acceptable in summer. Eaten either alone or with sugar and cream, there are few constitutions with which strawberries, even when taken in large quantities, are found to disagree. Further, they have properties which render them, in most conditions of the animal frame, positively salutary; and physicians concur in placing them in their small catalogue of pleasant remedies. They dissolve the tartareous incrustations of the teeth. They promote perspiration. Persons afflicted with the gout have found relief from using them very largely; so have patients in cases of the stone; and Hoffman states, that he has known consumptive people cured by them. The bark of the root is astringent." (*Abercrombie*.)

5124. *The species and varieties* are very numerous. They were first studied, classed, and described, by Mr. Barnet, in the *Hort. Trans.*, vol. vi.; but, as a number of varieties have since been added, we have had recourse to the invaluable assistance of Mr. Thompson, who has supplied us with the following descriptive table of the best sorts.

Class I. SCARLET STRAWBERRIES

5126. *General character.* Leaves nearly smooth, dark green, of thin texture, with sharp pointed serratures; the fruit mostly of small size, and bright colour, with the seeds more or less deeply embedded between ridged intervals; the flavour acid, with slight perfume.

1. *Old scarlet*, Scarlet, Early scarlet, Original scarlet, Virginian, Scarlet Virginian, *l'Esclaire de Virgile* (*Hort. Trans.*, vi. 152); mild, in-lined regular, of an uniform light scarlet; seeds deeply embedded; flesh pale scarlet, firm, and high-flavoured; ripens amongst the very earliest of the strawberry tribe, and is highly deserving of cultivation (even although it is rather shy sower), more especially as it is in great esteem with the confectioners.
2. *Grove End scarlet*, Atkinson's scarlet (*Hort. Trans.*, vi. 159., *Penn. Mag.*, t. 7.); fruit large for this class, roundish, or approaching to hemispherical, bright light vermilion; flesh pale scarlet, with a very agreeable subacid flavour; a most abundant bearer, ripening early and in succession; it is remarkable for the very wide serratures of the leaves, and named, in 1850, by William Atkinson, Esq., at Grove End.
3. *Roseberry*, Rose, Scotch scarlet, Aberdeen, Aberdeen seedling, Proflig pine (*Hort. Trans.*, li. 27.; vi. 154.); fruit large, conical and pointed, with a very short neck, dark red; flesh firm, pale scarlet, with an agreeably rich flavour; a very abundant bearer, ripening in the end of June, and continuing to bear long in succession; it is one of the sorts adapted for forcing; was raised at Aberdeen about twenty-six years ago.
4. *Garnetian scarlet* (*Hort. Trans.*, vi. 171.); fruit large, obtusely conical, with short neck, rich scarlet scarlet; flesh scarlet, and rich; a good bearer, ripening the end of June or beginning of July; raised in 1819, in Garston, in Herefordshire.
5. *Black Roseberry*, Black round-fruited Roseberry (*Penn. Mag.*, t. 20.); fruit of a good size, roundish, or obtusely conical, dark purple-lake, and very shining; flesh buttery and juicy,

very agreeably flavoured; a good bearer, ripening at the end of June or beginning of July.

6. *Jeany* or Jeany scarlet, Black American, New American scarlet, New Roseberry, Thompson's Roseberry (*Hort. Trans.*, vi. 165.); fruit middle-sized, conical, with a neck, of a deep shining blood-red colour; flesh dark scarlet, firm, rich, and sweet; a good bearer, ripening late in the season; it is necessary to give this deserving sort plenty of room, as the footstalks of the leaves are very long.
7. *Coal tree scarlet*, Sir George Mackenzie's late scarlet (*Hort. Cal.*, No. 13.); fruit above middle-sized, conical or ovate, dark scarlet; flesh pale scarlet, juicy and soft; a good bearer, and valuable for its ripening at a period of the season when other sorts are nearly, if not quite, over; was raised at Sir George Mackenzie's seat, at Coal, in Dumfriesshire.

Class II. BLACK STRAWBERRIES.

5126. *General character.* Leaves rugose, pale green and small; fruit conical, with a neck; seeds slightly embedded; flavour rich and highly perfumed.

1. *Downton*, Knight's seedling, Knight's strawberry (*Hort. Trans.*, vi. 183., *Penn. Mag.*, t. 32.); fruit large, ovate, with a neck, dark purple-scarlet; flesh scarlet, firm, and rich; a good bearer, ripening late; the plants require a good supply of water. The fruit preserves well, and makes excellent sweetmeats.

The *Pimston Mash* (*Hort. Trans.*, vi. 183.) and the *Sweet one* (*Hort. Trans.*, vi. 184., *Penn. Mag.*, t. 41.), both belonging to this class, are excellent as regards flavour; but the first is too delicate for general cultivation, and neither can be compared to the Downton for productiveness.

2. *Ellen seedling* (*Penn. Mag.*, t. 125.). fruit large, ovate, often compressed, or cockcomb-shaped, bright scarlet red; flesh deep red, juicy, with a sharp rich flavour; a great bearer, ripening late; it must be allowed to remain till it becomes dark-coloured before it is gathered, otherwise its acidity is too predominant.

Class III. PINE STRAWBERRIES.

5127. *General character.* Leaves almost smooth, dark green, of firm texture, with obtuse serratures; flowers large; fruit large, varying from nearly white to almost purple; seeds prominent on a smooth surface; flavour sweet and often perfumed.

10. *Kennel seedling*, Kennel seedling, Kennel's black pine, Murphy's child (*Hort. Trans.*, v. 261., t. 12.; vi. 100., *Penn. Mag.*, t. 51.); fruit very large, round or ovate, and many of the largest assuming a cockcomb shape, dark purple-scarlet, especially next the sun; flesh scarlet, firm, with a rich agreeable flavour; a great bearer, ripening early in the season. It is perhaps the best strawberry for forcing, and is undoubtedly so for general purposes, as far as productiveness and handsome appearance are concerned. The sort was raised by Mr. Kennel, at Isleworth, and was first brought into notice in 1821; since then it has been the means of almost completely banishing from the London market a race of very

bad sorts, sold under the name of pine, or sometimes hantula; consisting chiefly of the Bath scarlet, Chinese, Surinam, and Dutch, of the *Hort. Trans.*, &c. These sorts were large and abundant bearers; but with these properties, Kennel's seedling combines good flavour, and consequently has taken the lead of all others in extensive cultivation, and is likely to continue to do so for at least a considerable time.

11. *Old pine*, or *Carolina* Pine, Carolina, Scarlet pine, Old scarlet pine, Old Carolina, Common Carolina, Carolina pine, Large Carolina, Blue Key pine, Windsor pine, Fyne Hill, Miss Gunning's, North's seedling, Devonshire scarlet pine, Varinised, Barbara Down, Cockcomb pine, Regent's favourite, Superior, She's

scarlet, Bonderoff, Grundiffen (*Hort. Trans.*, vi. 183., *Penn. Mag.*, t. 37.). fruit large, ovate, conical, with a neck, occasionally cockcomb-shaped, bright scarlet; flesh pale scarlet, firm, and juicy, with a rich grateful flavour; a good bearer on suitable soils and in proper situations; it is so firm, and at the same time so abundant in rich juice, that its greater weight is almost sufficient to distinguish it when compared with an equal quantity of any other sort; its leaves are also of a darker green than those of, perhaps, any other kind of strawberry; it ripens later than the preceding sort; and although not so very productive as the one just alluded to, yet its superior richness renders it highly deserving of cultivation.

Class IV. CHILE STRAWBERRIES.

5128. *General character.* Leaves very villous, hoary, with small leaflets of thick texture, with very obtuse serratures; fruit large; seeds prominent; flesh insipid in the True Chile, and more or less so in the varieties which have originated from it.

12. *Wilson's superb* (*Hort. Trans.*, vi. 205.); fruit very large, roundish, or irregularly ovate, sometimes compressed or cockcomb-shaped, pale

scarlet, of a polished appearance; seeds projecting; flesh pale scarlet near the centre, and woolly towards the centre; flavour only

moderate. This, in strong rich soil, has been grown very large; and, in fact, its size is its only recommendation; it ripens rather late.

Class V. HAUTOBOIS (*Frágaria elatior*).

5129. *General character.* Leaves tall, pale green, rugose; scapes tall and strong; fruit middle-sized, pale greenish white, tinged with dull purple; flesh solid and musky.

13. *Proflig*, or *Conical* hautoibois, Double-bearing, Hermaphrodite, Hudson's Bay (of some), Musk, Regent's, Drarri, Baromet, Sir Joseph Banks's Spring Grove, Capen royal, Capen hermaphrodite (*Hort. Trans.*, vi. 213., *Penn. Mag.*, t. 51.); fruit large

(for this class, conical, dull purple; flesh greenish, firm, rich, and perfumed; an abundant bearer; ripening in the end of June or beginning of July. It is remarkable of this sort, in the *Hort. Soc. Cat. of Fruits*, 2d edit., that the "flowers are the

largest of the class; receptacle broad; stamens long, and protruding beyond the base of the fruit, even to the period of its maturity." What this is a distinctive mark of this excellent variety, it may be necessary to observe, that these stamens

commonly called male, have flowers considerably resembling the above, the stamens being also long, but the receptacle of the fructification is small and imperfect.

14. *Large flat hantbols*, White, Bath,

Salter's, Furness, Lowder's, Weymouth (*Hort. Trans.*, vi. 315.); fruit large, roundish, or approaching to hemispherical, reddish next the sun, pale where shaded; seeds deeply embedded; flesh greenish-white, firm,

and juicy, with the perfume peculiar to the class; a great bearer; ripening rather later than the preceding sort; the stamens are very short.

"Of all strawberries the hantbols are the most variable. They certainly retain a general character, from which they naturally do not depart; but constancy of character in varieties denominated as distinct, is but little to be depended on; the fruit will occasionally change from globular to ovate, and the contrary; while fertile plantations will produce runners that may, perhaps, be sterile, and seedlings, many of which will certainly prove so. The latter ought to be carefully looked after and extirpated, which can be only effectually done in plantations newly formed whilst the plants are single, and at the time they are in blossom. It will also be necessary to observe, that, in all the sorts of hantbols here enumerated, there exist both the *Prolific*, and also those sterile plants commonly called *Male*, which have *long stamens*. The latter ought, in all cases, to be entirely destroyed. They may be distinguished from all the sorts, except the *Prolific* or *Conical*, by their stamens being much longer; and from the sort now mentioned, with which they agree in having long stamens, by their flowers being scarcely so large, and the receptacle of the fructification small and imperfect." (*Hort. Soc. Cat. of Fruits*, 2d edit. p. 162.) Mr. Thompson adds:—"I believe there is no such thing as distinct plants of *Male* and *Female* hantbols. Stamens and pistillets are to be found in either a *perfect* or an *imperfect* state in every individual flower. Imperfection generally takes place in the pistillum, together with the receptacle. To see that these are sound is all that is necessary to be attended to."

Class VI. GREEN STRAWBERRIES.

5130. *These are sufficiently characterized as the Fragaria collina, and the Fragaria viridis of botanists.* The only variety that may be said to deserve notice for cultivation, is the green, which usually has the character of being a bad bearer; but in the garden of the Horticultural Society it has almost uniformly borne most abundantly.

15. *Green strawberry*, Green pine, Pineapple, Green alpine, Green wood, Fordonia pine, Vert d'Angouleme, Fraiser vert; fruit of a tolerably

large size, roundish or depressed, globular, of a powdery green colour, tinged with brownish next the

sun; flesh solid, greenish, very juicy, with a peculiar and somewhat pineapple flavour; ripens in July.

Class VII. ALPINE AND WOOD STRAWBERRIES (*Fragaria semperferens* and *Fragaria vesca* of botanists).

5131. *In general character* the alpine and wood strawberries are very similar, the principal difference being in the shape of the fruit, which in the alpine is conical, and in the wood varieties roundish.

16. *Red Alpine*, Des Alpes à fruit rouge, Des Alpes de tous les mois à fruit rouge, Des Alpes de deux saisons à fruit rouge, Des Alpes de quatre saisons à fruit rouge, Des Alpes rouge, Corriat Alpine, Froilite Alpine; fruit the largest of this class, conical; red; flesh rich and fine-flavoured; bears abundantly (in soils and situations

which are suitable) and in succession from June till November.

17. *White Alpine*, Des Alpes à fruit blanc, Des Alpes de tous les mois à fruit blanc, Des Alpes de deux saisons à fruit blanc, Des Alpes de quatre saisons à fruit blanc, Des Alpes blanc; fruit resembling the preceding, except in being white instead of red.

18. *Red wood*, Common rouge, Des Bois à fruit rouge; fruit scarcely so large as the Red Alpine, and roundish instead of conical; and the plants do not bear so long in succession; the colour and flavour are much the same.

19. *White wood*, Common blanc, Des bois à fruit blanc; bears the same relation to the White Alpine as the Red wood does to the Red Alpine.

5132. *Order of ripening of the preceding sorts of strawberries* (with the exception of the alpine and green, which bear in succession).

1. Old scarlet	No. 1.	6. Old pine	No. 11.	11. Downston	No. 2.
2. Grove Red scarlet	2.	7. Black Raspberry	5.	12. American scarlet	6.
3. Green seedling	10.	8. Prolific, or Conical hantbols	13.	13. Stone seedling	9.
4. Raspberry	3.	9. Large flat hantbols	14.	14. Coal leaf scarlet	7.
5. Gurnetons	4.	10. Wilnot's superb	12.		

5133. *Modes of propagation.* "The plants multiply spontaneously every summer, as well by suckers from the parent stem as by the numerous runners; all of which, rooting and forming a plant at every joint, require only removal to a bed where there is room for them to flourish. Each of these separately planted, bears a fine fruit the following season, and will bear in full perfection the second summer. A plantation of the alpine yields fruit the same year that it is made. The woods and the alpine come regular from seed, and bring a finer fruit than from offsets. The other species are uniformly propagated by offsets, except the intention be to try for new varieties." Knight, in making experiments, with a view of ascertaining whether most of the sorts would not breed together indiscriminately, raised above four hundred varieties, "some very bad, but the greater part tolerably good, and a few very excellent." The fruit of above a dozen sorts was sent to the Horticultural Society in August, 1818, and found of various degrees of excellence. The seeds, if sown immediately after being gathered, will produce plants which will come into bearing the following year.

5134. *Soil and site.* Neill says, "Strawberries are generally placed in a compartment of the garden by themselves, and it should be one which is freely exposed to sun and air. They are sometimes, however, planted in single rows, as edgings to borders, and in this way they often produce great crops. In either case, care must be taken to replant them every fourth or fifth year at the farthest. The alpine and wood species may be placed in situations rather cool and shady; perhaps as an edging in the shrubbery. In such places they produce their fruit perfectly well, and late in the season, which is desirable."

5135. *General culture.* The following original and excellent instructions for cultivating the strawberry are given by Keens, of Isleworth; a most successful grower of this fruit. He says, "I will commence with a general detail of my practice: this may be considered as applicable to all the varieties of the strawberry; and afterwards, in noticing each kind that I cultivate, I will specify such peculiarities of treatment as are exclusively applicable to each."

5136. *In preparing the soil for strawberries*, "if it be new, and, as is frequently the case, very stiff, it should be trampled; but if the bottom spit of soil, as sometimes happens, be of an inferior quality, I then recommend only a simple digging placing dung at the bottom, underneath the mould so dug; on the contrary, should the land have been kept in a high state of cultivation, or be good to the full depth, it will be advisable for the bottom spit to be brought up to the top, placing the dung between the two spits. The best way to obtain new plants is, by planting out runners in a nursery, for the express purpose, in the previous season: for it is a very bad plan to supply a new plantation from old plants. With respect to the time of planting, I have always found the month of March better than any other. Sometimes, when my crops have failed, I have had runners planted in the autumn, for the following year, but these have always disappointed my expectations. I plant them in beds, containing three or four rows, and the plants, in each row, at a certain distance from each other, leaving an alley between each bed; the distance of the rows and of the plants in the rows, as well as the width of the alleys, depending on the kind of strawberry planted. The width of the alleys, as it will afterwards be stated, may appear considerable; but I am satisfied that allowing this space for the workmen to stand on, when they water the plants, or gather the fruit, is beneficial, because I have observed in other persons' grounds, where less space is allotted for this purpose, that great damage is done to the plants and fruit by the trampling of the people."

5137. *Culture.* "After the beds are planted, I always keep them as clear of weeds as possible, and on no account allow any crop to be planted between the rows. Upon the growing of the runners, I have them out when necessary: this is usually three times in each season. In the autumn I always have the rows dug

between; for I find it refreshes the plants materially; and I recommend to those persons to whom it may be convenient, to scatter in the spring, very lightly, some loose straw or long dung between the rows. It serves to keep the ground moist, enriches the strawberry, and forms a clean bed for the trusses of fruit to lie upon; and thus, by a little extra trouble and cost, a more abundant crop may be obtained. A short time before the fruit ripens, I always cut off the runners, to strengthen the root; and after the fruit is gathered, I have what fresh runners have been made taken off with a reaping-hook, together with the outside leaves around the main plant, after which I rake the beds, then hoe them, and rake them again. In the autumn, unless the plants appear very strong, I have some dung dug in between the rows, but if they are very luxuriant the dung is not required; for in some rich soils it would cause the plants to turn nearly all to leaf. I also have to remark, that the dung used for manure should not be too far spent; fresh dung from the stable door is preferable to spit dung, which many persons are so fond of. The duration of the bed must be determined by the produce of the plants, which varies much according to the different sorts; it also varies with the same sort in different soils, so that the precise time of the renewal of the beds must be regulated by the observation of the gardener, in each particular case."

5128. *Sorts grown by Keene.* The *pinces* Keene grows in a light loam, "though no other kind of strawberry will bear a strong loam better than this. It is likewise to be noticed, that this is of all others the most difficult strawberry from which to procure a good crop. Particular care must be taken that they are planted in open ground: for in small gardens they grow very strong, but seldom bear fruit, in consequence of being so much shaded by standard trees; and I have observed the shade of the walnut tree to be much more injurious to these than to others: for under it they seldom bear at all, but run entirely to leaf. In planting the beds of pines, I keep the rows two feet apart, and put the plants eighteen inches from each other in the row, leaving alleys three feet wide between each bed: these large distances I find necessary, for the trusses of fruit in my garden-ground are frequently a foot long. The duration of this strawberry, with me, is three years: the first year it bears the best, the second year the crop is very good, and the third year it is less."

5129. *The scarlets* must be treated also like the pines. "With respect to distance for planting the beds of scarlets, I put each row twenty-one inches apart, and each plant eighteen inches distant in the row, and make the alleys two feet six inches wide. The duration of this strawberry with me seldom exceeds three years."

5140. *The haultbouts* "I have always found to thrive best in a light soil: and it must be well supplied with dung, for excess of manure does not drive it into leaf like the pine-strawberry. In planting the beds, each row must be two feet apart, and from plant to plant, in the rows, must be eighteen inches, leaving the alleys between the beds three feet wide. There are many different sorts of haultbouts: one has the male and female organs in the same blossom, and bears very freely; but that which I most approve, is the one which contains the male organs in one blossom, and the female in another: this bears fruit of the finest colour, and of far superior flavour. In selecting these plants, care must be taken that there are not too many of the male plants among them; for as these bear no fruit, they are apt to make more runners than the females. I consider one male to ten females the proper proportion for an abundant crop. I learned the necessity of mixing the male plants with the others, by experience, in 1809; I had, before that period, selected female plants only for my beds, and was entirely disappointed in my hopes of a crop. In that year suspecting my error, I obtained some male blossoms, which I placed in a bottle on the bed of female haultbouts. In a few days, I perceived the fruit near the bottle to swell; on this observation, I procured more male blossoms, and in like manner placed them in bottles, in different parts of the beds, removing the bottles to fresh places every morning, and by this means obtained a moderate crop where I had gathered no fruit the preceding year. The duration of the haultbouts, with me, seldom exceeds three years."

5141. *The alpine strawberry* must always be raised from seed, which should be sown in a bed of rich earth, in the spring. "When the plants are of a proper size, which will be in July or August, I plant them in rows at the back of hedges or walls, in a rich, or in a very moist soil: the rows should be two feet apart, and the distance from plant to plant, in the rows, twelve inches. My alpine, this year, thus managed, are bearing most abundantly, so much so, that in gathering them there is not room for the women to set their feet, without destroying many. The alpine differ from all other strawberries in quickness of bearing; for no other seed, sown in the spring of the year, will produce fruit under two years, whereas this yields a crop at the end of one year. Its duration, with me, seldom exceeds two years, and frequently it lasts only one year." (*Hort. Trans.*, vol. II.) Williams considers that the fruit of plants raised from seed, comes in very well as a late autumn crop, but is certainly inferior in flavour to that produced from transplanted runners. (*Hort. Trans.*, vol. I. p. 247.)

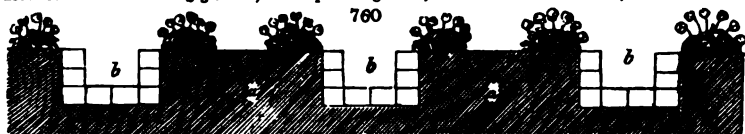
5142. *The wood strawberry* is best raised from seed, "which I obtain from fruit just gathered, sowing it immediately in a bed of rich earth. When the plants are of a proper size, I transplant them into other beds, where I let them continue till the March following. They are then planted in rather a moist soil, in beds, as the others, each row being two feet apart, and the plants in each row eighteen inches distant, the alley between each bed being three feet wide: in this way I produce abundant crops of very fine fruit. I have propagated this strawberry from runners, but never with such good success as from seeds, particularly if the runners were taken from old roots. The duration of this strawberry, with me, seldom exceeds two years."

5143. *The Rev. T. Gornier*, a successful cultivator of strawberries, never suffers any of the varieties to remain in the ground more than one year. "Early in August, or as soon as the gatherings are over, I destroy all my beds, and proceed immediately to trench, form, and manure them in the manner before directed, to receive the plants for the crop of the ensuing year, taking care to select for that purpose the strongest and best-rooted runners from the old rejected plants. If at this season the weather should be particularly hot, and the surface of the ground much parched, I defer the operation of preparing my beds and planting them till the ground is moistened by rain. Such is the simple mode of treatment which I have adopted for three successive years, and I have invariably obtained upon the same spot, a great produce of beautiful fruit, superior to that of every other garden in the neighbourhood. Depth of soil I have found absolutely necessary for the growth and production of fine strawberries, and when this is not to be obtained, it is in my opinion, to plant many of the best varieties. It is not generally known, but I have ascertained the fact, that most strawberries generate roots, and strike them into the ground, nearly two feet deep in the course of one season. The pine and roseberry succeed better than any other in stiff and shallow soils, but they should always be planted in an open situation, and not, as is too commonly the practice, in shady and neglected parts of the garden." (*Hort. Trans.*, vol. IV. p. 480.) The practice of renewing strawberry plantations every year, and even of using runners of the current year for forcing, is now become very general among gardeners. Mr. Knight generally adopts this mode, and, notwithstanding the increased labour attending it, it is even adopted by some market-gardeners about London for their earliest crops. It is invariably found that by this mode the fruit not only comes larger, but somewhat earlier. It must always be recollected, however, by those who intend practicing it, that almost the whole of the success depends on bringing forward the earliest runners, by encouraging them to root. This is done by stirring the soil beneath them, hooking them down, or retaining them in their proper places by small stones; or, when the object is to procure plants for forcing, rooting them into small pots.

5144. *Young* justly blames gardeners for cutting over the leaves of strawberries after they have borne a crop, thereby preventing proper buds being formed for next year, and also depriving the roots of the plants of their natural protection from the frost. He is also adverse to the practice of digging between the rows in winter, which, he says, cuts off the fibrous roots, and prevents the plants from setting out in spring with that vigour which they otherwise would do. Instead of supplying manure in this way, he recommends the appropriation of liquid manure; or, what is better, never letting a crop remain above three years on

the same piece of ground. (*Caled. Hort. Soc. Mem.*, vol. iii. p. 291.) Middleton is of the same opinion with Mr. Young. (*Gard. Mag.*, vol. vii. p. 468.)

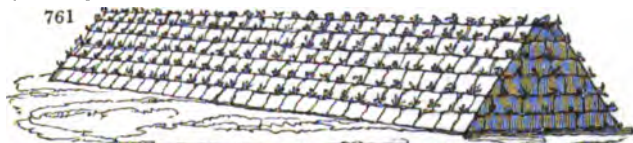
5145. *Brick-beds for strawberries.* These were observed in a small garden near Chatham, and are thus described:—"The beds (*fig. 760. a*) were upon flat ground, each about three feet wide, and between them



were trenches about nine inches wide, and four-inch walls of brick on each side of the trenches (*b*), to keep up the earth on the sides of the beds. These trenches were about the depth of two or three courses of bricks laid flat, without mortar, and were intended for the purpose of holding water, which was supplied from a pump whenever the ground was dry, while the plants were in fruit. By this method, a much greater crop of fruit was obtained, and the plants continued bearing much longer than in beds where there were no trenches for water. In Devonshire, strawberry-beds are constructed against the side of a hill or bank, by building up beds in steps, with rough granite at the front, to keep up the earth, each step being about two feet high and three feet wide. These steps were filled with good loam, and the surface of each was covered with rough pieces of granite bedded into the loam, leaving openings between the stones, just sufficient to put in the plants. The surface being covered with granite, kept the ground longer in a moist state, and the fruit always clean. "I should expect," observes the writer, "that chippings of stone, such as may be had from the masons in London, might answer the same purpose. I have found a great advantage in keeping the fruit clean, by laying a row of common bricks on each side of the rows of strawberry-plants; I tried plain tiles, but found bricks answer better, as the tiles are apt to be broken in gathering the fruit, and will not do to use a second time." (*Atkinson in Hort. Trans.*, vol. v. p. 191.)

5146. *At East Loce, in Cornwall,* the runners are allowed to cover the beds with plants as thick as they can stand. In autumn the beds are covered with earth from the alleys or elsewhere, to the depth of two or three inches. In the following spring, the runners shoot through the covering with vigour, producing very strong foliage, and in due season abundance of large and finely flavoured fruit. The soil is light. The first year of this plan is less productive than the succeeding ones. The woods and alpine do not succeed under such treatment. (*Gard. Mag.*, vol. iii. p. 173.) The same practice is followed at Donnington. (*Ibid.*, vol. vi. p. 710.)

5147. *Egers* grows his strawberries from one-year-old plants, placed six inches apart, on what he calls a strawberry wall. (*Ag.* 761.) This wall is three feet six inches wide at the base, and of such a height, that



the sides and ends form an angle of 45° . The outer surface of the wall is formed of small coarse stones, or bricks, and the interior is filled up with soil. Early in every August the wall is taken down and replanted. The advantages of this bed are, more produce on a given space; a succession of crop by placing the bed east and west; facility of watering, which is done in a small trench left along the top; and fruit free from sand and earth. (*Gard. Mag.*, vol. v. p. 438.)

5148. *Brown* grows his strawberries on a stage composed of a bank of earth, at an angle of 45° ; the earth supported by nine inches of brickwork in front, and three feet behind. The space between is divided into steps or beds, each four inches above the other, supported by one brick on edge, and along each step a row of plants is placed, which are renewed every year. So treated, the fruit ripens twelve or fourteen days earlier than that on the common surface of the garden. (*Gard. Mag.*, vol. ix. p. 677.)

5149. *Fairbairn* lays down flat tiles painted black round his plants, just as they are going out of flower. The tiles are semicircular, with small circles about three inches in diameter cut out of them, in order that they may fit closely to the plants. The object is, to retain moisture in the soil, and keep the fruit clean. These tiles are made by Peake and Co., Tunstall, Staffordshire, and Flookes, of Wilton near Salisbury. (*Gard. Mag.*, vol. viii. p. 425.)

5150. *Taking the crop.* The fruit ripens from June to August and September; but the main crop is usually over in July. Gather when the weather is dry, and the same day that the fruit is to be sent to table, otherwise it will soon lose its flavour. Pinch off the calyx and a quarter of an inch of the peduncle along with the berry.

5151. *To have a regular succession of strawberries throughout the autumnal months.* This is commonly done by means of the wood and alpine species, and their varieties. Garnier thinks it may be accomplished by late planting; for example, of Wilmot's late scarlet, or the common scarlet about May. He has planted runners of the roseberry on the 1st of July, and gathered fruit on the 7th of September. (*Hort. Trans.*, vol. iv. p. 483.) Williams cultivates the alpine for this purpose. "Early in the month of May, when they are in flower, he cuts away all the blossoms, preserving the leaves uninjured; this is again repeated at the end of the month. Towards the middle or end of June more blossoms appear, and the plants afford flowers and fruit all the latter part of the summer, and till cut off by the autumnal frosts. If the first blossoms were not removed, the principal crop of alpine would be ripe at the time the larger strawberries are in season, and consequently of little worth; but by this mode of culture, they come into bearing in the latter part of the summer, just at the time the other kinds are over." (*Hort. Trans.*, vol. v. p. 247.)

5152. *Insects and vermin.* The strawberry is sometimes attacked by aphides, which may be washed off by strong lime-water thrown forcibly on the leaves by a syringe; or tobacco water may be used. The chief enemies of the strawberry, however, are the slugs and snails, which ought always to be effectually destroyed by watering with lime water before the plants come into flower. When the slug is not destroyed till the plants are in fruit, the crop may be considered as unfit for use, the labour of the year lost, and the soil occupied to no good purpose. Grubs of different kinds sometimes attack the roots of strawberries, in which case the simplest mode is to destroy the plantation, and to form a new one.

5153. *For forcing the strawberry,* see § 3751. to § 3764.

SECT. IV. Nuts.

5154. Among nuts the most useful in this country is the walnut, both for the dessert and pickling; the filbert is also a very useful fruit; chestnuts are wholesome and nutritive, and form, in Spain and Italy, an important article of human food.

Synonym. 1. *Walnut*. — *Juglans regia* L. (*Lam. ill.* 781.); *Monec. Polyd.* L. and *Terebinthacea* J. Noyer, Fr.; *Walnussbaum*, Ger.; *Waloot*, Dutch; *Noce*, Ital.; and *Nogal*, Span.

5155. *The walnut* is a native of Persia and the south side of Caucasus; but it is supposed to have been introduced here from France, and called *gaul-out*, before 1562. The kernel, when ripe, is in esteem at the desert; and the fruit whole, in a green state, before the stone hardens, is much used for pickling. An oil which supplies the place of that of almonds, and is much used by painters, is expressed from the kernel in France and Savoy. (See *Bakewell's Tarentaise*, &c.) In Spain they strew the gratings of old and hard nuts, first peeled, into their tarts and other meats. The leaves strewed on the ground, and left there, annoy worms; or, macerated in warm water, afford a liquor which, from its bitterness, may effect their death. The unripe fruit is used in medicine for the same purpose. Pliny says "the more walnuts one eats, with the more ease will he drive worms out of his stomach." The timber is used in this country for gun-stocks, being lighter in proportion to its strength and elasticity than any other. It was formerly almost exclusively used in cabinet-work in some parts of the Continent. The young timber is held to make the finest-coloured work, but the old to be more beautifully variegated.

5156. *Varieties*. Those commonly cultivated for their fruit are —

The round early oval.
Doubtless large French.

Tender-shelled, and
Thick-shelled.

Highdry of Thetford, the best variety known. (*Hort. Trans.*, iv. 517.)

5157. *Propagation*. It has generally been propagated from the nut; and this mode is recommended by Miller and Forsyth; probably from their not having known that the tree may be continued by incision, as practised successfully by Knight. Inarching this tree was long ago recommended by Boutecher, who says, "he found the fruit in this way produced in one third of the time necessary for plants raised from the nut."

5158. *Knight*, after numerous trials, succeeded in propagating the walnut tree from budding. "The buds of trees," he observes, "of almost every species, succeed with most certainty when inserted in the shoots of the same year's growth; but the walnut tree appears to afford an exception; possibly, in some measure, because its buds contain within themselves, in the spring, all the leaves which the tree bears in the following summer; whence its annual shoots wholly cease to elongate soon after its buds unfold; all its buds of each season are also, consequently, very nearly of the same age, and long before any have acquired the proper degree of maturity for being removed, the annual branches have ceased to grow longer, or to produce new foliage. To obviate the disadvantages arising from the preceding circumstances, I adopted means of retarding the period of the vegetation of the stocks, comparatively with that of the bearing tree; and by these means I became partially successful. There are at the base of the annual shoots of the walnut and other trees, where those join the year-old wood, many minute buds, which are almost concealed in the bark, and which rarely or never vegetate, but in the event of the destruction of the large prominent buds which occupy the middle and opposite ends of the annual wood. By inserting in each stock one of these minute buds, and one of the large and prominent kind, I had the pleasure to find that the minute buds took freely, whilst the large all failed without a single exception. This experiment was repeated in the summer of 1815, upon two yearling stocks which grew in pots, and had been placed, during the spring and early part of the summer, in a shady situation under a north wall; whence they were removed late in July to a forcing-house, and instantly budded. These being suffered to remain in the house during the following summer, produced from the small buds shoots nearly three feet long, terminating in large and perfect female blossoms, which necessarily proved abortive, as no male blossoms were procurable at the early period in which the female blossoms appeared: but the early formation of such blossoms sufficiently proves that the habits of a bearing branch of the walnut tree may be transferred to a young tree by budding, as well as by grafting by approach. The most eligible situation for the insertion of buds of this species of tree (and probably of others of similar habits) is near the summit of the wood of the preceding year, and, of course, very near the base of the annual shoot; and if buds of the small kind above mentioned be skillfully inserted in such parts of branches of rapid growth, they will be found to succeed with nearly as much certainty as those of other fruit-trees, provided such buds be in a more mature state than those of the stocks into which they are inserted."

5159. *Cerville* (*Hort. Trans.*, vol. II.) mentions the case of a walnut tree raised from the nut in the usual way, on a light soil or sandy subsoil, and in a warm sheltered situation, which produced fruit in six years; but the usual period is eighteen or twenty.

5160. *Abercrombie* says, the walnut tree is propagated, in general, by sowing well-ripened nuts of the finest varieties: but as seedlings are apt to vary, new plants are occasionally raised by layers and inarching, to continue particular sorts. The nuts may be sown in autumn or spring, in drills, nine to twelve inches apart, and two or three inches deep; place the nuts two inches asunder, and, having earthed them in, smooth the surface. They will come up in the spring. When of one year's growth, set out the plants in nursery rows, a foot asunder by six inches in the rows, to remain two years, then to be transplanted (doubling the distance) into other nursery lines. Train each with a single stem of six or seven feet high: then to be permitted to branch out above, and form a spreading head. Layers may be made, in autumn or spring, of young shoots produced near the ground from proper stools formed for that purpose: they will be rooted in one season, to plant off in nursery rows for training as above. Inarching may be performed in February or March upon seedling walnut stocks, having proper stems.

5161. *Soil and site*. The walnut tree will succeed in any common fertile soil, a light or a clayey loam, so that the subsoil be dry, and the site a little sheltered; but it thrives best where there is a good depth of loam, mixed with sand or gravel rather than clay. As this tree is long before it bears fruit, there is a particular inducement for procuring plants from the nursery, either inarched, budded, or in as advanced a stage as it will be safe to remove them. This may be when they are from eight to twelve years old, according as they may have been prepared by repeated transplantations. Walnut trees may be planted in orchards or small paddocks, in a row towards the boundaries; or in parallel double rows in a quincunx order, in extensive grounds, but detached from fruit trees of more contracted growth. The line of walnut trees, when fully grown, will serve as a screen to the fruit trees occupying the interior ground. The plants should stand at twenty-five, and the trees at fifty feet distance.

5162. *Manner of bearing*. On the extremities of the preceding year's shoots.

5163. *Pruning*. Walnut trees when finally planted may be permitted to branch out in their natural order, with the exception of a little occasional pruning, to regulate any casual disorderly growth, to reduce over-extending branches, and to take off the low stragglers.

5164. *Ringing to induce bearing*, is practised by the Baron de Tschoudi, near Metz, in Lorraine. A zone of bark two inches broad is taken out, and the part plastered over with cow-dung and loam; the consequence is, that the trees prove more prolific, and the fruit ripens sooner.

5165. *Taking the crop.* Walnuts should be taken for pickling while the internal parts remain tender and fleshy, which may be ascertained by probing them with a pin or needle. The nuts are ripe in September and October, and should then be gathered so as not to injure the tree, and housed in the proper manner for winter use.

SUBJECT. 2. Chestnut — *Castanea vesca* W., *Fagus Castanea* L. (*Eng. Bot.* 886.); *Monac. Polyg.* L., and *Amentifera* J. *Châtaine*, Fr.; *Castanienbaum*, Ger.; *Karstengeboom*, Dutch; *Castagno*, Ital.; and *Castano*, Span.

5166. The chestnut is supposed to have been originally brought from Sardis to Italy by Tiberius Cæsar. It is so common there, and in France as to be considered a native; and some consider the tree as naturalised in England, though it is not likely to propagate itself in this country. Some of the oldest trees in the world are of this species; as that mentioned by Brydson on Etna, and the great tree at Tortworth in Gloucestershire.

5167. *Use.* The fruit is a desirable nut for autumn and winter, and is eaten roasted, with salt, and sometimes raw. Abroad, it is not only boiled and roasted, but puddings, cakes, and bread are made of it. "Chestnuts stewed with cream," according to Phillips (*Promiscue* 224., 95.), "make a much admired dish, and many families prefer them to all other stuffings for turkeys." He says, "I have had them stewed and brought to table with salt fish, when they have been much admired." The timber was formerly in very general use in house-carpentry, though some, with every appearance of reason, consider what is generally called old chestnut as old oak. The test is, cutting the wood with a wetted chisel; when, if it is oak, a stain will be produced, which will not be the case if it be chestnut.

5168. *Varieties.* In Devonshire there are some varieties which ripen their fruit a few days earlier than others, but scarcely any of these have been fixed on, and perpetuated by the nurserymen, so as to be rendered available by purchasers. There are numerous varieties in cultivation in the north of Italy and the south of France. Chabrol de Voivie says (*Gard. Mag.*, vol. 1. p. 523.), "there are between fifty and sixty varieties cultivated in the neighbourhood of Savona. In this country there are no varieties of any note; a number of sorts which have been planted in the Horticultural Society's garden not having yet produced fruit."

5169. *Propagation.* Miller and most gardeners recommend propagation from nuts; but, for fruit, the Devonshire practice of grafting is decidedly preferable. Sir Joseph Banks says, "the nurserymen there deal in grafted chestnut-trees;" and we may add, that they are now to be had in the London nurseries. (*Hort. Trans.*, vol. 1. p. 63.) Knight says, "The Spanish chestnut succeeds readily when grafted in almost any of the usual ways; when the grafts are taken from bearing branches, the young trees afford blossoms in the succeeding year, and I am much inclined to think, from experiments I have made on this tree, that by selecting those varieties which ripen their fruit early in the autumn, and by propagating with grafts or buds from young and vigorous trees of that kind, which have just attained the age necessary to enable them to bear fruit, it might be cultivated with much advantage in this country, both for its fruit and timber." (*Hort. Trans.*, vol. 1. p. 63.)

5170. *Soil and site.* The tree prefers a sandy loam with a dry bottom; but will grow in any soil on a dry subsoil. Distribute the plants towards the northern boundary of orchards; and in larger groups, over any vacant tracts in extensive grounds or parks, to form spacious avenues, or a row along any out-boulevard. A great number should not be placed close to a residence, as the smell of the flowers is offensive. Plant them at not less than thirty feet, and thence to fifty feet distance.

5171. *Subsequent culture.* "Permit the trees to branch out freely above, and to form large regular heads. Give occasional pruning only to very irregular and cross branches, and low stragglers. After they have attained some tolerably branchy growth, they will come into bearing; and when they have expanded into large full heads, they may be expected to yield considerable quantities of nuts."

5172. *Taking the crop.* "The nuts ripen from the end of September to the end of October. When the outer capsule containing the nuts begins to divide, and the nuts appear of a brown colour, their full maturity is indicated. They may be gathered by hand, or beaten down by long poles. Selecting the finest and best-ripened, clear them from the husks; let them be well dried, and deposited in the fruit room, upon shelves, &c.; and some packed in layers of very dry fine sand for longer keeping." (*Abercrombie*.)

SUBJECT. 3. Filbert. — *Corylus Avellana* L. (*Eng. Bot.* 723.); *Monac. Polyg.* L. and *Amentifera* J. *Noisette*, Fr.; *Nussbaum*, Ger.; *Hazelnoot*, Dutch; *Avellano*, Ital. and Span.

5173. The common hazel-nut, or the filbert in its wild state, is a large-sized shrub, with an ash-coloured bark, and alternate roundish cordate leaves. The male catkins appear on the preceding year's shoots in autumn, and wait for the expansion of the female buds in the spring. It is a native of Britain, very common in most woods, and extensively cultivated about Maidstone, in Kent.

5174. *Use.* As a table nut it is in universal esteem; and the wood and twigs of the wild plants are used for sticking pens, staking green-house plants and raspberries, forming pegs and number-sticks, and many other similar purposes in gardening.

5175. *Varieties.* The best are —

1. *Bead and*: rather large, ovate, oblong; shell thin.
2. *Cob nut*: middle-sized, short, ovate, or roundish, with a thick hard shell, but well filled by the kernel; trees of upright growth.
3. *Orval cob nut*: large size; shell thick.
4. *Ceywood* and (*Pres. Mag.*, t. 55.): an excellent variety, oblong; shell remarkably thin, and striated longitudinally.
5. *Privet filbert* (*Pres. Mag.*, t. 76.): easily distinguished by its much lacinated husk, on which account it might also be introduced as an ornamental shrub; nuts rather small, but early and abundant.

5176. *Estimate of sorts.* The red and the white filberts ought to be in every collection, as also the Cotford. The cob nut is also desirable, because it fills and keeps well, and perhaps it may be also found eligible for certain situations, on account of its branches growing more upright than those of the other varieties. For large-sized fruit, the great cob-nut, the Downton large square nut, and the Spanish nut, may be selected.

6. *Red filbert* (*Long. Puss.*, t. 57. 1.): Red head, *Langhertum*, *Blossum*, *Rotho Lambertum*, *Avellana*, *Rothe*, *Corylus tabulae* Willd., very distinct, from the peltate of the kernel being of a crimson-red colour.

7. *White filbert* (*Long. Puss.*, t. 57. 1.): very like the preceding in appearance and flavour, but differing in the peltate of the kernel being pale instead of red; both have a long tubular husk, contracting so much beyond the apex of the fruit as to prevent its falling out; consequently, these sorts are best adapted for pro-

serving long in the husk; they are middle-sized, ovate, or ovate-oblong, and of excellent flavour. Nuts, as mentioned in the *Rev. Soc. Cat. of Fruits*, 2d ed. p. 55., were formerly divided into *short-bearded*, and *long or full-bearded*; from the latter filbert appears to have been derived. Similar terms are used by the Germans, the two sorts just mentioned being called by them *Die langbeharteten*, and *Die volle langbeharteten*.

8. *Devonian large square nut*: large, short, and obviously four-sided.
9. *Northampton*: oblong, very good.
10. *Spanish*: a very large oblong nut.

5177. *Soil and site.* Abercrombie says, "A cool, dry, poorish soil is to be chosen for filbert and nut trees in general; for example, a sandy loam, mixed with minute shattery stones or grit, and with a small portion of vegetable or animal remains; for the plants fruit best when but moderately strong. About Maidstone, according to the Rev. W. Williamson, they prefer a heavy loam of some depth, on a dry sub-soil, which should be dressed every year, as the filbert requires a considerable quantity of manure. Filbert trees are generally planted in the orchard, or in the slips which surround the kitchen-garden."

5178. *Propagation.* "All the sorts can be propagated by grafting, by layers, by suckers, and by sowing the nuts. The most advisable methods, because they are certain to keep the respective variety permanent, are, either by grafting them in February or March upon seedling or sucker stocks of the filbert or hazel; or by layers of the young wood in the spring. Sow the nuts in October or November, or in the spring, in a bed of light earth, covering them about two inches. The greater part will germinate in spring, and when the plants are one or two years old plant them out in nursery lines in autumn or spring. Train a principal supply in standards, half-standards, and dwarf standards, each with a single clean stem, from six feet high down to twelve inches." (Abercrombie.) About Maidstone, according to Williamson, filberts are almost universally propagated by suckers. (*Hort. Trans.*, vol. iv. p. 152.)

5179. *Mode of bearing.* All the species bear principally upon the sides and ends of the upper young branches; and from small shoots, which proceed from the bases of side branches cut off the preceding year.

5180. *Final planting.* "The season for planting all the sorts is autumn or spring, or any interval in mild weather from October till the beginning of March. Allot detached standards, not less than ten, and thence to twenty feet distance, to have room to branch out in full heads. In the filbert grounds about Maidstone it is usual to plant hops, standard apples, and cherries among the filberts. When the filberts come into a bearing state the hops are destroyed, and the fruit trees only suffered to remain. The ground is then planted with gooseberries, currants, &c. and herbaceous vegetables." (*Hort. Trans.*, vol. iv. p. 153.)

5181. *Pruning.* "In the filbert-orchards about Maidstone in Kent, it is a prevailing practice to train the trees with short stems, like a gooseberry-bush, but with the heads in the shape of a punch-bowl, and exceeding thin of wood, and to prune them with exact attention to the mode of bearing. Williamson advises to plant the trees where they are to remain; to suffer them to grow without restraint for three or four years; and then to cut them down within a few inches of the ground. They will push five or six strong shoots, which, the second year after cutting down, are to be shortened one third. Then place a small hoop within the branches, and fasten the shoots to it at equal distances. In the third year, a shoot will spring from each bud; these must be suffered to grow till the following autumn, or spring of the fourth year, when they are to be cut off nearly close to the original stem, and the leading shoot of the last year shortened two thirds. In the fifth year, several small shoots will arise from the bases of the side branches which were cut off the preceding year; from these the fruit is to be expected, and the future object of the pruner must be directed to produce an annual supply of these by cutting out all that have borne fruit. The leading shoot is every year to be shortened two thirds or more, and the whole height of the branches must not be suffered to exceed six feet. Every shoot that is left to produce fruit should also be tipped, which prevents the tree from being exhausted making wood at the expense of the branch. Observe, in pruning early in spring, to have a due supply of male blossoms, and to eradicate all suckers." Such is the Maidstone practice, which "has been long celebrated;" by which 30 cwt. of nuts per acre have been grown on particular grounds, in particular years; but 20 cwt. is considered a large crop, and rather more than half that quantity the usual one, with a total failure three years out of five, so that the average produce is not more than 5 cwt. per acre. Williamson thinks the failure, happening so often, may be owing to the excessive productiveness of the successful years, owing to the mode of pruning, by which "the whole nourishment of the tree is expended in the production of fruit." He recommends leaving the trees rather more in a state of nature, and, from experiments in his own garden, thinks a regular crop in succession will thereby be obtained. (*Hort. Trans.*, vol. iv. p. 154.)

5182. *The Rev. G. Swayne*, having had a plantation of filberts, which for the 20 years of their existence had produced very little fruit, began to suspect a want of male blossoms. He therefore selected a number of catkins from the common hazel, and suspended them over the scarlet blossom of his filberts; and the result was, that the first year he had more fruit than he had during the 20 preceding years. To prove that it was owing to the farina of the male blossoms, he tried some with and some without this assistance, and found the fruit produced as the male blossoms applied. He taught this mode to a neighbouring farmer's wife who had a row of barren trees, and she was "much delighted" with the plan; put it in execution the next day, and the same season sent her instructor 6 lbs. of very fine filberts from four old stunted trees that had not borne one for many years. (*Hort. Trans.*, vol. v. p. 216.)

5183. *Insects.* Several insects feed upon the leaves of filberts, but without doing them much injury. Great quantities of the nuts are, however, destroyed by the maggot or larva of the nut-weevil (*Balanus nuceum* G., fig. 693. *c* in p. 694.). The egg is inserted in the fruit through a hole, made by the long snout of the female; it is there hatched, and the larva feeds upon the kernel, which continues notwithstanding to ripen, and the nut falls from the tree at the same time as those not infected. The only remedy against this injury is to examine the nuts after they have been gathered, and carefully to remove all those that have been perforated. The perfect insect makes its appearance early in the month of August, and may then be shaken from the hazel trees.

5184. *Taking the crop.* "The maturity of the fruit is indicated by the cup turning brown, and by the nuts, which have also become brown, readily quitting the husk. House a quantity for keeping; gather them in bunches as they grow. If a portion, after being properly dried, be laid in boxes, and covered with dry sand to exclude the air, it will tend to preserve the kernels from shrinking; and they will thus keep well for a month or two." Braddick kept nuts two years by closing them up air-tight in emptied butter-drums, and placing these in a cool cellar.

SECT. V. Native, or neglected Fruits, deserving Cultivation.

5185. Though some of our native fruits recommend themselves by their already known utility, as the cranberry; yet others, as the sorb, haw, &c., are only mentioned with a view of directing scientific horticulturists, of leisure and means, to try what can be done in improving them. We shall enumerate them in the order of stone-fruits and berries.

5186. *The sloe* is the *Prunus spinosa* L. (*Eng. Bot.* 842.; *Icon. Monog. L.* and *Rosaceæ* J. Ripe, it makes an excellent preserve; unripe, the inspissated juice forms the German *acacia*, and affords an almost indelible ink used to mark linens. It is used in home-made wines, to communicate the colour and roughness of red port; and the leaves are employed to adulterate the teas of China. Knight and others consider the sloe as the parent of the bullace (*P. insititia*), and all the varieties of the common plum (*P. domestica*). As a shrubby plant the sloe is most ornamental, blossoming before all others of the *prunus* tribe.

5187. *The bird-cherry* is the *Prunus Pádus* L., *Céraneus Pádus* Dec. (*Eng. Bot.* 1383.) The fruit is nauseous to most palates; but infused in gin or whiskey it greatly improves these spirits, and is only surpassed by an infusion of peach-leaves. A few trees, therefore, are desirable, especially in Scotland and Ireland. In shrubberies, its long upright spikes of white flowers, which appear early in the season, are most ornamental.

5188. *The mountain-ash* is the *Pyrus aucuparia* E. B., *Sorbus aucuparia* L. (*Eng. Bot.* 137.) *Isodon. Di-Pent. L.* and *Rosaceæ* J. The berries are eaten in some parts of Scotland and Wales, and afford an

agreeable fermented liquor, and, by distillation, a strong spirit. Grafted on the service-tree, as is frequently done in France, the fruit is said to become larger and more abundant. (Neill, in Hort. Trans. 364.)

5189. *The wild service* (*Pyrus torminalis* W., Eng. Bot. 1290; *Pentst. Monog. L. and Cacti J.*) affords a fruit somewhat smaller and more acid than the common red currant; but by crossing and cultivation might perhaps be greatly improved; and, from its comparatively tree-like habits, might be a more convenient fruit-shrub in respect to crops below or around it.

5191. *The common bramble*, *Rubus fruticosus* L. (Eng. Bot. 715); *Icos. Polyg. L.* and *Roadside J.* The fruit is powerfully acid and astringent, forms agreeable pies and tarts, medicinal gargles, and may also be used raw. There are several species and varieties, all to be found in our hedges and woods; and most of which have been collected together, and planted in the garden of the Horticultural Society.

5192. *The cloudberry* (*Rubus Chamamædrus* L., Eng. Bot. 716.) (Ag. 764.) In some parts of the Highlands

of Scotland, the fruit is also called roebuck-berries or knot-berries, and they are perhaps the most grateful and useful kind of fruit gathered by the Scotch Highlanders. On the sides and near the bases of the mountains it may be collected for several months in succession. It is not cultivated without difficulty, and it seldom yields its fruit in a garden. By raising from seed, and again from the seeds of plants so raised, and so on for six or eight generations, perhaps at the same time crossing the flowers with those of the bramble or raspberry, this plant might possibly become a valuable accession to the kitchen-garden. Its berries are ripe in September. (See a curious paper

in *Caled. Hort. Mem.*, vol. i. p. 383.) In Lapland and Sweden the fruit is much prized, and used for a great variety of purposes. Dr. Clarke found it medicinal. (*Scandinavia*, chap. xv.)

5193. *The dwarf crimson bramble* (*Rubus arcticus*, Eng. Bot. 1868.) (Ag. 765.) produces an excellent berry, found only on the highest and wildest mountains of Scotland. By successional sowing of the seeds on different levels, doubtless it might be brought down, step by step, to live and produce fruit on plains, and in appropriate parts of gardens. "The *Rubus arcticus* produced fruit in the garden of the Horticultural Society almost as abundantly as a bed of strawberries. It was planted in peat, and its crimson blossoms were very ornamental." (*R. T.*)

5194. *The dewberry* (*Rubus caesius*, Eng. Bot. 896.) (Ag. 766.), the *stone bramble* (*Rubus saxatilis*, Eng. Bot. 2333.) (Ag. 767. a), and the *upright bramble* (*Rubus suberectus*, Eng. Bot. 2572.) (Ag. 767. b), afford agreeable acid and aromatic fruits, which come in late in the season, and merit attempts with a view to accommodating them to habits of cultivation. The same remarks will apply to a plant common in the woods of Russia and Poland, and which Dr. Clarke has figured, and named *Crispis*; but which appears to be a species of *Rubus*, and probably a variety of *R. suberectus*.

5195. *The snowberry* is the *Gaultheria procumbens* P. S., *Vaccinium hispidulum* L., and *Chigones* of Salisbury (*Mich. Am. L. 23*); *Decan. Monog. L.* and *Ericace J.* At Shaw-hill, near Halifax, it produced fruit abundantly, planted under a north wall, shaded behind by high trees, in a border of sandy peat; and it succeeded pretty well in nearly a similar situation at Chapel Allerton, during the eighteen years of my residence at that place, often ripening its berries; but they being little esteemed, I only preserved a patch of it as a rare plant. The flavour of the fruit, however, is exceedingly agreeable to some persons, being strongly perfumed, like *can de noyau*, or bitter almonds, and mixed with a pleasant acid. I now regret that I never tried the berries baked with sugar in a tart: if gathered before they are too soft, they may, no doubt, be preserved in bottles, like cranberries, and possibly prove a valuable addition to our winter fruits of that sort. (*Salisbury*, in *Hort. Trans.*, vol. ii.)

5196. *The purple or common bilberry, blackberry, or whortleberry* (*Vaccinium Myrtillus* L., Eng. Bot. 466.), is another bog-plant common in Britain and the north of Europe. The berries are gathered in



autumn for making tarts; in Devonshire they are eaten with clotted cream; in Poland they are ripe in July, and being mixed with wood-strawberries, and eaten with new milk, are considered a great delicacy. In the Highlands of Scotland they are eaten with milk, and made into jellies. They may be successfully cultivated in a shady border of bog-earth.

6197. *The red bilberry, or crowberry, Vaccinium Vitis idæa* L. (*Eng. Bot.* 598.) The fruit is acid and somewhat bitter, but makes a very good rob or jelly, which in Sweden is eaten with all kinds of roast meat, and forms a sauce for venison, which is thought superior to currant jelly. In Wales we have experienced it to be an excellent addition to roast mutton. It may be cultivated in a moist shady border of bog-earth, like the common bilberry.

6198. *The broad-leaved whortleberry (Vaccinium amœnum* L., *Bot. Rep.* 128.) is cultivated at Englien, in the Duc d'Arenberg's garden, and the fruit used in the same way as the cranberry. (*Neill, in Hort. Tour.* p. 522.)

CHAP. X.

Horticultural Catalogue. — Tropical and other Exotic Fruits.

5199. *Among exotic fruits* we comprehend such fruits as require the aid of artificial heat to bring them to perfection, and among these we have included the vine and the fig: for, though these fruits ripen in the open air in very favourable situations and warm seasons in England, yet it is allowed on all hands that, in by far the greater number of situations and seasons, even in this favoured portion of the island, grapes and figs grown in the open air do not attain any thing like their proper size and flavour. Exotic fruits may be arranged as follows:—

5200. *Those in general cultivation*; as the pine, vine, fig, melon, and cucumber.

5201. *Those well known, but neglected, as such*; as the orange, pomegranate, olive, Indian fig, torch-thistle, and strawberry-pear.

5202. *Those little known, some of which seem to merit cultivation*; as the akee tree, alligator pear, anchovy-pear, durion, guava, granadilla, jamrosade, Malay apple, leeches, loquat, mango, mangosteen, pishamin, and various others.

SECT. I. *Tropical and Exotic Fruits in general Cultivation.*

5203. *The tropical and exotic fruits in general cultivation* include the first three fruits in the world; the pine, pre-eminent for its flavour; the vine, for its generous and enlivening juice; and the melon, approaching in flavour to the pine. All circumstances considered, it is doubtful if the durion, mangosteen, and other Indian fruits, equal these; certainly no fruit hitherto discovered in any region surpasses the pine-apple.

SUBSECT. 1. *Pine-apple.*—*Bromelia Ananás* L., *Ananás* Lindl. (*Bot. Mag.* 1554.); *Hexán. Monog.* L. and *Bromeliaceæ* J. *Ananas*, Fr., Ger., and Ital.; *Pijn appel*, Dutch; and *Pina*, Span.

5204. *The pine-apple* is supposed to have derived its name from the resemblance of the fruit in shape to the cone of some species of pine tree. In richness of flavour this fruit stands unrivalled; and, as Neill observes, "it is one of the greatest triumphs of the gardener's art, to be able to boast that it can be produced in Britain in as high perfection as in a tropical climate." South America is generally considered the native place of the pine, though it is indigenous in uncultivated places in Africa, in great abundance. Linnaeus ascribes it to New Spain and Surinam; and Acosta says, that it was first sent from the province of Santa Croce, in Brazil, into the West, and afterwards into the East Indies. Professor Martyn thinks it may be common to the tropical parts of the three continents. The pine-plant has been long cultivated in Jamaica and other West India

islands with great success, and was introduced to the gardens of Europe by Le Cour, of Leyden, about the middle of the seventeenth century. This gentleman, Miller informs us, received his first plants from America, and, "after a great many trials, with little or no success, did at length hit upon a proper degree of heat and management, so as to produce fruit equally good (though not so large) as that which is produced in the West Indies." From Le Cour "our gardens in England were first supplied with this king of fruits;" and it is "commonly said that Sir Matthew Decker, of Richmond, was its earliest cultivator;" but, as a botanical plant, it was introduced so far back as 1690, by Bentick. (*Hort. Kew.*) Miller informs us, that at first the plants were kept in dry stoves, during winter, placed on scaffolds, after the manner in which orange trees are placed in a greenhouse; and that in summer they were removed to hotbeds of tanners' bark, under frames. They soon, however, began to erect "low stoves," called succession-houses, and bark-pits under deep frames, for the suckers and crowns. We learn from Bradley, that by the year 1730 pine-stoves of the different kinds were established in all the principal English gardens; and Justice, in his *British Gardener's Directory*, published in 1744, states, that pine-apple stoves had also been erected in Scotland; and he gives the plan of one erected by him in his own garden at Crichton, near Edinburgh, in the year 1732, in which the pine was fruited for the first time in Scotland. He recommends such as intend cultivating this fruit, to get their plants and furnaces (the latter cast in one piece) of Scott, of Turnham Green, London, and their thermometers from Coles, in Fleet-street. Since that period, the spread of pine-stoves in Britain has been most rapid, and equally so the improvement in the modes of culture, and the increase in the number of varieties cultivated.

1906. Use. It is the first of dessert fruits; and is also preserved in sugar, made into marmalades and other confectioneries; and is used to flavour rum. In preparing to eat this fruit, first twist out the crown, and then cut the fruit into horizontal slices: these being served, the rind and scales of the pipe are pared off by the guest with a knife and fork. (*Speechly.*) In the West Indies, the slices are cut obliquely in the direction of the pipe.

1906. Species and varieties. There are four edible species, and nearly 50 varieties of this fruit cultivated in Britain. The whole of these have been collected together, and cultivated by the London Horticultural Society; and an excellent classification and description of them have been drawn up by the Society's head gardener, Mr. Munro, published in the Transactions of the Society, vol. I. second series. From this paper we shall select the following classification:—

I. *ANANASSA BRACTEATA.*

1. Scarlet.

II. *ANANASSA DEBILIS.*

2. Waved-leaved.

III. *ANANASSA LUCIDA.*

3. King.

4. Flaberrick striped globe.

IV. *ANANASSA SATIVA.*

a. *Leaves spinulose.*

a. Flowers purple.

b. Havanah.

6. Smooth Havanah.

b. Flowers lilac, nearly white.

Fruit globose.

7. Green Antigua.

Fruit pyramidal.

8. Striped smooth-lv'd sugar-loaf.

** *Leaves with minute spines (about eleven in an inch on an average).*

a. Flowers purple.

Fruit oval.

9. White Providence

10. Green Java.

11. Black Jamaica.

Fruit cylindrical.

12. Orange sugar-loaf.

13. Downon Havanah.

Fruit pyramidal.

14. New Jamaica.

a. Flowers lilac.

15. New Demerara.

16. Striped Surinam.

*** *Leaves with middle-sized spines (about six or seven in an inch on an average).*

a. Flowers purple.

Fruit cylindrical.

17. Sierra Leone.

18. Amora's.

19. Moutserat

20. Trooper's helmet.

Fruit pyramidal.

21. Green Providence.

22. St. Vincent.

b. Flowers lilac.

Fruit cylindrical.

23. Globe.

24. Lemon queen.

25. Oshette.

26. Surinam.

27. Buck's seedling globe.

Fruit pyramidal.

28. Brown-leaved sugar-loaf.

29. Brown sugar-loaf.

30. Mandy-leaved sugar-loaf.

31. Black sugar-loaf.

32. Striped-leaved sugar-loaf.

33. Trinidad.

34. Buck's seedling.

35. Kevik.

36. New Saville.

37. Spring Grove Saville.

38. Lord Ragot's seedling.

39. Blithfield average.

**** *Leaves with large rigid spines (about four in an inch on an average).*

a. Flowers purple.

40. Black Antigua.

41. Welbeck seedling.

42. Ripley.

b. Flowers lilac.

Fruit globose.

43. Russian globe.

44. Russian cockscomb.

Fruit cylindrical.

45. Queen.

46. Ripley's queen.

47. Green queen.

48. Moscow queen.

49. Striped queen.

50. Silver striped queen.

51. Antigua queen.

52. Blood-red.

1907. Selection of sorts. The first three species may be considered as more ornamental than useful; the best of them is the king pine, which is a very handsome middle-sized fruit, but rather tardy in fruiting. All the varieties worth cultivating have been produced from the *Ananassa sativa*, and of these the following are considered by Mr. Munro as best meriting cultivation:—

1. *The Queen* is one of the best varieties at present known for general cultivation. It grows freely, fruits early and, although not so high-flavoured as some of the larger kinds, is still the most valuable for a small family. Exposed to a very high temperature in the months of June, July, and August, it is liable to become hollow near the core, but early or later in the season it is not subject to that defect. It is the sort generally grown by gardeners for the London market. The Ripley's queen, a slight variety of the common Queen, is probably the best; the leaves are greener and broader, and it does not throw up so many suckers.
2. *The Moscow queen* is an excellent variety, but is rather a slow grower; the fruit is about the same size as the common Queen, but superior to it in flavour.
3. *The Black Jamaica* is an excellent fruit at all seasons of the year, but

- particularly in the winter months, when pines rarely come to perfection; it cuts firm to the core, is highly flavoured, keeps some time after it is fully ripe, and bears carriage better than any other. It is, however, rather a slow grower, and the fruit seldom attains a large size.
4. *The Brown sugar-loaf* is the best of the sugar-loaf kind; it is a large, handsome, and highly flavoured fruit, swells freely in the winter months, its flesh is firm and juicy.
5. *The Ripley* is large, handsome, and highly flavoured; it is a good summer fruit, and swells freely in winter.
6. *The St. Vincent*: the fruit is not large, but highly flavoured, particularly in summer; and it is said to swell freely in winter.
7. *The Black Antigua* is an excellent and highly flavoured pine if cut when it begins to turn from green to yellow, but if allowed to remain on

- the plant until it is quite ripe it loses all its richness.
8. *The Seedling* is deserving of a place in collections as one of the handsomest pines in cultivation; although it is neither rich nor highly flavoured.
9. *The Lemon queen* is of free growth, the fruit is rich, juicy, and high-flavoured.
10. *The White Providence*, when grown to a large size, is generally deficient in flavour, but is a very handsome showy kind. It may sometimes bear perfection, and in that case the fruit be allowed to become perfectly ripe on the plant it is equal in flavour to a Queen.
11. and 12. *Large Pines*. The Trinidad is an excellent fruit, which may be grown to a larger size than any hitherto cultivated in England. It is reported to weigh occasionally 35 lbs. Buck's seedling pine greatly resembles the Trinidad. (*Hort. Trans.* 3d series, l. 24.)

5208. *Compendium of culture.* Notwithstanding the great length to which this subject has extended in a former part of our work (sect. 2496, to sect. 3555.), we consider it right to introduce the following admirable summary by Mr. Lindley:—"One of the best methods, without entering into any lengthened detail of operations, seems to be that which has been recommended by Mr. Sweet, which is, to pot the young plants in a mixture of one third loam, and two thirds of half-decayed leaves, in which they root very freely; they may then be plunged in frames, or a stove, but not in too much bottom heat, as that will injure their roots, as is often done by those who expect to force them on by bottom heat, but who by that means kill their plants, or injure them so much that they never perfectly recover. They do not consider that giving plants a strong bottom heat is working against nature; for in their native climate it is the sun that warms the ground in which they grow, and this heat should not be exceeded here."

5209. "Place *drives much the best by keeping the houses very warm and moist, and by giving air early in the morning, and shutting it up early in the afternoon.* As soon as shut up, give a gentle sprinkling of water all over the plants with an engine, which causes a fine steam to rise, and the leaves never burn, but the plants grow with increased vigour. When they are large and require larger pots, add more loam to the soil in which they are potted, and keep the pots well drained with small pebbles in the bottom. In shifting them into larger pots, care must be taken not to injure their roots. When they are put into the fruiting house, first turn the tan bed all over to the bottom, adding a sufficient quantity of new tan, so as to give a strong heat; then set the plants upon the tan, but do not plunge them till the heat begins to decline. Where plenty of leaves can be had, they need not be plunged at all; but, as

soon as the heat declines, fill up between the pots with them. Oak or chestnut leaves are the best; these cause the heat to rise as strongly as is required: when the heat again declines, add another quantity of leaves, and so on till the plants are half buried, and water them frequently, but little at a time, and they will root in the leaves, and swell off their fruit to a great size; the suckers root also into the leaves, and grow so large plants before they are taken off, so that these plants produce their fruit when potted off, much earlier than by any other means."

5210. "When the plants are wanted to show fruit, they should be checked by keeping them dry for a considerable time; then by watering them and giving them a little fresh heat, they fruit immediately. The pine-house should be kept up as near as possible to 70° of Fahrenheit's thermometer in winter; in summer it may be shut up at 100° or more: this heat may be said to apply to a collection of plants when grown together in one house; but when there is a sufficiency of room, it will be more advisable to grow the Queen pines by themselves, and those called Black pines in another department, as these latter require a heat of at least twenty degrees more to grow them well than what ought to be allowed to the Queens. The White Providence pine being a much larger grower than any other, it would be desirable to grow it in a third house, or in a large pit constructed for the purpose. This does not require a greater degree of heat than any of the Black pines; but its leaves being so much longer and larger than any other, prevents it being arranged in the pit, so as to allow the others an equal advantage." (*Lindley's Guide to the Kew Garden*, p. 440.)

5211. The insects prejudicial to the pine-apple, and the methods in use for destroying them, have been already described, sect. 3537, to sect. 3546.

SUBJECT. 2. *Grape Vine.* — *Vitis vinifera* L. (*Jac. Ic. i. t. 50.*); *Pentén. Monog. L.* and *Vites J. Vigne*, Fr.; *Weintrauben*, Ger.; *Wijngaard*, Dutch; *Vigna*, Ital.; and *Vina*, Span.

5212. *The grape vine* is a trailing, deciduous, hardy shrub, producing flowers in the form of a raceme, of a greenish-white colour, and fragrant odour, appearing in the open air in this country in June; and the fruit, which is of the berry kind, attains such maturity as the season and situation admit, by the middle or end of September. The berry or grape is generally globular, but often ovate, oval, oblong, or finger-shaped; in these colours green, white, red, yellow, amber, and black, or a variegation of two or more of these colours. The skin is smooth, the pulp and juice of a dulcet, poignant, elevated, generous flavour. Every berry ought to enclose five small heart or pear shaped stones; though, as some generally fail, they have seldom more than three; and some varieties, when they attain a certain age, as the Ascalon or sultana raisin, none. The weight of a berry depends not only on its size but on the thickness of its skin, and texture of the flesh, the lightest being the thin-skinned and juicy sorts, as the sweetwater or muscadine; and what are considered large berries of these varieties will weigh from five to seven pennyweights, and measure from an inch to an inch and a half in girth. A good-sized bunch of the same sorts may weigh from two to six pounds; but bunches have been grown of the Syrian grape, in Syria, weighing forty pounds; and in England, weighing from ten to nineteen pounds. A single vine in a large pot, or grown as a dwarf standard in the manner practised in the vineyards in the north of France, ordinarily produces from three to nine bunches; but by superior management in gardens in England, the number of bunches is prodigiously increased; vines in pots have ripened 20 bunches each plant the first year, and one plant, of the red Hamburgh sort, in the free soil of the vinery of the royal gardens at Hampton Court, has produced 2200 bunches, averaging one pound each, or in all nearly a ton. That at Valentines, in Essex, has produced 2000 bunches of nearly the same average weight.

5213. *The age to which the vine will attain* in warm climates is so great as not to be known. It is supposed to equal or even to surpass that of the oak. Pliny speaks of a vine which had existed six hundred years; and Boac says, there are vines in Burgundy upwards of four hundred years old. In Italy there are vineyards which have been in a flourishing state for upwards of three centuries; and Miller tells us, that a vineyard a hundred years old is reckoned young. The extent of the branches of the vine, in certain situations and circumstances, is commensurate with its produce and age. In the hedges of Italy, and the woods of America, they are found overtopping the highest elm and poplar trees; and in England, one plant trained against a row of houses in Northallerton (lately dead), covered a space, in 1685, of one hundred and thirty-seven square yards; it was then above one hundred years old. That at Hampton Court, nearly of the same age, occupies above one hundred and sixteen square yards; and that at Valentines in Essex, above one hundred and forty-seven square yards. The size to which the trunk or stem sometimes attains in foreign countries, is so great as to have afforded planks fifteen inches broad, furniture, and statues; and even in this country, the stem of the Northallerton vine above mentioned, in 1783, measured four feet in circumference near the ground; and one branch of the Hampton Court vine measures one hundred and fourteen feet in length. Vine timber is of great durability. It may be remarked, that vines regularly pruned and dressed can rarely attain similar magnitudes, nor is it desirable that they should.

5214. *The native country of the vine*, like that of most of our acclimatised fruits, is generally considered to be *Peria*; and Dr. Sichter (*Geschichte der Obst Cultur*, vol. I.) has given a learned and curious account of its migration to Egypt, Greece, and Sicily. From Sicily it is supposed to have found its way to Italy, Spain, and France; and in the last country it is believed to have been cultivated in the time of the Antonines, in the second century. Some species have been found wild in America, and the cultivated sort is now considered as a native, or naturalised in the temperate climates of both hemispheres. In the old world, its culture forms a branch of rural economy from the 21st to the 51st degree of north latitude, or from Schiras in Persia to Coblenz on the Rhine. Some vineyards are to be found even near Dresden, and in Moravia; and, by means of garden-culture, it is made to produce fruit for the table still farther north; being grown to a considerable degree of perfection in the hot-houses of St. Petersburg and Stockholm.

5215. *The introduction of the vine to Britain* is supposed by some to have taken place under the first Roman governors, though, from Tacitus, it appears to have been wanting in Agricola's time. There is evidence, however, to prove that vineyards were planted here in the year 980, A. D.; and Bede, writing in 731, says, there were vineyards growing in several places. Hart observes, that the religious fraternities of the dark ages spread out from Italy in all directions, carrying with them the knowledge of agriculture and gardening; and there is little doubt, Professor Martyn remarks, that orchards and vineyards were common appendages to abbeys and monasteries from their first establishment, at least in the southern parts of the island, to the time of the Reformation. From this period they have disappeared, in part, perhaps, from the culture of the vine being little understood by those to whom the lands of religious houses were sold or granted; and in part, because a better article would be introduced from our French provinces in the time of the Henries, and continued to be imported when we lost these.

5216. *Vineyards* have also been planted in modern times, and wine produced, nearly, if not entirely equal, to that of France. In the *Museum Rusticum*, it is stated, that at Arundel Castle in Sussex, the Duke of Norfolk had a vineyard, of which there were in his Grace's cellar, in 1763, above sixty pipes of excellent Burgundy. Bradley informs us, that Warner, a gentleman of Rotherhithe, made good wine from his own vineyards. Switzer mentions several instances, and among others, that of Roogue, of Waltham Green, who made wine for thirty years from a vineyard he had planted in a common field-garden. Hanbury and Hales confirm these accounts, and cite others; and Barry, in his *History of Wines*, gives an account of a very productive vineyard, formed by the Hon. Charles Hamilton, at Painshill, in Miller's time, which succeeded for many years, and produced excellent champagne. Some of the vines which formed this vineyard may still be seen on the original site, now covered with a grove of Scotch pines. There can be no hesitation, therefore, in agreeing with these authors, and with Miller, Martyn, and Speechly, that vineyards would succeed in various parts of England, and produce wine equal to some of that imported from France. But, in a national point of view, we may conclude, with equal safety, that the culture of the vine, as a branch of rural economy, would not be a profitable concern here, on the broad general principle, that it cannot be long worth while to grow any thing at home which we can get cheaper from abroad. The high duties on imported wines may seem to bear against this opinion; but this is merely a temporary cause; for, in the progress of international commerce, governments gradually discover the advantage of leaving trade comparatively free; and in proportion as this becomes the case, each country will feel its advantage in pursuing those branches of industry in which nature or habit has rendered it pre-eminent. Chaptal, in his *L'Industrie Française*, published in 1819, states the quantity of wine made in France to be 600,000,000 imperial gallons; one third of which does not bring the vine grower more than 24 d. per gallon. The price rises gradually on the remaining 400,000,000 of gallons, a part of which may sell for 5s. per gallon; but still Chaptal estimates that 39 thirtieths of all the wine grown in France does not bring the grower more than 2s. per gallon, or 4d. per bottle. Such wine, therefore, if duty free, might be introduced into England, and sold by retail at 8s. per bottle. The consumption in such a case would be immense, and the benefit to both countries very great. Till this arrives, it may afford some satisfaction to individuals, in favourable situations, to form vineyards, and drink their own wine.

5217. *Grapes for the table* appear to have been in demand as early as the beginning of the 16th century; for Tussier includes "grapes white and red," in his list of fruits, published about the year 1600; but, as far as appears from horticultural literature, the vine had only been grown as dwarf standards, or trained against walls or buildings, till the beginning of the 18th century. Stoves for preserving curious exotics had been introduced soon after the middle of the 17th century; but we find no mention of the application of artificial heat to the vine, till 1718, when Lawrence informs us, in his *Fruit-Gardener*, published that year, "that the Duke of Rutland, at Belvoir Castle, has done so much justice to the vine as to have fires constantly burning behind his slope walls, from Lady-day to Michaelmas; whereby he is rewarded by the largest grapes, and even the best Frontignans, in July." These sloped walls, which were built at the instigation of H. Facio, the Duke's tutor, we are informed, were afterwards covered with glass. Switzer (*Pract. Fruit. Gard.*, 2d edit. 1763) appears to be the first author who gives a regular plan of a vinery, with directions for forcing the grape. He advises making fires as early as the middle of December, so as to make the vines push by the middle of January. Since his time, the art of forcing has made such rapid progress that no kitchen-garden worth notice is now without a vinery; the fruit is produced in some vineries during every month of the year; and in the London markets is to be had in the highest degree of perfection from March to January. Vines are at the same time still grown on walls unaided by fire-heat, and in favourable seasons, the more hardy early sorts attain a tolerable degree of maturity. In the nursery-gardens of Messrs. Kirke, at Brompton, a wall upwards of two hundred and twenty yards long, and ten feet high, is covered with plants of the white muscadine, which have produced regular crops for many years. On the border to this wall are standard vines of the same sort, trained to stakes about four feet high, which also bear in proportion, though the fruit does not ripen quite so early, nor attain an equal degree of flavour with that on the wall. In propitious seasons these grapes attain a tolerable degree of flavour; but even then they are of little value, compared to those grown in vineries and hot-houses.

5218. *Use.* The uses of the grape in Britain are well known; in the desert it ranks next the pine, and is by some preferred to it. The berries, when green or not likely to ripen, may be used in tarts or pies; and the leaves form an elegant garnish to other table-fruits. Wine is sometimes made in England, by expressing and fermenting the juice, either alone or with that of other fruits; and it has even been made from decoctions of the leaves of some sorts. In warmer climates, the grape is not only used in the desert, but eaten with bread, either newly gathered or dried as raisins; and, in these countries, from the fermented juice a wine or liquor is made, superior to all others for stimulating the stomach, and exhilarating the spirits of man. The medical products of the vine are verjuice, formerly used as the juice of lemons; tartar, a gentle cathartic; vinegar, used as a condiment, for extracting the virtues of other medicines, and for counteracting the effects of vegetable poisons. Even wine itself is given as a medicine, in typhus fevers; in nervous disorders; in putrid sore throats; and even in the plague. "In almost all cases of languor, and great prostration of strength," Martyn observes, "wine is a more grateful and efficacious cordial than can be furnished from the whole class of aromatics."

5219. *Varieties.* These are exceedingly numerous; partly from the antiquity of the vine, it having, as Professor Martyn remarks, been cultivated from the time of Noah; partly from the influence of soils and climates in changing the qualities of grapes, there being hardly two vineyards in France or Italy where the sorts, though originally the same, remain long precisely alike; but chiefly, as far as respects this country at least, from the facility with which new sorts are procured from seed. Tussier, in 1560, mentions only "white and red" grapes. Parkinson, who was more of a horticulturist, gives, in 1627, a list of twenty-three sorts, including the white muscadine, "very great, sweet, and firm; some of the bunches have weighed six pounds, and some of the berries half an ounce." Ray, in 1688, enumerates twelve sorts as then most in request. Rea, in 1702, gives most of those in Ray's list, and adds five more sorts, recommending the red, white, and the d'Arbois, or royal muscadine, the Frontignans, and the blood-red, as the fittest sorts for England. The best vines, he says, were then on the walls of the physio-garden at Oxford.

5220. *Switzer*, in 1717, says, "It is to Lord Capel and Sir William Temple that we are owing that collection of good grapes now so plenty in England. The latter," he says, "brought over the Chasselas, parsley-leaved, and Frontignan; and also the Ambroysa, Burgundy, black muscat, and grizzly Frontignan; all highly approved, and distributed amongst the nurserymen, as well as the nobility and gentry. The best grapes," he tells us, "were grown at Twickenham, Isleworth, and Richmond." Speechly, from 1760 to 1790, excelled in the culture of the vine at Welbeck.

5221. The most valuable modern additions to the varieties of grapes in this country have been procured by sowing the seeds of sorts ripened in this country. That excellent grape, the red Hamburg, was raised from seed, about a century ago, by Warner, of Rotherhithe, already mentioned. In France, during the consulship, in 1801, the celebrated chemist Chaptal, when minister of the interior, ordered a specimen of every known variety of the grape to be collected from the different departments where the vine is grown, and planted in the nursery of the Luxembourg garden, with a view to ascertain their respective merits. Though this assortment was never completed, the number collected amounted to upwards of three hundred distinct varieties.

5222. A classification of the numerous varieties of the vine has not hitherto been made, either in France or England. Boce, the inspector of government vineyards in France, was employed to compare and class those collected at the Luxembourg; but in 1809 he had only succeeded in describing and figuring fifty distinct sorts. The groundwork of his classification was, the colour, form, and size of the fruit; the surface, margin, texture, colour, and position of the leaves; and the redness, greenness, or variegation of the footstalks. From these eleven characteristics combined, he forms 156 classes, in which, he says, may be placed all the possible varieties of grapes. Boce, aware of the great variety of considerations of another order, which augment the number of characteristics, such as grapes which are in other respects alike, yet differ in their time of ripening, in the time they will hang without alteration on the plant, in the quantity produced on a plant, quality of the pulp, &c., acknowledges, that, after four years' labour, he could offer no useful result. In the catalogue of the Luxembourg collection, published by Hervey in 1809, the arrangement is, 1. vines with black oval fruits, 37 sorts; 2. black round fruits, 98 sorts; 3. white oval fruits, 44 sorts; 4. white round fruits, 73 sorts; 5. grey or violet oval fruits, 6 sorts; and 6. grey or violet round fruits, 10 sorts: in all, 360 sorts. The elaborate descriptions of the varieties of the vine which have yet appeared, are contained in a Spanish work, *Ensayo sobre las variedades de la vid comun que crecen en Andalucia*, &c. by D. Simon Roxas Clemente, librarian to the botanic garden at Madrid. This author finds his varieties on the character of the stem, shoots, leaves, flowers, bunches, and berries. He describes 120 varieties, comprising them in two sections, *douces* and *smooth leaved*. Each section is arranged in tribes or clusters of subvarieties, bearing one common name, and distinguished by a common character in some of the parts of the fundamental characteristics above named, and into isolated varieties, which he describes singly. He enumerates thirty-six authors who have written on the vine, since Columella, by whose names he has distinguished many of his tribes; the others by their local appellations. The table of grape vines here given, has been prepared for us by Mr. Thompson; and though it must necessarily be less perfect than his tables of the hardy fruits before given, from the circumstance of all the vines not having been yet proved in the gardens of the Horticultural Society, yet it is such a table as no other person in this country could furnish.

GRAPE VINES WITH ROUND DARK RED, PURPLE, OR BLACK BERRIES.

1. *Early Black July*, Marcellin black, Madeline, Madeline noire, Raisin violette, Raisin merlette blanc.
2. *Miller's Burgundy*, Le Moussier, Miller grape, Miller, Alouette du Pô, Marcellin Thomas, Fremont, Beaune, Farinet noir, Seyvalier noir.
3. *Black muscadine*, Black Chassaigne, Chassaigne noir.
4. *Black Frontignan*, Purple Frontignan, Violet Frontignan, Purple Constantia, Black Constantia, Muscat noir, Muscat noir de Frontignan.
5. *Reynolds*, Hardy blue Windsor, Turner's black.
6. *Black Lombardy*, West's St. Peter's, West's black St. Peter's (of seed).
7. *Black St. Peter's*, St. Peter's, Black grape, from Palestine.
8. *Black Damascus*, Workshop Muscat grape.
9. *Black Tripoli*, Black grape, from Tripoli.
10. *Petersburg*, Black St. Petersburg.
11. *Black Corinto*, Tonto, Black Achras, Currant, Corinthian raisin, Raisin de Corinthe.

OVAL DARK RED, PURPLE, OR BLACK BERRIES.

12. *Black cluster*, Black Burgundy, Burgundy, True Burgundy, Early black, Small black cluster, Avenir noir, Avenir noir, Maurillon, Maurillon noir, Pineau noir (of Burgundy), Pineau de Bourgogne, Black Orleans.
13. *Black muscadine*, Black raisin, Negoli, Raisin Augibert noir.
14. *Cleret*, Blood-red.
15. *Alouette*, Black Portugal, Black Spanish, Gros noir d'Espagne, Alouette Pinot; also, Temurier, Black Valencia, Black Lisbon (of seed).
16. *Black Prince*, Sir Abraham Piche's black.

17. Cambridge Botanic Garden grape.

18. *Black Hamburg*, Warner's black Hamburg, Warner's red Hamburg, Red Hamburg, Purple Hamburg, Brown Hamburg, Black Gohander, Hampton Court, Frankenhater, Frankenhater vine, enthal; also, Black Lisbon, Black Portugal, and Black Tamaris (of seed).
19. *Black Marocco*, Anjou's large oval black, Herdforth seedling, Rhodes's, Le Couer, Raisin d'Espagne, Raisin de Maroc, Gros Maroc, Raisin d'Algerie.
20. *West's St. Peter's*, Raisin des Carreaux.
21. *Worley Hill seedling*.
22. *Pomak*.

ROUND WHITE BERRIES.

23. *White muscadine*, Common muscadine, Chassaigne de Fontenobonne, Early white grape of Tamaris, Royal muscadine (of seed), Malmsbury muscadine.
24. *Royal muscadine*, d'Arbois, or d'Arbois, Chassaigne, Bux-ent-Aube, Bux-ent-Aube black, Chassaigne blanc, Raisin de Chassaigne, White muscadine (of seed).
25. *White seedling*, Dutch sweetwater, Pearl Dray, Sellward's sweetwater.
26. *Chassaigne prince*. Closely resembles the preceding; but is supposed to be rather earlier and finer.
27. *Pineau white cluster*, Blacksmith's white cluster.
28. *Scott's white cluster*, Blacksmith's white cluster.
29. *Chassaigne muscat*, Le Couer, or Frankenthal (of Miller).
30. *White Frontignan*, Muscat blanc, Muscat blanc de Frontignan, Muscata Bianca.
31. *Cleret*, Pansley-leaved, Parsley-leaved chassaigne, Parsley-leaved muscadine, White pansley-leaved, Raisin d'Artriche.

32. White Nile.

33. *White Kishabhi*, Corinthe blanc, Corinthe sans pepins, Uva passa blanc, Kishabhi, Roman-berried muscat, Yellow muscat, White seedling Corinthe.

OVAL WHITE BERRIES.

34. *White Muscat of Alexandria*, White Muscat, Alexandria Frontignan, Muscat of Jerusalem, Touchant, Part Muscat, Malaga, Muscat d'Alexandrie, Muscat d'Alexandrie blanc, Pansy-longue muscat, Pansy muscat blanc, Sabotina Candia.
35. *Bonnes Hall Muscat*. Closely resembles the preceding.
36. *Long*, White Muscat of Long.
37. *White Hamburg*, White raisin, Raisin Muscat, White Lisbon, White Portugal.
38. *Charterworth's Tokay*.
39. *White Tokay*, German Tokay, White Morillon.
40. *Verdelle*.
41. *Gros Bud sweetwater*.
42. *Alexandria cluster*.
43. *Syriza*, Jew's Syria.
44. *London Seedling*.
45. *White Corinthian*, Corinthian blanc, Finger grape.

RED, ROSE-COLOURED, GREENISH, OR STRIPED BERRIES.

46. *Red Frontignan*, Muscat rouge.
47. *Grimy Frontignan*, Muscat gris.
48. *Lombardy*, Flame-coloured Tokay, Rhinish grape, Red Rhinish, Warrage, Brick grape.
49. *Red muscat*, Red Seyvra, Red Malaga, &c.
50. *Alouette*, Striped Alouette, Swin, Raisin Suisse, Swissland grape, Raisin d'Alpe, Black and white, Raisin panache, Variegated Chassaigne.

5223. Estimate of sorts. We shall here submit a few selections suitable to common cases.

Vines to plant against a common garden-wall of south exposure, or against the walls of a house.

White muscadine, Grove End sweetwater, Pitsmaston white cluster, White and Black sweetwater, Small and Large Black and White cluster, Black exposure, &c.

To plant a vineyard for early forcing. Take the preceding sorts; or Nos. 5, 16, 17, 22, 34, 35, 39.

To plant a vineyard for a full crop of good grapes of various flavours. Take a White, and Red, or Black muscadine, a White and Red Muscat, a White and a Red Frontignan, a Black or Red muscadine, a White raisin-grape, White and Black Hamburg, Black Prince, and White sweetwater, a White and Red Nile.

There are here 26 grapes of 14 distinct flavours; an equal number of both colours; large showy bunches

and berries, as those of the Nile; and small high-flavoured ones, as those of the Frontignas; the whole placed in the order in which they will ripen. The foliage in autumn will be alternately tinged with red and yellow; and supposing the Muscadine to be placed next the end at which the fine eastern, they will ripen nearly a month earlier than any of the others: the Muscat, Frontignan, and Muscadine, being hot-house grapes, will have a sufficient heat to ripen them; and the last three sorts, being somewhat more tardy, will come in succession.

To plant a vineyard for a late crop. Take the Black Tamaris, Black Frontignan, Black Hamburg, Red Syracuse, Black and White raisin, Black and White St. Peter's, Black Prince, &c.

To plant a hot-house in which vines are grown: one plant under each trellis. Take the White and Red Muscat,

Black muscadine, Red or Black Hamburg, Red Syracuse, Red and White raisin, Black Frontignan, and four sorts, White sweetwater, Royal muscadine, White Frontignan.

To plant vines to run up the rafters of green-houses, or plant-houses. Choose such sorts as have small leaves and short footstalks.

Early small forced sorts for the rafters of a green-house. White and Black sweetwater, Black cluster, Black muscadine, Parsley-leaved muscadine, Black muscat. Small-leaved sorts for the rafters of a plant-house. Black Marocco, Blue Frontignan, Blue Tokay, Cleret, White Tamaris, White muscat, &c.

Small fruited sorts for planting in pots or boxes. Black and White Corinthian, Black and White cluster, Black and Red, and Grimy Frontignan, Red and Red Burgundy, &c.

5924. A DESCRIPTIVE CATALOGUE OF GRAPE VINES, propagated in most British Nursery Gardens, arranged according to the Shape and Colour of the Fruit.

Abbreviations. — h. hot-house; v. vinery; w. open wall.

GRAPES WITH ROUND, DARK RED, PURPLE, OR BLACK BERRIES.

No.	Name (for the Shape and Colour, see Sect. 5923.)	Early, early, or otherwise, or otherwise.	Where found.	Where described.	Size of bunches.	Size of the berry.	Flavour and consideration.	Time of ripening against a wall.	Bunch length, in.	Length of the berry, in.	Local. No.	Character of the skin, and general reputation of the fruit.
1.	Early black July	An old variety from France	Lamp. P. t. 47. 53.	Lindley, No. 16.	Small	Small	Sugary	Sept. Oct.	6 in.	4 in.	w.	Tender when in blossom
2.	Miller's Burgundy	Very old variety from Burgundy	From. Mag. t. 45.	From. Mag. t. 45.	Small	Small	Tender and sweet	Sept. Oct.	6 in.	4 in.	w.	Very tender when in blossom
3.	Black Muscadine	An old variety from France	Lamp. P. t. 47. 53.	Lindley, No. 11.	Medium	Above med.	Pleasant	Sept. Oct.	11	6	v.	Very tender when in blossom
4.	Black Muscadine	An old variety from France	From. Mag. t. 45.	From. Mag. t. 45.	Medium	Above med.	Pleasant	Sept. Oct.	11	6	v.	Very tender when in blossom
5.	Black Muscadine	An old variety from France	From. Mag. t. 45.	From. Mag. t. 45.	Medium	Above med.	Pleasant	Sept. Oct.	11	6	v.	Very tender when in blossom
6.	Black Muscadine	An old variety from France	From. Mag. t. 45.	From. Mag. t. 45.	Medium	Above med.	Pleasant	Sept. Oct.	11	6	v.	Very tender when in blossom
7.	Black St. Peter's	From Damascus	From. Mag. t. 45.	Lindley, No. 81.	Large	Large	Juicy and rich	Sept. Oct.	10	7	v.	Hardy and very prolific
8.	Black Damascus	From Damascus	From. Mag. t. 45.	Lindley, No. 5.	Medium	Large	Delicate, rich flesh	Sept. Oct.	11	5 1/2	v.	Berries apt to crack in high temperature
9.	Black Tripoli	From Damascus	From. Mag. t. 45.	Lindley, No. 5.	Medium	Large	Delicate, rich flesh	Sept. Oct.	11	5 1/2	v.	An excellent late grape; should be fertilized with some hardy kind
10.	Pennburgh	From. Mag. t. 45.	From. Mag. t. 45.	Lindley, No. 5.	Medium	Large	Delicate, rich flesh	Sept. Oct.	11	5 1/2	v.	Berries apt to crack in high temperature
11.	Black Cornish	From. Mag. t. 45.	From. Mag. t. 45.	Lindley, No. 5.	Medium	Large	Delicate, rich flesh	Sept. Oct.	11	5 1/2	v.	An excellent late grape; should be fertilized with some hardy kind
12.	Black chasser	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
13.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
14.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
15.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
16.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
17.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
18.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
19.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
20.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
21.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace
22.	Black muscadine	An old variety from Burgundy	From. Mag. t. 45.	Lindley, No. 9.	Small, com.	Small	Very sweet	Sept. Oct.	10 1/2	7	w.	Generally without stone; is the sort which produces dried Corinths, or currents of Alsace

DESCRIPTIVE CATALOGUE OF GRAPE VINES — continued.

GRAPES WITH ROUND WHITE BERRIES — continued.

No.	Name.	How, when, and where, first cultivated, preserved, or described.	Where figured.	Where described.	Size of bunches.	Size of the berry.	Flavour and unsuitableness.	Time of ripening, according to season.	Breadth of leaf.	Length of foot of leaf.	Locality.	Character of the skin, and general reputation of the fruit.
53.	White Muscadine	Introduced by Sir W. Temple, 1660.	Penn. Mag. t. 18.	Lindley, No. 58.	Above med.	Medium	Sugary and rich	Sept.	-	5½ in.	v. v.	One of the very best for a wall; a great bearer
54.	Royal Muscadine	Ditto	-	Lindley, No. 49.	Large	Above med.	Rich and sweet	Sept.	-	-	h. v. v.	Parkinson describes it as the White Muscadine, and mentions its having been proved to the weight of 100 lbs. per acre. Sometimes in blossoms do not set well
55.	White Sweetwater	From France	Brooksb. P. t. 65.	Lindley, No. 61.	Medium	Large	Luscious & saccharine	Sept.	-	-	v. v.	Very like the preceding
56.	Chaudes preceps	By Williams of Pimmsion	Hert. Tr. 3. t. 8.	Lindley, No. 48.	Small, com.	Medium	Tender and sweet	Sept.	-	-	v. v.	A good bearer, and very suitable for a wall
57.	Scottish white cluster	Raised by a Macintosh at Edinburgh, 1819.	-	-	Medium	Medium	Juicy and sweet	Sept.	-	-	v. v.	Hardy, and a great bearer
58.	Chaudes preceps	-	-	-	Med. long	Medium	Rich muscat flavour	Sept.	-	-	h. v.	Contains much of the flavour of the Muscat of Alexandria
59.	White Frontignan	-	Brooksb. P. t. 54.	Lindley, No. 54.	Medium	Medium	Rich, with a highly musky flavour	-	-	-	h. v. v.	A much esteemed grape
60.	White Frontignan	-	Dubau. t. 2.	Lindley, No. 45.	Large	Medium	Juicy, rich, & highly juicy, refreshing, but not rich.	-	-	-	h. v.	Early distinguished by its much incised foliage
61.	White Nica	-	Hert. Tr. 4. t. 4.	Lindley, No. 56.	Small	Small	-	-	-	-	h. v.	A very large, loose, and branched bunch
62.	White Kishish	Kishish, in the Persian Gulf	-	-	Small	Small	-	-	-	-	v.	Sometimes for the most part
63.	White Muscat of Alexandria	-	Brooksb. P. t. 55.	Lindley, No. 59.	Large	Large	Firm, musky, delicious.	-	-	-	h.	Generally esteemed as the finest and richest grape; it is sometimes cultivated in the North American States.
64.	White Muscat of Alexandria	-	Hert. Tr. 3. t. 1. 69.	Lindley, No. 60.	Large	Large	Rich, green, slightly mixed with acid.	-	-	-	h.	Bears much resemblance to the preceding
65.	White Muscat of Alexandria	-	Brooksb. P. t. 60.	Lindley, No. 55.	Large, loose	Large	Muscat-flavoured.	-	-	-	h.	Allied to the Muscat of Alexandria. Several grapes of the above—imported annually to the value of 10,000.
66.	White Tokay	-	Lindley, No. 45.	Lindley, No. 45.	Small	Small	Rich and vinous	-	-	-	h. v.	A good late grape. One of those grapes which furnishes the excellent Tokay wine
67.	White Tokay	-	Hert. Tr. 3. t. 8.	Lindley, No. 51.	Medium	Medium	Sweet and rich	-	-	-	v.	The grape from which the Madeira wine is made
68.	White Tokay	-	Hert. Tr. 4. t. 1.	Lindley, No. 50.	Large	Large	Firm & good, and musky	-	-	-	h. v.	A good bearer on the open wall
69.	White Tokay	-	Dubau. t. 6.	Lindley, No. 41.	Small	Small	Firm, of only mod. fl.	-	-	-	h. v.	Sets rather irregularly
70.	White Tokay	-	-	-	-	-	-	-	-	-	h.	Grown by Speculator, at Widdow, in 10 lb. weight
71.	White Tokay	-	-	-	-	-	-	-	-	-	h.	A cultivated and distinguished English berry
72.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
73.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
74.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
75.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
76.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
77.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
78.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
79.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
80.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
81.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
82.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
83.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
84.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
85.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
86.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
87.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
88.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
89.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
90.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
91.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
92.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
93.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
94.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
95.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
96.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
97.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
98.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
99.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-
100.	White Tokay	-	-	-	-	-	-	-	-	-	h.	-

GRAPES WITH RED, ROSE-COLOURED, GREYISH, OR STRIPED BERRIES.

5225. Propagation. The vine is propagated from seed, layers, cuttings, grafting, and inoculation. By seed, for the sake of obtaining new varieties; by layers, to get strong showy plants the first year; by cuttings, for economy in management, and to get plants with tops proportioned to their roots; and by grafting and inoculation, for various useful and curious purposes.

5226. By seed. The first thing is to select the seeds. If the object be to propagate an esteemed variety from which cuttings cannot be obtained, or to procure a subvariety of any esteemed sort, then select the largest and best ripened berries from the largest and best formed bunches, out of which take the seeds. But if the object be to procure an entirely new variety, then the first preparatory steps must be taken when the vines are in flower, either by bringing two or more sorts near together, so that the pollen of the anthers may effect a promiscuous impregnation, as was practised by Speechly; or by cutting out, with small scissors, the stamens from the flowers to be impregnated, before their anthers burst, and introducing the pollen of the variety with which it is to be crossed, by dusting the stigma with the ripe anthers, as was practised by Knight. This is the most certain and effectual method: the most certain, because if the blossom destined to bear seeds be fecundated or set, it must evidently have been set through the influence of the stranger pollen; and the most effectual, because the stranger pollen operating alone must have more influence on the progeny than when operating in conjunction with that of the blossom to be crossed.

5227. As some guide for the selection of sorts to breed from (to borrow the phraseology of a sister art), we may state, that the legitimate object which ought to be had in view, should not merely be to obtain a new variety, but one superior in the size both of the bunch and berry, in flavour and delicacy of skin and flesh, in point of hardness and bearing, or in earliness or lateness. In connection with each of these particulars, the form of the bunch, and the length of the footstalk of the fruit, and even the size of the leaves and the length of their footstalks, are also objects deserving attention: close-growing grapes, which always have short footstalks, being subject to many misfortunes. "All the sorts of Frontignan grapes," Speechly observes, "are proper to add an excellency of flavour to other kinds; but there is a superior richness in the black, blue, and red Frontignans; and they do not partake so much of the strong muscat flavour as the white and grisly do. But it must be considered, that the blue Frontignan grows close upon the bunch, and therefore is only proper to be coupled with the loose-growing kinds, that have long footstalks. The white muscat of Alexandria produces large loose-growing bunches, and the berries being very large and well-flavoured, it must be a proper kind to be coupled with many sorts. There is a peculiar delicacy in the flesh of the white sweetwater; it is also a remarkably thin-skinned grape, with large berries; consequently, it is a proper kind to couple with various sorts that are small and less delicate. Were the red Frontignan and white sweetwater wedded together, their union would probably produce a very valuable sort, as there would be a good chance of its being large, delicate, and well-flavoured. The Syrian vine is only admired for producing most astonishingly large bunches; and, therefore, I would not advise the joining this coarse sort to most others, as, in all likelihood, the offspring would only produce bunches much less ponderous; but the white muscat of Alexandria, having larger berries and longer footstalks, would bear joining to the Syrian grape, and the progeny might exceed the original parents both in size and flavour." The following kinds will also admit of hybridising: "the black Damascus and grisly Frontignan; the flame-coloured Tokay and red Frontignan; the white muscat of Alexandria and white sweetwater; the black Frontignan and white muscadine; and the St. Peter's grape and white muscat of Alexandria." Grapes, for seed, should be permitted to remain on the plant till the fruit is perfectly mature, and the seeds of a very dark brown colour. They should be separated from the pulp, and preserved till February or the beginning of March. They should then be sown in pots filled with light fresh mould, and plunged in a moderately warm hotbed; they will come up in four or six weeks, and when the plants are about six inches high, they should be transplanted singly, into forty-eights, and afterwards into pots of larger size. Water gently, as circumstances require, allow abundance of light and air, and carefully avoid injuring any of the leaves. Cut down the plants every autumn to two good buds, and suffer only one of these to extend itself in the following spring. Shift into larger pots as occasion requires, till they have produced fruit. This, under good management, will take place in the fourth or fifth year, when the approved sorts should be selected, and the rest destroyed, or used as stocks on which to graft or march good sorts.

5228. Forsyth and some other authors advise planting seedling vines the second year of their growth, against a wall in the open air, and there letting them remain till they produce fruit. Where there is abundance of walling to spare, and no great haste requisite for proving the fruit, this is a very good mode, as the fruit in such a case is certain of growing larger, and therefore affording a better opportunity of judging of its merits, as to size of bunch and berry. Keeping the plants in large pots, on the other hand, though the bunches and berries may not grow quite so large, is a more eligible mode, as both the wood and fruit may be better ripened under glass; the plants will produce fruit sooner, and that fruit will be of better flavour.

5229. Speechly says, "it would not be prudent to furnish a wall, or any part of a hot-house, with seedling vines in their untried state, or before they have produced fruit; for although the prospect of obtaining good kinds from seed sown in a hot-house, be more promising and certain than that of getting them from seed of grapes in vine countries (because there, when the vines flower, the very air is impregnated with the farina of the grapes of the vineyard, which are, generally, of sorts of harsh, austere qualities, esteemed only for making wine, and not at all fit for eating); yet many of the new kinds from seed will prove to be worse sorts than the originals from which the seed was saved. A specimen, therefore, of the fruit should be obtained from each plant, and be tried and tasted before it is permitted to be planted against the walls in a viney or hot-house, or in any permanent situation. The fruit of seedlings is not even always such as to render it advisable to produce the plants in a vineyard; for though a man may have the sweetest flavour, bulk, or precocity desired in an eating grape, it may be of that insipid large-berried kind, which is fit only for making the most inferior wines. In most vine countries, a small black berry, with an austere taste, and aromatic flavour, and a close bunch like that of our black cluster, is preferred to all others." (*Treat. on the Vine*, 8vo edit. p. 60.) It may be observed, that though vine-plants raised from the seeds of black or red grapes will generally produce red or black berries, yet they will occasionally produce white ones; and the produce of white berries will sometimes be berries of other colours.

5230. By layers. The principal advantage of layers is generally stated to be that of procuring large showy plants to come immediately into bearing; and we have given (3872.) a successful instance of this practice from layers made in a viney; but when taken from stools in the open air, it happens almost always that the roots of the layer are not ripened; the consequence of which is, that their extremities rot off, and the following year the plants make hardly any shoots. Layering without, or with but a trifling incision, as is too frequently done in the hurry of nursery business, greatly contributes to this effect, by obliging the shoot to derive all its nourishment from the parent plant or stool, to which, in autumn, the descending sap is returned. Whereas, when a deep incision is made, or a ring of bark taken off in Williams's manner (5266.), less sap ascends, the shoot is not so long, it ripens sooner, and the descending sap reposes in, and ripens the roots. It is not easy to conceive in what way plants so raised can be inferior to those raised from cuttings of one or of several eyes; though such an opinion was till lately general among gardeners.

5231. Layers in the open air, according to Green, need not be ringed, pruned, twisted, tongued, cut, or bruised in any way, but simply abundantly supplied with water. Make a layer in a pot, any time before June; for if it is laid over so early in the spring, it will make no roots before the middle of July. Supply it abundantly with water; separate it from the stool in the last week in August; plant it immediately where it is to remain, and it will make roots a yard long before winter sets in. (*Gard. Mag.*, vol. iii. p. 24.)

5232. Rapid propagation by layers. At the pruning season, leave a shoot of strong young wood, or a

and above what may be wanted for training, of a sufficient length to bend down to any convenient place where a pot can be placed to receive it as a layer; and also for training it during its growth. When the vine begins to push, displace all the buds from the shoot intended for laying, except the leading one. When this is grown to about eight inches or one foot in length, bend it down to the pot, and lay it so that the top joint, whence the young wood has sprung, may be fixed with a strong crook at about one inch under the surface of the mould. As soon as it begins to take root, which may be known by removing a little of the earth, begin to weaken its resources from the mother plant, by making an incision in the wood behind the pot; which enlarge by degrees, as fast as the young plant will bear it, until it be quite separated from the old one. (*Gard. Mag.*, vol. viii. p. 578.) Shoots are obtained by this mode ten or twenty feet long in one season, and a house, as Mr. Gordon has shown, may be filled immediately. (*Ibid.*, p. 578.)

5233. *By cuttings.* The advantages of propagating by cuttings are, economy in labour, economy in the wood or shoots to be propagated from, and tops or shoots proportioned to the roots. There are three kinds of cuttings used in propagating vines:—

5234. *Long cuttings.* These are from a foot to eighteen inches long, consisting of new or young wood, with a joint or two of that of the preceding year. This is the sort recommended by Miller; adopted in forming vineyards on the Continent; and formerly also in this country in planting walls or vinerias. They are inserted so as to leave only two eyes above ground; the earth is firmly pressed round the lower part, to which the old wood is attached; they are mulched, and water is supplied regularly in dry weather. Cuttings of this sort, planted in autumn, so treated, strike freely, as Speechly observes, either with or without bottom heat. We have seen them, in some French nurseries, producing luxuriant shoots and ripening bunches of grapes the first year. Justice says he prefers stocking a vineyard from such cuttings to using rooted plants.

5235. *Short cuttings.* These are cuttings with only one eye on young or one-year-old wood, and a few inches of that of the preceding year attached. Each cutting should have two inches of the old wood, with one eye of the new. The bottom part should be cut perfectly smooth; plant in pots, one cutting in each pot, which, as to size, should be forty-eight. When the plants begin to get strong, and the pots full of roots, it will be necessary to shift them from the forty-eights to the thirty-twos." (Speechly.)

5236. *Single eyes.* By the third mode, the cuttings have only a single eye on young or one-year-old wood. This mode was first adopted by the Rev. M. Mitchell, and by him communicated to Speechly, about the year 1770. The following is Speechly's reasoning in its favour:—"It is allowed," he says, "that cuttings are generally preferable to layers, and that plants of any sort raised from small cuttings, commonly make the best plants. The new plant is injured in proportion as it partakes too abundantly of its original or mother plant. Hence, the less the bulk of the matter that forms the new plant the better; for plants raised from seed have the smallest beginning of any, and are preferable both to layers and cuttings." (*Treat. on the Vine*, p. 52.) Perhaps, the chief advantage of propagating by eyes in preference to short or long cuttings or layers, is, that the sets are more manageable, and can be more readily potted and placed in pits or frames to receive bottom heat; on which, applied early in spring and continued through summer, accompanied by proper shifting and watering, much more than on the form of the cuttings, depend abundance of roots and fitness for bearing the second year. We have seen single eyes raised in vinerias, produce strong shoots from ten to twenty feet the first year, and others, in cold frames or pits, with only a little bottom heat to start the plants in spring, produce weak shoots, not longer than two or three feet. Ripe wood is to be chosen for propagating by eyes; and though some are of opinion that cuttings taken from the lower part of the vine are preferable to those that grow higher, and at a distance from the root, yet Speechly says he never could find any difference, provided the wood was equally well ripened. Forward shoots, from vines forced early, he considers as the most eligible; and these will generally be found at the most distant parts from the root, as vines usually break first at the extremities of the shoots; and at these extremities will be found both the strongest, earliest, and best-ripened wood, and largest and most abundant bunches of fruit. Very strong shoots about too much with pith to make good cuttings, the requisites to which are as follow:—

1. The eye or bud should be large, prominent, and bold. 2. The shoots should be moderately strong, round, and short-jointed. 3. The texture of the wood should be close, solid, and compact; and the best criterion of its maturity is, its solidity, and having very little pith." (*Treat. on the Vine*, p. 57.) "Choose fit shoots at the pruning season, and preserve them till wanted in spring, by cutting them into moderate lengths, and placing their lower ends in earth, which must be moistened, if it get very dry. Cut the upper part of the shoot sloping, with a sharp knife, about a quarter of an inch above the eye; and, at about three inches below the eye, cut off the wood horizontally, or right across, and smooth the section." In some of the London nurseries, Speechly's mode of forming vine-cuttings is reversed, and the wood is cut off horizontally close below the eye, and at three inches above it; others cut at equal distances from the eye, and bury the whole cutting in the soil, with the eye uppermost, which appears superior even to Speechly's mode, where no bottom heat is given, as affording a greater supply of nourishment to the young shoot. In vines, as in potatoes, the larger the set, the larger the shoot. Plant in pots, and apply bottom heat.

5237. *Whatever kind of cuttings are employed, either in the case of the vine, or in the winter wood of any deciduous plant, the success will materially depend on exciting that part of the cutting which is under ground, before that part which is exposed to the air. The object is to get fibrous roots, no matter how short, before the buds break. Hence the advantage of putting in cuttings in the open air in autumn; and hence also the advantage of giving bottom heat to cuttings of vines, provided the temperature of the air in the frame, pit, or house, can be kept much lower than that of the tan, dung, or other medium communicating the bottom heat.*

5238. *By grafting.* The advantages of this mode of propagation may not at first sight appear, but they are, Speechly observes, "many and important." First, when a wall, or vinery, is planted with inferior kinds of vines, the usual method of stubbing them up and supplying their places with better sorts, is attended with much expense and loss of time; as several years must elapse before the wall can be completely finished with new vines; but, by grafting, the nature of the vines may be changed without expense or loss of time; for good grapes are generally produced from the same year's graft; and in a hot-house the grafts, if permitted, will frequently shoot thirty or forty feet the first summer. Secondly, in small vinerias, or vine-frames, where it would be inconvenient to have any considerable variety of sorts from roots, they may be procured by grafting different kinds upon one and the same plant. "A Syrian vine, growing in the hot-house at Welbeck, (1759) produced sixteen different sorts of grapes." But the most important advantage Speechly considers to be, "the improving the various kinds of grapes, and particularly the small kinds, which generally make weak wood. By grafting a weak and delicate-growing vine, as the blue Frontignan, upon a robust and vigorous stock, as the Syrian, it will produce well-sized handsome bunches, almost as large as those of the Hamburg." The Syrian vine, raised from seed, is greatly preferable to all others for stocks. If the seed degenerate to a kind of wildness, so much the greater will be the vigour of the plants, and the higher the flavour of the sorts grafted on them. At the pruning season select cuttings for grafts from the best bearing branches, in general preferring the bottom part of last year's shoot; preserve them, by inserting three parts of their length in pots, till wanted. The season for grafting in stoves is the beginning of January; in the open air, the middle of March. On small stocks, not more than one inch in diameter, cleft-grafting will be found the most proper; but, upon larger stocks, whip-grafting is to be preferred. As vine-grafts do not take so freely as those of most other fruits, the operation must be performed with the greatest care. But the most eligible mode of grafting vines is by approach, in which case either the stock or scion must be growing in a pot. Strong plants, two years potted, are to be preferred for the open air; but, for a vinery or hot-house, plants from the nursery may be potted, or shifted, if already in pots, and marched the same season. In whip or cleft

grafting, the clay may be taken off when the scion has made shoots five or six inches long; but here both clay and bandage should remain two or three months after the graft has formed a union, lest the grafted part spring from the stock.

5289. *Knight* finds grafting most successful when the lower part of the scion consists of two-year-old wood, and when the graft is well covered with clay kept moist, or, if the branch be on a horizontal trellis, with a pot or saucer placed under the graft, and the points of junction kept well covered with earth occasionally watered. (*Hort. Trans.*, vol. iv. p. 106.)

5290. *Bradick* has made several experiments on grafting vines: he found the scion generally sicken by the bleeding of the stalk; but, at last, he contrived by a very close bandage round the graft to force the sap of the stock up through the vessels of the scion, when the latter grew. From these, and various other experiments, he says, "I feel confident in stating, that healthy vines may be successfully grafted with young wood of the preceding year's growth, from the time that the shoots of the stocks which the grafts are to be put upon, have made four or five eyes, until midsummer, with every prospect of the graft's growing, and without the least danger of the stocks suffering by bleeding. They may likewise be grafted with shoots of the same summer's growth, worked into the rind of the young wood, from the time that the young bunches of grapes become visible on the stocks till July, out of doors; or till a month later, under glass." The operation must not be performed later than the periods here specified, because time is necessary for the young shoots of the graft to ripen before winter." (*Hort. Trans.*, vol. v. p. 204.)

5291. *Linnæ*, of *Poitou*, practices cleft grafting on the vine, with complete success.

5292. *Grafting with both the scion and stock of the present year's growth* has been found to succeed with common care. The best time to perform the operation is when the shoots have attained the length of two or three feet. The stock is cut as for common whip-grafting, within a short distance of last year's wood; and the graft is prepared as for inarching, leaving about two inches at the lower end of it entire, to be placed in a bottle of water suspended by the trellis. The scion and stock are then tied and clayed in the usual manner. The bottle will require to be filled up almost every day. (*Gard. Mag.*, vol. i. p. 464.)

5293. *The vine may be budded on the wood of the current year, or on the wood of the last year, in spring, with complete success.* (*Ibid.*)

5294. *Culture.* For the culture of the vine in the forcing department, see § 2556; what follows concerns chiefly the management of vines in the open air.

5295. *Soil.* The vine will thrive in any soil that has a dry bottom: in such as are rich and deep, it will grow luxuriantly and produce abundance of large fruit; in shallow, dry, chalky, gravelly, or schistous soils, it will produce less fruit, but of better flavour. The greater part of the vineyards of France, *Bosc* observes (*Cours Complet d'Agriculture*, &c., art. *Vigne*), are on a soil *argil-calcaireux*: sometimes primitive, as those near Dijon; and sometimes secondary, as those at Bordeaux. Argillaceous gravel is the next in frequency, as near Nîmes and Montpellier, and that which produces the *Vins des Graves* of Bordeaux. Both good and bad wines are produced from the debris of granites; among the former are the *côtes roties* and hermitage on the Rhone. The excellent wines of Anjou are made from vines growing among schistous rocks. Wines which are made from vines planted in chalky soils, are weak, colourless, and do not keep well; as those of Champagne. Wines grown on the ashes discharged from volcanoes are excellent; as those of Vesuvius and Etna. Soils surcharged with oxide of iron, red or yellow, are not less proper for making good wine. Retentive clays are the worst soils for the vine; the flowers are in great part abortive, the fruit, if it sets, does not ripen; the shoots not ripening well are more easily affected by frosts; and the wine, if any can be made, is weak and flavourless. Such a soil, even when in a warm climate, is particularly obnoxious to the vine, as *Bosc* observed in the botanic garden established at Charleston, in South Carolina, by Michaux. There vines brought from France produced for six months in the year, buds, leaves, and shoots; flowers, the greater part of which proved abortive, and green and ripe berries.

5296. *Switzer* observes, that the soil for the vine should be light, having a bottom of chalk or gravel, under a surface of about two feet deep, and free from springs; it cannot be too hot, or too dry, provided it be not in its own nature so very barren that nothing will grow upon it. If given to brambles, it is a certain sign of fitness, as no plant whatever is so co-natural to the vine as this shrub. In chalky-bottomed lands, and in gravel, which is not springy, grapes are largest and sweetest. (*Fr. Fruit Gard.*, p. 149.)

5297. *Hist.* Having observed a vine at the old Castle wall, the stony foundation of a wall, without any other roots than what were fixed therein, producing better fruit, and earlier ripe, than any other in the open ground in these gardens, advises the mixture of lime-rubbish, brickbats, &c. for a foot deep in the bottom of wall-borders destined for the vine. (*Tr. on Fr. Tr.*, p. 12.)

5298. *Lawrence* says, "he cannot easily be brought to think that any soil or situation can be too dry for the roots of the vine, after having seen at Barnwall, near Oundle, a flourishing vine grow from between the joints of an old castle wall, near twenty feet high from the ground, which produced admirable crops of grapes when well managed." (*Fruit Gard.*)

5299. *Speckly* says, "the soil in which I have known the vine to prosper in the most superlative degree, without artificial aid, was a kind of rich sandy loam, intermixed with beds of materials like jointed slate or stone, so very soft in its nature as almost to be capable of being crumbled between the fingers. Strong and deep lands most suitable for tillage are the least so for vines, and hence the introduction of vineyards would have no bad effect respecting agriculture." (*Tr. on the Vine*, p. 29.)

5300. *Manures.* Dung, *Speckly* observes, should not be permitted to approach the roots of vines till it be perfectly reduced to a kind of black mould. Soot, wood-ashes, pigeons' and hens' dung, he considers too hot for the root of the vine; pond-mud and moor-earth too cold. Stableyard dung is too spirituous, hot, and fiery, when introduced before its heat is thoroughly abated. Some sorts of lime are bad; but others might be advantageous, if introduced into vine compost. "Vines are greatly injured in their roots by the common practice of laying lime-rubbish for the bottom floor in the preparation of the ground. Blood, the offal of animals or shambles' manure, horn-shavings, old rags, hair, shavings of leather, bone-dust, dung of deer and sheep, and human ordure," are admissible when duly meliorated by time, a winter's frost, and repeatedly turning over. The dust and dirt of roads, *Speckly* greatly esteems as a manure for vines; its fertile nature he attributes, in part, to the dung, urine, and other rich materials with which it is incorporated; and in part to a kind of magnetic power impressed upon it by friction, and its perpetual pulverisation." (*Tr. on the Vine*, p. 37.) Cow-dung is generally preferred for the vine in France; but the vine growers take every sort of manure that they can get: the more careful, however, form composts of earth, leaves, weeds, clippings of box, cleanings of ditches, rivers, and ponds, which they turn over a year at least before using. In some places, littery dung is buried in trenches between the rows; but, in general, the dung, of whatever kind, is spread on the surface, and regularly dug in. Green crops are sown and dug in some places. (*Cours Complet*, &c., art. *Vigne*.) Forsyth considers the best manure for vines to be a mixture of vegetable mould, rotten spit-dung, and fresh loam; these ingredients should be thrown into a heap, and frequently turned a year or two before they are used. The vine is allowed by all gardeners to be a gross feeder: the fertility of both the Hampton Court and Valentines vines are attributed to their roots having found their way, the former into a large common sewer, and the latter into a pond of stagnant muddy water. (*Hort. Trans.*, vol. iii. p. 237.) Some vines in the hot-houses at Earl's Court produced abundance of blossoms the second year from the eye, and the young wood of the same vines the third year (June 1. 1820) put out laterals with large bunches of flowers; so that these vines the third year produced two crops, one of which was ripe while the other was in blossom. The cause of this extraordinary fertility was the soil of the border, which was composed of equal parts of garden-earth and blood mixed together, and repeatedly turned over one year before using.

5301. *Vine-walls.* A south wall is always to be preferred for vines; though, in some years, the

hardier sorts may attain a tolerable degree of perfection on a wall considerably inclined to the east or west. Vines, Speechnly observes, do well on low walls six feet high; and it has been found that the plants grow stronger, and afford larger grapes when they do not exceed four or five feet in height; they enjoy in this way both the reflected heat of the wall and that of the earth. Flued walls have been tried for vines in some parts of the north of England; but Speechnly, and English gardeners in general, do not approve of the practice. In Scotland, though flued walls are more common and better understood, yet vines are seldom planted in the open air. For standards or plantations in the way of vineyards, Switzer recommends, "the side or declivity of a hill lying to the south or south-east; which, if favoured with other hills, somewhat higher, clothed with wood on the north, north-east, and north-west, will break the severity of those perishing quarters." Speechnly concurs in this opinion, adding, that the hills in the counties bordering on the English Channel have in general declivities tending to the south, and are, therefore, highly favourable for vineyards. Steeps of poor gravelly and rocky soils, in warm situations, would produce more under vines than under any other crop.

5252. *Sorts for the open air.* Some of these have been already enumerated (5223.); and an addition may be made from the hardy sorts described in the catalogue, § 5224.

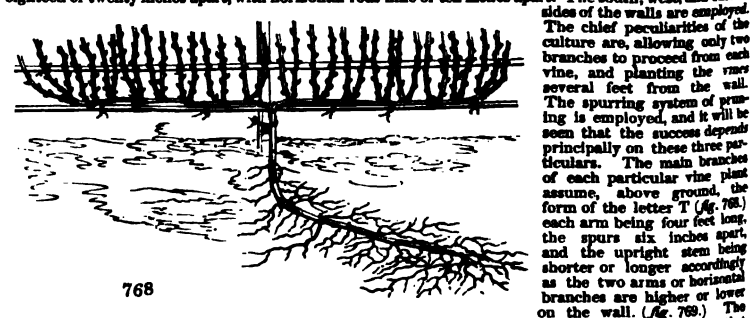
5253. *Planting.* Where a wall is to be entirely covered with vines, three plants of a sort may be planted at the distance of three, or, if a large-leaved kind, of four feet from each other; the two outer plants to be considered as temporary, to fill the wall and produce a supply of fruit; and the centre plant to be considered as permanently to fill the space occupied by the other two. The temporary plants will, therefore, be trained chiefly on the upper part of the wall, and the permanent ones below; and in four or five years the latter will be in a state to cover the wall, when the former may be rooted out. When vines are only planted in the intervals between other fruit trees, or on piers, to be trained within a narrow upright space, then one plant to each is sufficient. Some, however, as Forsyth, place two against a pier, one on each side; but this is more to obtain a variety of sorts than to fill the space.

5254. *In pruning and training* in the open air, any of the modes described as applicable to forced vines (3660.) may be adopted. As they break more regularly in the open air than when forced, the spur method (3590.) and the fruit tree method (§ 3584., fig. 725.) seem to deserve the preference.

5255. *To hasten the maturity of grapes grown in the open air,* means may be taken to throw them early into a state of rest. On the 30th of September prune the vine, as you would in the month of December, taking off all the leaves and grapes, ripe or unripe, and shortening all the branches to one, two, or three eyes at most. The following spring it will push its buds a few days before any of the neighbouring vines, pruned in winter. Train it as carefully all the summer as though you were certain that it would ripen its crop of fruit. Pursue the same system annually, pruning the tree always between the 20th and 30th of September, and in the course of seven years you will be rewarded for your patience and expense with half a ripe crop in most summers, and a whole ripe crop in warm summers. (*Gard. Mag.*, vol. i. p. 43.) For the same object, before the vines are out of flower, Mr. Fleetwood brings each branch into a perpendicular position by a thread attached to its extremity, and fastened to a nail in the wall, carefully confining the young branch with the bunch thereon, as close to the wall as possible. Fixed in this way, the bunches ripen a month earlier than when left to hang in the usual manner. (*Ibid.*, vol. i. p. 169.)

5256. *Williams of Pittaston* (*Hort. Trans.*, vol. iii. p. 250.) describes a mode of training a vine so as to fill up the vacancies of other fruit trees, which seems well deserving attention. "A vine," he says, "might be trained horizontally under the coping of a wall to a great distance, and by inverting the bearing shoots, the spaces between the other fruit trees and the top of the wall could readily be filled up, and if different vines were inarched to the horizontal branch, the south wall of a large garden might be furnished with a variety of sorts from the stem and root of a single plant, the roots of which would not encumber the border in which the other fruit trees were growing. I have an experiment of this kind now in progress in my garden. Within a few years past, I have gradually trained bearing branches of a small black cluster-grape to the distance of nearly fifty feet from the root, and I find the bunches every year grow larger, and ripen earlier as the shoots continue to advance. According to Knight's theory of the circulation of the sap, the ascending sap must necessarily become enriched by the nutritious particles it meets with in its progress through the vessels of the albumen; the wood at the top of tall trees, therefore, becomes short jointed and full of blossom buds, and the fruit there situated attains its greatest perfection. Hence we find pine and fir trees loaded with the finest cones on the top boughs, the largest acorns grow on the terminal branches of the oak, and the finest mast on the high boughs of the beech and chestnut; so likewise apples, pears, cherries, &c. are always best flavoured from the top of the tree. But I suppose there are certain limits beyond which the sap would be so loaded with nutriment that it could not freely circulate."

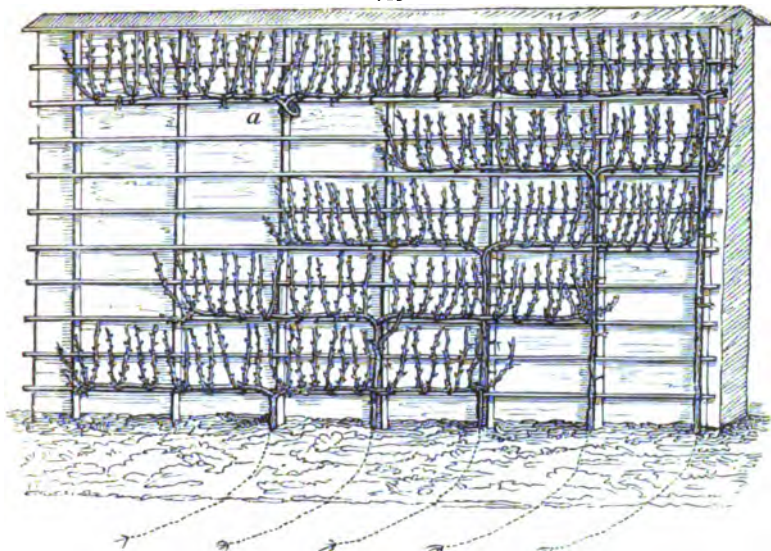
5257. *The mode of training the vine at Thomery, on the Seine,* is worthy of notice. The walls are eight feet high, built of clay, plastered or washed over with mortar of lime and sand, and covered by a coping of boards or straw, projecting nine or ten inches on each side. The trellage is formed of upright rails, eighteen or twenty inches apart, with horizontal rods nine or ten inches apart.



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horizontal branches are placed eighteen inches apart, the lowest being six inches from the ground, so that a wall eight feet high will contain five lines of mother branches. (fig. 769.) If the plants are all planted on one side, their stems at the base of the wall will be eighteen inches apart; but in very poor soils they are all planted on both sides of north walls, and the stems of those on the north side brought through holes in the wall to the south side (fig. 769. c).

5258. *Training the shoots of vines along the ground,* like those of melons and cucumbers, has been proposed by Vispré (*Dissert. on the Growth of Wine in Eng.* Bath, 1786), and was practised by him on a small scale at Chelsea, where "the grapes were considerably larger than those of the same kind growing on a south wall, and well ripened." Bacon had before suggested this mode, from a report that "in some places vines are suffered to grow like herbs, spreading upon the ground, and the grapes of these vines are very large," &c. It appears from Vispré, that the Rev. M. Le Brocq had taken out a patent for training



fruit trees in this manner. Speechly says, "Fruit trees of various sorts have been so trained at Welbeck for fourteen years;" and we saw the practice adopted in the Earl of Selkirk's garden at St. Mary's Isle in Kircudbrightshire in 1805.

5259. *Growing the vine on espaliers.* This may be done, following the same directions in all respects as for walls; but it is evident that, under such treatment, the fruit will not come to the same degree of maturity as when enjoying the shelter and reflection of a compact screen. Where wine is made from green grapes, as is now frequently done, the practice may be preferable to growing the vines as dwarf standards.

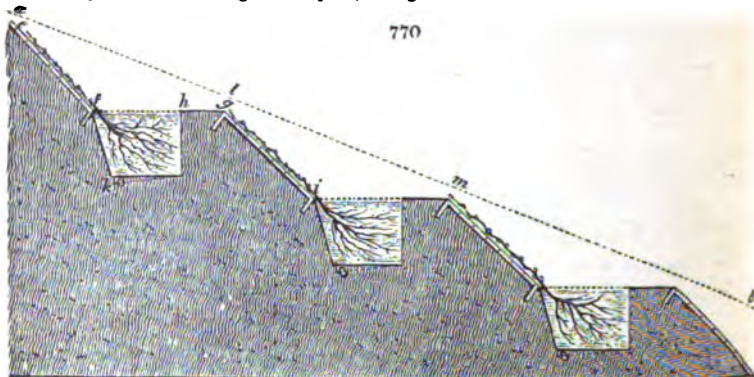
5260. *To facilitate the bursting of the buds,* they are frequently thinned out at the time of giving the vines their winter pruning. The uppermost bud is left, which may be called No. 1.; 2. and 3. are cut out; 4. is left; and so on, cutting out two and leaving one, to the bottom of the shoot. (*Gard. Mag.*, vol. II. p. 413.)

5261. *Growing vines as standards.* This practice may be adopted either in the borders of gardens, or in extensive plantations as vineyards, and the plants may be trained either like red currants or raspberries. In the former case no stakes are used; but about a foot from the ground, three or more shoots, eighteen inches or two feet in length, diverge from the stem, and supply young wood annually for bearing. The summer pruning consists in removing shoots which have no fruit, or are not wanting for the succeeding season; in topping fruit-bearing shoots, and also those for the succeeding years, when inconveniently long and straggling. For as by this mode the shoots destined to bear are all cut into three or four eyes at the winter season, no inconvenience arises from their throwing out laterals near the extremities, which stopping will generally cause them to do. This mode is adopted in vineyards on dry rocky situations where they do not run much to wood. In training standard vines, as raspberries, the single stem at bottom is not allowed to exceed six or eight inches in height, and from this two or three shoots are trained or tied to a single stake of three or four feet in length. These shoots bear each two or three bunches within a foot or eighteen inches of the ground, and they are annually succeeded by others which spring from their base; that is, from the crown or top of the dwarf main stem. This is the mode practised in the north of France, and in Germany; in the south of France, and in Italy, the base or main stem is often higher, and furnished with side shoots, in order to afford a greater supply of bearing wood, which is tied to one or more poles of greater height. The summer pruning in this case is nearly the same as in the last. In the winter pruning, the wood that has borne is cut out, and the new wood shortened in cold situations to three or four eyes, and in warmer places to six or eight eyes.

5262. *The coiling system of growing grapes* has been before (§ 2612.) referred to, as a recent invention by Mr. John Mearns. It is nothing more than taking a long shoot or cutting from a vine, taking off all the buds, and then beginning at the lower end of the shoot, and coiling it round and round, say from three to six or eight times, the inside of a pot of twelve or fourteen inches or more in diameter. The shoot may be of any length, from six feet to thirty feet, and it may be entirely of last year's wood; or the greater part of it may be of old wood, provided three or four feet at the upper end be of new wood; because, as every gardener knows, the buds from young wood are more certain than those from old wood of producing blossom the first year. The vine being coiled round in the pot, and plenty of drainage being put in the bottom, take care that the end of the shoot left out of the pot, on which the fruit is to grow, be not injured at the point where it separates from the coil. This shoot may be two or three feet long; and, to keep it steady, it may be tied to a stake, or coiled round two or three stakes. After this, fill up the pot with a rich loamy soil, pressing it firmly against the coil, as if you were making firm the end of a cutting. Unless this is done in such a manner as to bring every part of the coil in close contact with the soil, it will not root so readily as it otherwise would do. The next operation is, to wrap up all that part of the stem which is above the pot with moss, and this moss must be kept constantly moist till the grapes are formed. The pot should now be plunged into bottom heat either in a pit or forcing-house; but, wherever it is plunged, care must be taken to regulate the temperature of the atmosphere of the house, in such a manner as to prevent the top of the vine from being excited before the roots. If this should happen, the young shoots produced will soon wither for want of nourishment. Abundance of air, therefore, should be given for several weeks, so as never to allow the temperature of the atmosphere of the house, frame, or pit, to exceed 45° or 50°, while the temperature of the medium in which the pots are plunged may be as high as 65° or 70°. When, by examination, you find that fibres are protruded from the coil, the temperature of the atmosphere may be gradually raised, when the buds will soon break, and the shoots will grow apace. The shoots proceeding from that part of the stem above the pot should

he led up to within eight or ten inches of the glass, and there trained, at that distance from it, towards the back of the pit or house. It is needless to state to the practical gardener, that each shoot will require to be shortened, freed from laterals, &c. Each vine will produce from three to twenty or more bunches, according to the length of the coll and the variety of the grape. In January, 1834, Mr. Mearns had upwards of 200 colled branches in pots, and nearly fifty of them in action; some with twenty bunches of fine grapes on them. (*Gard. Mag.*, vol. x. p. 138.)

5263. *Formation of vineyards.* A vineyard is a collection of standard vines, planted in rows of a greater or less width, according to the height and mode of training proposed to be adopted; and according as the soil may be rich and deep, or poor and thin, or its surface flat or inclined. A square yard of surface to each plant, when they are kept low, may be considered as a desirable medium. Where plantations of vines are made on the sides of very steep hills, it is sometimes customary to form the surface into terraces or horizontal beds rising one above another. The width of these beds or terraces depends on the regular or irregular declivity of the hill. When the declivity is regular and the hill steep, each terrace is narrow and supported by a wall, against which the vines are planted and trained as on low garden walls or espaliers; but, in general, the irregularity of the declivity and surfaces of hills causes a very great inequality in the breadth and height of the terraces, and in these cases the vines are planted as standards, according to the room afforded by the platforms of the terraces. The walls which support these platforms, in vine countries, are generally too rude to admit of training against them, and therefore one of the standard modes above described is almost always adopted. The following is a plan recommended for this purpose:—Commence your operations upon a hill composed of chalk, or of any kind of stone which can easily be worked, having from six inches to a foot of tolerably good soil, and facing the south. (*Fig. 770.*) The inclination of the face of the hill must be as the line *a b* is to the level line *c d*. Begin to take off the earth from the top of the hill till you have worked downwards thirteen or fourteen feet; wheel it away, and lay it in a ridge at the foot of the hill; then remove the chalk or stone to any place where it will not be in the way, till you have reduced the upper part of the hill to the angle formed by *e f g*. This will give you the inclined plane *e f*, six feet broad, on which the sun at noon will shine vertically about the third week in August, and a flat terrace, *f g*, of the same breadth. From *f* to *h*, which is four feet, dig a trench two feet and a half deep; the side of a trench below *f* should be rather inclined towards the bottom of the trench below *h*, to prevent the wall, which will be mentioned presently, from sliding down. From *h* to *g* is a footpath; from *g* to *i* is the second wall. If the bottom of the



trench is composed of materials through which water will easily filter, it may be made perfectly level; if otherwise, make it a little sloping towards the back, and likewise to either end, or from the centre to both extremities, just as it may be found convenient, and place at the back a row of draining tiles, *k*, to convey the water through the boundary wall entirely out of the vineyard. The dotted line from the draining tiles shows the bottom of the trench, in case the substance of the hill retains water. At the angle close to *f* let in a row of bricks endwise; from this row, of what masons would term "headers," face up the slope with bricks laid flat in a bed of mortar, till you get within two inches and a half of *e*; the two inches and a half are to be occupied by a second row of "headers," and thus the whole will be kept firm and compact. The bricks, which are laid flat, together with the mortar, will require about three inches: this space will be gained by the masons while in the act of levelling the rough work of the labourer. The wall should be neatly pointed with good mortar; the lime may be made near the spot with the chalk dry from the hill. Having proceeded thus far, cast the turf from *i* to *u* into the trench *f h*, and then the earth which was under the turf upon it, till the trench is filled up to the level of the path *h g*. The first wall and terrace are now finished. Make similar inclined planes, trenches, and paths all down the face of the hill, constantly throwing the earth from that part of the hill you are going to work upon to the trench you have just dug out above; and the earth in the first place carried to the foot of the hill will be ready for the last trench. On these inclined walls the sun being vertical about the 30th of August, the greater portion of heat will be enjoyed by the vines at the time it is most necessary for them; as it must be recollected the grapes will be as forward by the third week in August, as they are on the common wall by the same time in September. They will be so, not merely from the greater effect of the solar rays, but from the confinement of the roots, and from the moderate supply of sap the plants will receive in consequence; for, in a damp season, they will not have more water than is useful, and, in a dry one, the supply may of course be regulated accordingly as it appears to be requisite. As no foundation is wanted for the inclined walls, and as the bricks, except the first and last course, are to be laid flat, the expense will be consequently small, compared with the number of square feet covered with vines. (*Gard. Mag.*, vol. iii. p. 148.)

5264. *Sorts of grapes proper for a vineyard.* On the Continent the vines reckoned best for making wine are by no means the most agreeable to eat; and there is always a clear distinction made between fruits to eat, and fruits for the press, by the nurserymen, who, in general, have only plants of the former sort for sale. The names of vineyard-grapes vary in every district; so that, if it were desired to procure sorts from France or Germany, only a general order could be given. In this country, however, it would probably, in the event of planting a vineyard, be found preferable to select from the sorts already acclimated: such as the clusters, sweetwaters, esperions, &c. The sorts planted in the vineyard at Palaiseau, making wine in France, Germany, and Italy, and, we are informed, in Spain, Portugal, and every other wine country, may be considered as varieties or subvarieties of the black cluster; and the vines which are grown to produce sweet wines, as the Constantia and Malmsley Madeiras are variations of the chasselas or muscadine.

5265. *Making of wine from grapes.* The making of wine is a part of domestic economy that can hardly be considered as included under gardening. We shall, therefore, merely suggest, that, where grapes are to be pressed in any quantity, the management of the liquor should not, if possible, be left to mere empirical practitioners. Some knowledge of the general principles of fermentation will help to guard against accidents, and direct in doubtful cases. An excellent paper "On the Processes of Wine-making," will be found in the second volume of the *Memoirs of the Caledonian Horticultural Society*, by Dr. Macculloch, of Woolwich. Matthews (in the *Hort. Trans.*, vol. ii.), has given a receipt for making a very tolerable sort of red wine from the leaves of the claret grape; these leaves, it is suggested, might be employed to give colour to wine produced from certain sorts of white grapes, green gooseberries, or other fruits producing a colourless fermented liquor.



means of destroying this insect." (*Tr. on the Vine*, p. 162.) The thrips (*Thrips L., Latr., and Leach*) is more injurious to vines in the forcing department than to those in the open air. However, if young shoots chance to receive any injury from late spring frosts, the tender part of the leaf will immediately curl up, and change to a dark-brown colour; and in this state, the thrips generally attacks them with great greediness, especially the white sweetwater and white muscadine kinds. The green fly sometimes attacks vines; but seldom so as materially to injure them. Smoking destroys both insects. There are two or three kinds of cocci or turtle insect which attack the vine (*Coccus hesperidum and adonidum*), but they rarely do much injury in the open air.

5267. *Grapes are attacked by birds, wasps, and flies.* To protect them from the first, netting or bunting should be used; or, when the fruit is nearly ripe, bagging may be adopted. Some use black crape, and others gauze; but it is found that the berries do not attain so large a size in the latter material as in the former. (*Gard. Mag.*, vol. iv. p. 486.) Wasps, flies, and other insects may be collected by bottles, filled with some sweet water, suspended on nails near the principal bunches. In some places the hornet (*Vespa Crabro L., fig. 771.*) joins in the same devastation.

SUBJECT. 3. *Fig.* — *Ficus Cárlica L. (Trew. Ehret. t. 79, 4.); Polygámia Dia'cia L. and Urtices J. Fiquier, Fr.; Feigenbaum, Ger.; Vigenboom, Du.; Fico, Ital.; and Higuera, Span.*

5268. *The fig tree* is a low tree, a native of Asia and Barbary; naturalised in Italy and the south of France, and enduring the open air in the mildest parts of Britain. The fig tree in France and Italy grows as large as our apple trees, but in this country, except in the southern parts of England, it seldom exceeds two yards in height. The fruit is a berry, turbinate and hollow within: produced chiefly on the upper part of the shoots of the former year, in the axils of the leaves on small round peduncles. The flower is produced within the fruit; what is considered as the fruit being a common calyx or receptacle: the male flowers are few, and inserted near the opening in the extremity of the receptacle, or fruit; the female flowers are very numerous, and fill the rest of the hollow space within. The greater part prove abortive, both with and without the process of caprifigation. The fig forms an important article of culture in the islands and on the shores of the Mediterranean sea, and especially in Greece, Italy, and Spain.

It is also much cultivated for drying in the south of France; and for the table, at Argenteuil, near Paris. The earliest notice we have of its culture in England is by Turner in 1562. The first trees were brought over from Italy by Cardinal Pole, in 1535, during the reign of Henry VIII., and yet exist in the gardens of the archbishop at Lambeth. They are of the white Marseilles kind, and still bear delicious fruit. They cover a space of fifty feet in height, and forty in breadth; the circumference of the trunk of two of the trees is twenty-eight, and of another twenty-one inches. In the severe winter of 1813-14, these trees were greatly injured, and in consequence their principal stems were cut over near to the ground; but this we believe has happened several times with many very old fig trees, without destroying them. Some of the largest standard fig trees in England are in the castle garden at Arundel, where they bear abundantly every year; the highest trees there are upwards of thirty feet. There are also orchards of standard figs at Tarring and other places on the coast of Sussex. Gerarde says, "the fig requires a hot wall;" and Parkinson, that fig trees are planted in great square tubs, to be removed into the sun in the summer time, and into the house in winter. The culture of the fig was little known here till the time of Miller, who introduced above a dozen new sorts from Italy. He observes, that the generality of Englishmen are not lovers of this fruit, and that, therefore, few trouble themselves with the culture of it. Since Miller's time, the fig has been introduced to the forcing department, and there

cultivated to a much higher degree of perfection than before on open walls; and though it be still true, that a taste for the fig in its green or fresh state is less prevalent in England than elsewhere, yet, by those who have been some time abroad, it is generally much esteemed.

5269. Monck believes the fig tree to be, of all the fruit trees which we cultivate in our gardens, the least understood; but, to those who may have acquired a knowledge of its habits, the most tractable. No tree is propagated more easily. "I sent from London, in April last, to Kolas in Northernland, two cuttings of figs," he says, "which were so small as to travel by the post in a common letter-cover. I have gathered this autumn from one of them three ripe figs, and two from the other. The fig tree may be checked in its usual habit of luxuriant growth by ringing, so as to become fruitful at a very small size. It may be forced by heat and liquid manure, with copious irrigation, so as to support an abundant crop of fruit, and bring them to perfection, to a greater extent than any other tree. Spare branches of a large fig tree growing out of doors may be ringed, and surrounded by a small pot of earth, into which they will speedily strike roots, so as to bear being separated in autumn from the tree; and they may be used to furnish any glass houses with trees to bear fruit through the next summer. I believe, too, that the fig tree may be easily propagated by inoculation, if that should be desired." (*Hort. Pyram.*, vol. v. p. 178.)

5270. *Use.* It is cultivated here entirely for the dessert; but in fig countries it is eaten green or dried, fried or stewed, and in various ways, with or without bread or meat, as food. Abroad the fig is introduced during dinner, as well as at the dessert. In common with the melon, it is presented after soup; and the person who eats a fig, holds it by the small end, cuts a thin circular slice off the large end, and then peels down the thick skin of the fruit in flakes, making a single *bonne bouche* of the soft interior part. All the species of the genus *Ficus* have more or less the quality of interesting animal fibre, like the papaw tree (*Cárica Papáya*), the *F. elástica* in the greatest degree, and next, the common fig. The milky sap may be used as rennet, and for destroying warts. Phillips says, "a gentleman who lately made the experiment, assured me that a haunch of venison, lately killed, was hung up in a fig tree when the leaves were on, at about ten o'clock in the evening, and was removed before sunrise in the morning, when it was found in a perfect state for cooking, and that in a few hours more it would have been in a state of putrefaction." (*Pom. Brit.*, p. 169.)

5271. *Varieties.* These, in fig countries, are almost as numerous as those of the grape; new sorts being readily procured from seed, and continued by cuttings, layers, or grafting. Boos says, that even in France new sorts are continually produced, and as quickly falling into neglect. The varieties in England have of late years been greatly increased. The following list is taken from *Lindley's Guide*, &c.

I. Fruit blue or black.

1. *Black German*: skin dark purple, and pulp bright red, and highly flavoured; ripe in August.
2. *Black Ischia*: fruit middle-sized; skin black; pulp deep red, and highly flavoured; ripe in August.
3. *Black Italian*: fruit small and round; pulp very delicious; an abundant bearer in pots.
4. *Large blue*, Common blue, or Purple, (fruit blue, large purple: fruit large, oblong; pulp deep red, of a very good flavour; very hardy, and a most excellent bearer.
5. *Small blue*, Little blue: fruit below the middle size; pulp red, of a good flavour; ripe in August.

II. Fruit red or purple.

6. *Bordeaux*, *Figue patre*, *Violette de Bordeaux*: fruit pyramidal; skin brownish-red, becoming deep violet when fully matured, slightly mottled with a few greenish specks; pulp deep red or purple, succulent and sweet, but possessing a very high flavour. Cultivated throughout the south of France, where it produces two crops annually.
7. *Brown Turkey*, Brown Italian: fruit small and round; pulp very delicious; the plant equally desirable for growing in pots.
8. *Brunswick*, *Madama*, *Hanover*: fruit very large; skin pale green on the shaded side, next the sun of a brownish-red; flesh pinkish, extremely rich, sweet, and high-flavoured; ripe the beginning and middle of August. "This," says Mr. Lindley, "is one of the most useful of the hardy figs. In a south-eastern corner, trained against a wall, it ripens by the middle of August, in even

unfavourable seasons. In an ordinary summer, in the neighbourhood of London, it begins to mature by the beginning of that month. It is, perhaps, the largest Purple fig we have, and the most useful variety that can be selected for a small garden."

9. *Chesnut*, Chestnut-coloured *Ischia*, *Brown Ischia*: fruit large, globose; eye pretty large; pulp purple, sweet, and high-flavoured; seeds large; the suit of this sort generally bursts open when ripe. If planted against a hot-wall, two crops may be obtained annually.
10. *Long brown Naples*, *Long Naples*: fruit long; pulp red, and well-flavoured; seeds large; ripe in September.
11. *Male*, Small brown of some gardens: fruit small; pulp very sweet and well-flavoured; ripe towards the end of August, and if the fruit is permitted to hang upon the tree till it is shrivelled, it becomes a fine sweetmeat.
12. *Murphy brown Naples*, *Round Naples*: fruit pretty large, globose; light brown; pulp of a good flavour; seeds large; and ripe the latter end of August.
13. *Progenies*: fruit large; pulp deep red, remarkably sweet and rich; seeds unusually small; ripe from August to October. This beautiful and excellent variety was sent to England from the Ionian Isles by Dr. Skye.
14. *Purple Genoa*: fruit large; pulp extremely sweet and luscious.
15. *Small brown Ischia*: fruit small; pulp purple, of a very high flavour; leaves less divided than most other sorts; ripe late in September.
16. *Violette*, *Figue violette*: fruit small; pulp near the skin white, in the in-

terior deeply tinged with red. Produces two crops annually in the neighbourhood of Paris, of which the autumnal one is the most productive.

III. Fruit yellow, reddish, or green.

17. *Angélique*, *Concombre blanche*, *Mé-lisse*: fruit rather small; skin yellow; pulp white; resembles the *Marseilles*, but longer; in a fine season the fruit is excellent.
18. *Green Ischia*: fruit oblong; skin green; pulp high-flavoured, especially in warm seasons.
19. *Marseilles*, *White Marseilles*, *Peach*, *Figue blanche*: fruit small; the skin pale green; flesh white, dry, sweet, and rich; ripe in August; succeeds well in the highest temperature of a pine-stove, in which it has been for many years cultivated by Mr. Knight, of Downham Castle.
20. *Red*: fruit rather less than the *Marseilles*, and more long in shape; skin pale greenish yellow; pulp similar in colour to the skin of a green gooseberry; much the richest fig known in Britain; there is in its juice a slight degree of very delicate acid, which renders it peculiarly agreeable to most palates; succeeds only under glass in a low temperature; it would probably mellow well if placed in the free soil of a conservatory.
21. *Small green*, *Little green*, *Green red within*: fruit small; skin green and thin; pulp red and excellent; the tree is a low grower, hardy, and a very good bearer.
22. *Yellow Ischia*, *Cypres*: fruit large; skin yellow; pulp purple and well flavoured; leaves large, and not much divided; ripe in September; the tree grows luxuriantly, but does not produce much fruit in England.

5272. According to Forsyth, the figs proper for a small garden are the

Large white Genoa. | Early white. | Murry fig. | Small brown Ischia. | Black Ischia.

5273. *Sauvage* recommends for a regular succession of figs from August to October, inclusive, the

Brown Ischia, Large white Genoa, Green Ischia, Brown Naples, White Marseilles, Black Provence, Yellow Ischia, | and Gentile; which ripen in the order in which they are here placed, from the middle of August to the end of October.

5274. *Lindley's* selection for a small garden in the southern and midland counties of England is as follows:

Black Ischia. | Brunswick. | Malta. | Large white Genoa. | Neri. |
Brown Turkey. | Chesnut. | Progenies. | Marseilles. | Small early white.

5275. *Propagation.* Figs may be propagated from seed, cuttings, layers, suckers, roots, and by ingrafting; the most generally approved method is by layers or cuttings, which come into bearing the second, and even the first year.

5276. *By seed.* Here the same process as that directed for raising seedling vines is to be followed, with this difference, that the young plants should not be cut down on account of their mode of bearing. They will produce fruit in the sixth or seventh year. The process of crossing to obtain new varieties can be performed only in the general way, of placing two or more sorts together; or of introducing with a small hair pencil the pollen from the male variety, to take effect in conjunction with that of the male blossoms in the plant destined to bear seed. Possibly, however, some curious horticulturist may find a

mode of cutting out the male blossoms without destroying the females; in which case the pollen from another variety may be introduced to take effect alone.

5277. *By cuttings.* These are formed of young wood from eight inches to twelve inches in length, with or without an inch or two of old wood attached. They should be taken from the most fruitful, well-ripened, short-jointed boughs in autumn, and either preserved from the frost till spring, or planted in pots or in a bed of earth from six to nine inches deep, without cutting off their tops. The soil should be a loam inclining to sand, and in a warm situation; it should be covered with old bark, leaves, or ashes, to keep out the frost in spring, and the drought in summer. If the cuttings have been planted in autumn, then their tops will require the additional protection of haum or litter during winter. Give water and keep clear of weeds during summer, and by the following autumn the plants will be fit to be transplanted into nursery rows; where they must be again mulched at root, and protected at top. They require no pruning farther than what may be necessary to rear them with a single stem, and keep their heads of a regular shape; the second or third year they may be removed to where they are finally to remain. Cuttings of roots readily make plants, but the process is too slow for general use, and the plants so produced are not likely to come so soon into bearing as by the layers or cuttings of the young wood.

5278. *By layers.* This is the quickest mode of getting bearing trees, as shoots of two or three years' growth, if laid down, will make abundant roots the first summer, and will admit of being taken off and placed where they are finally to remain in the autumn.

5279. *By suckers.* This is an easy, but a bad method, for a common reason, that all trees raised from suckers are subject to send out great quantities of suckers again from their roots, which branches are never compact and fruitful, because too luxurious to be ripened in our climate.

5280. *By grafting.* This mode can only be advantageously adopted in cases similar to those recommended for grafting the vine. (5268.) The process by any of the modes readily succeeds, and we have seen in Italy above a dozen sorts of figs on one tree.

5281. *Budding.* As we have seen (5269.), is also applicable in this tree as in most others.

5282. *Culture.* For the culture of the fig in the *Forcing Department*, see § 3667. In the open air, the plants are grown as standards, espaliers, and against walls; but, as already observed, the fruit produced in any of these situations is of very inferior flavour to that grown under glass. A crop of figs, Miller observes, is generally more uncertain than that of any other fruit: and Neill says, Britain is certainly not the country for figs. From the attention most paid to this fruit, however, by some eminent horticulturists, we may hope for some improvement at any rate for the more general taste for the fruit.

5283. *Soil.* The fig tree thrives in all soils not wet at bottom; but they produce a greater quantity of fruit upon a strong loamy soil than on dry sandy ground, a dry soil being apt to make them cast their fruit. Miller says, "I have always observed those fig trees to bear the greatest quantity of well flavoured fruit which were growing upon chalky land, where there has been a foot or more of a gentle loamy soil on the top. They also love a free open air; for although they will shoot and thrive very well in close places, yet they seldom produce any fruit in such situations." Smith (*Caled. Hort. Mem.*, vol. ii.), after trying several soils, found the fig tree thrive best in a light friable loam, free from latent water at bottom.

5284. *Growing the fig as standards.* In fig countries, this tree is always grown as a standard; and here dwarf standards, planted in fine warm situations, will, in very favourable seasons, afford tolerable crops of fruit. Some of the best in England are at Arundel Castle; and there is a fig orchard of nearly 100 trees at Tarring, and another of 14 trees at Tompning, near Worthing. (*Hort. Trans.*, vol. iv. p. 506.) Those at Arundel are planted six or eight feet apart, and from a single stem allowed to continue branching into regular cordons, the heads pruning chiefly irregular and redundant growths, and cutting out decayed or injured wood. Miller says, standard fig trees, when protected during winter, generally bear better than those against walls; which, however, may be considered as in great part owing to the mode of training and pruning figs in the latter situation not having then been generally understood. At Argenteuil, where the fig is cultivated in immense quantities for the supply of the table, the plants are grown as dwarf standards; and the chief part of their culture, Bosc observes, consists in keeping their branches short, low, and spreading, to enjoy both the heat of the sun and reflection of the earth. The ground is manured occasionally, and stirred at least once a year; and for protection from the frost during the winter, the circumferential low branches are buried six inches in the soil, and the central ones enveloped in litter. (See *Gard. Mag.*, vol. vii. p. 262.)

5285. *On espaliers.* Where figs will succeed as standards, they will also thrive against espalier rails; in which situation they admit of being more readily covered or protected during winter. The plants may be placed at ten or twelve feet distance, and trained in the fan or horizontal manner.

5286. *On walls.* This mode is probably the best mode for our climate, as it admits of more readily protecting the plants during winter, and is more likely to bring the fruit to maturity in the summer or autumn. The distances at which the plants are placed will depend on the height of the wall. In general, a low wall is to be preferred, both because the fig is naturally adapted for being kept low, and because, when low, it admits more readily of protection. The plants may be placed from fifteen to twenty feet apart, with temporary trees of any other fruit between.

5287. *Mode of bearing.* "The fig tree," the Hon. W. Wickham observes, "is distinguished from most, if not from all, other trees, by this extraordinary property, that it bears, and, in warmer climates, brings to maturity, in every year, two successive and distinct crops of fruit, each crop being produced on a distinct set of shoots. The shoots, formed by the first or spring sap, put forth figs at every eye, as soon as the sap begins to flow again in July and August. These figs (which form the second crop of the year), ripen, in their native climate, during the course of the autumn; but rarely, if ever, come to perfection in England, where, though they cover the branches in great abundance, at the end of that season, they perish, and fall off, with the first severe frosts of winter. The shoots, formed by the second flow of sap, commonly called midsummer shoots, put forth figs in like manner at every eye, but not until the first flow of sap in the following spring. These last-mentioned figs, which form the first crop of each year, ripen, in warmer climates, during the months of June and July, but not in this country before September or October. In warmer climates, indeed, very little attention is given to this first crop, because the midsummer shoots, on which it is borne, are commonly in the proportion only of one to six or eight in length, when compared with the shoots of the spring, which produce the second crop; and the crop itself is always small, in the same proportion: but in England, it is the reverse, as no care or skill of the gardener can ever insure a second crop of ripe figs in the open air."

5288. *Pruning and training.* Most gardeners, Miller observes, imagine that fig trees should never have much pruning; or, at least, that they should always be suffered to grow very rude from the wall to some distance. A pruned fig tree never bears, is a common saying, nor, according to Wickham, can its truth be denied, when applied to the most common method of pruning these trees, *i. e.* by cutting away or shortening the last year's shoots, instead of cutting away old wood, and training those shoots to the wall in its place.

5289. Wickham recommends a system of pruning which may increase the proportion which the midsummer shoots (the only ones, as stated above, which produce fruit that ripens in this country) bear to the spring shoots, both in number and length. For this purpose, he breaks off the spring shoots as they nearly attain their full growth, and just as the spring sap in each begins to abate something of its full vigour. He breaks them at moderate distances (six to fifteen inches, according to the strength of each shoot), from the place whence they severally spring, taking care that enough of the shoot be left to admit of its being bent back, and nailed close to the wall at the ensuing winter pruning, and that one eye, at least, be left uninjured by the fracture; and always preserving a quantity unbroken, sufficient to keep up a future supply of branches and wood. The shoot may be either broken short off, or left suspended by a

few ragged filaments, which may afterwards be separated with a knife, when the spring sap has ceased to flow. The former mode is less unsightly, and will therefore be generally preferred by the gardener; but the latter has been found more successful in practice. It is of consequence, however, to the full success of this system, that the shoots should be broken and not cut. If left to their natural growth, or shortened by a sharp smooth cut with a knife (instead of a fracture), they would produce, at their extremities, only one single midsummer shoot, being a simple prolongation of the wood, formed in the spring; but when the shoot is broken at the time and in the manner above described, it generally happens that, on the second flow of sap in July, two or three more shoots (forming a kind of stag's horns) are pushed from the fractured part instead of one; and it is hardly necessary to add, that each of these, according to its length, will produce several figs in the ensuing spring (making the first crop of that fruit), all of them capable of being ripened by our ordinary summer and autumn heats. A sufficient supply of midsummer shoots being thus procured during the summer, room must be made for them at the succeeding winter pruning, by cutting away so much of the old wood as will admit of their being all trained in, at full length, and nailed close to the wall, which should always be done before the first severe frosts. Keeping this object in view, the knife cannot well be used too freely in cutting away the old wood, nor is there any reason to fear that its free use will either injure the future crops, or deprive the tree of its regular supply of branches. The midsummer shoots being trained in, each of them will produce, in the following year, one spring shoot, at least, at its extremity, whilst another will rise from each eye of the remnants of the old spring shoots that had been preserved in the manner above described, when these shoots were broken in the preceding month of June. From this fresh supply, by pursuing the system here explained, either wood or fruit, or both, may be obtained for the succeeding year, at the discretion of the gardener. Where he wishes for wood, he must suffer these new shoots to grow to their full length: where fruit, and not wood, is desired, he must break them in the month of June, in the manner and with the precautions that have been minutely explained. (*Hort. Trans.*, vol. iii. p. 74. et seq.)

5290. *Knight* disapproves highly of training the branches of fig trees perpendicularly, as encouraging too much the prolongation of the shoots; he approves of Wickham's mode in warm situations, but in high cold situations, he radiates his branches from the top, and parts near it, of a single stem. He says, "Let the stems, if there be, as usual, many within a narrow space, be gradually reduced to one only; and from the top, and parts near it, of this, let lateral branches be trained horizontally and pendently, in close contact with the wall. Under such treatment, all troublesome luxuriance of growth will soon disappear; the pendent shoots will not annually extend more than a few inches, and few or no more leaves will be produced than those which the buds contain before they unfold. The young wood consequently ceases to elongate very early in the season, and thence acquires perfect maturity; while, by being trained close to the wall, it is secure, or nearly so, from injury by the severest frost. The quantity of mature and productive young wood thus necessarily becomes very great, relatively to the size of the tree: and the fruit, being in contact with the wall, and not shaded by excess of foliage, acquires an early and perfect maturity." (*Hort. Trans.*, vol. iii. p. 307.)

5291. *The Rev. G. Swayne* recommends rubbing off, as soon as they can be discovered by the naked eye, all the figs which are produced after midsummer on the same year's shoots. The object is not only to prevent those figs which would never ripen without artificial heat from exhausting the tree, but to give it sufficient time to employ the strength which would have been wasted in nourishing these incumbering branches, in the preparation of new embryo figs for the following year. "If this operation," he says, "be performed in due time, it will not fail to prepare for one, and often on both sides of almost every fig so displaced, such embryos. For this purpose, the trees should be examined once a week, from the beginning of August, at which time the figs of this second crop usually begin to show themselves, and this examination must be repeated as long as any continue to make their appearance. Most gardeners," he says, "omit removing these late figs at all, or delay the practice till October or November, when no benefit is derived from it." He trains the trees horizontally, and does not prune them till late in the spring, when he can plainly distinguish between a leaf-bud and a fruit-bud, and discover the whole of the mischief occasioned by the frosts of the preceding winter. (*Hort. Trans.*, vol. iv. p. 430.) The above practice, in connection with the mode of training recommended by *Knight*, would, we think, effect an important improvement in the culture of this fruit. Wickham's mode appears to excite too much the powers of the tree; and the common mode of fan-training from three or four root-stems, which are in fact so many suckers, is only calculated to produce wood and leaves. Training the figs on walls, as a rider, and, in the steeple manner (fig. 855. c), and pinching off all the embryo fruit after midsummer, would probably effect every thing that can be desired in the culture of this tree on the open wall in this country.

5292. *Peacock* considers that the fig requires a plentiful supply of water during summer, in order to swell the fruit to a sufficient size. He grows them against a wall fourteen feet high, with a coping which projects fifteen inches. This coping adds to the labour of watering during the spring and summer months, but by preventing radiation it promotes the ripening of the fruit in August, September, and October. (*Gard. Mag.*, vol. vii. p. 327.)

5293. *Protecting during winter.* This is found necessary in many parts of France, and everywhere in Britain. *Miller* recommends tying together the branches of standards, and applying pease-husks, straw, or any other light covering, and placing rolls of reeds on each side of espaliers; removing these coverings in mild weather, to prevent the figs from coming out too early. *Forayth* covers fig trees against walls with "laurel, yew, fir, or spruce boughs," and then "tucks in short grass or moss against the branches." *Smith* covers with spruce fir branches, from three to six feet long, fastening them to the wall by the middle rib of the branches, in two different places. "To prevent any friction by the wind, the branches should be made to fit each other, so that the covering may be of a regular thickness over every part of the trees. As the covering is generally put on the trees in the month of December, the branches remain green all the winter; in the month of March, when the days get long, the leaves begin to drop from the branches, and continue falling through April; and by the beginning of May, when the covering is entirely removed, only the ribs of the branches are found remaining. Thus, the progress of the season reduces the coverings in a gradual manner, so as not to expose the trees to any sudden check, which might be the case, if they were all at once laid open to the weather."

5294. *Sawyer*, in November, detaches the branches of his fig trees from the walls, picks off all the autumnal fruit that are larger than a filbert, or not of a dark shining green; he then ties the branches of the tree together in bundles, forming a sort of cone, filling the interstices with dry hay, and wrapping mats round the whole. After this he lowers the cones to the right and left, and makes them fast to the wall with rope-yarn. In this state they remain till March, when the whole is undone, and the branches replaced and covered first with treble, then double, and lastly single netting, which last is removed in May. 5295. *Meun* (*Hort. Trans.*, vol. ii.) adopted the French mode of burying the branches in the soil, in 1780, and has practised it with success ever since.

5296. *Wickham* observes (*Hort. Trans.*, vol. iii. p. 80.), in respect to covering fig trees, that "much must be left to the care and skill of the gardener, whose precautions must be determined, as well as varied, by the situation, aspect, and local shelter belonging to each particular tree, and by the varying temperature of each particular winter; it may, however, be laid down as a general rule, that the covering, where used, should be as thin and light as a due consideration of all the above circumstances will admit, and that it should generally be removed in the day-time, and always on the return of moderate weather."

5297. *Swayne* protects the branches of fig trees during winter, by wrapping strips of old newspaper round them, and afterwards attaching the branch to the wall. This covering is removed towards the latter end of April. The branches are previously loosened and pruned, to reduce to a minimum the quantity of paper and labour required. Printed paper is preferred to plain paper, because having a

considerable portion of its surface covered with the oil of the ink, it does not readily imbibe moisture. (*Gard. Mag.*, vol. i. p. 306.)

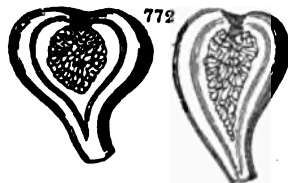
5298. *Pearson* employs spruce fir branches, sticking them in in November, and leaving them till the leaves drop off of themselves in the beginning of May. (*Gard. Mag.*, vol. vii. p. 329.)

5299. *Ripening the fruit.* Williams suggests that the practice of taking off a circular ring of bark from the lower part of the branches of the fig, in the manner he has so successfully practised on the vine, might accelerate the maturity of the fruit. Monck tried ringing, and found that it may be practised on the fig tree with "as much safety, and more effect upon the age of its fruit, than on the pear tree." (*Hort. Trans.*, vol. v. p. 172.) In Italy, a wound with a knife is sometimes made on the broad end of the fig, or a very small part of the skin of the fruit removed for the same purpose. Brandy is also sometimes applied, either by a puncture on the side of the fruit with a bodkin dipped in the spirit, or by dropping a small quantity in the eye of the fruit. "Plums and pears," Tournesfort observes (*Travels*, letter viii.), "pricked by insects, ripen the faster for it, and the flesh round such puncture is better tasted than the rest. It is not to be disputed but that considerable change happens to the contiguity of fruits so pricked, just the same as to parts of animals pierced with any sharp instrument." (*Hort. Trans.*, vol. v. p. 172.) At Argenteuil, the maturity of the latest figs is hastened by putting a single drop of oil into the eye of each fruit. This is done by a woman, who has a phial of oil suspended from her waist, and a piece of hollow rye-straw in her hand; this she dips into the oil, and afterwards to the eye of the fruit, in the manner described at length in *Gard. Mag.*, vol. vii. p. 262. The ripening of figs by this method is practised in other parts of France.

5300. *The process of caprification of figs* is performed in the Levant to hasten the maturity of the autumnal crop, and consists in placing on the fig trees what are called *figues-fleurs*, or spring figs, in which a certain insect of the great species (*Culex L.*) has deposited its eggs. From these eggs, in the spring figs, proceed a multitude of grubs, which, in their turn, deposit their eggs in the autumn figs, or rather in their flowers, effecting in their passage the fecundation of these flowers, and, by consequence, hastening the maturity of the fruit. The most enlightened French naturalists are of opinion that this is a very unnecessary part of the culture of the fig. Olivier, member of the Institute, and author of a *Journey through the Ottoman Empire*, considers it as "a tribute which man pays to Ignorance and prejudice." "It is not performed, nor is it done in France, Italy, or Spain; and it is now neglected in some of the isles of the Archipelago, where it was practised formerly." Bosc says, "the larva of the *Cynips*, in eating the interior of the figs, can be no otherwise useful than the larva of the *Pyrale pommonelle* of Hübner (*Phalaena L.*), or apple-worm, can be in hastening the maturity of the apple: and who would take it upon him to advise rendering apples worm-eaten in order to enjoy the advantage of eating them a fortnight sooner?" This remark, it may be observed, rather confirms the idea that caprification hastens maturity, which, from what we have seen in the neighbourhood of Rome, Naples, and at Argenteuil, we believe to be the case; we agree, however, with Olivier, that it is by no means absolutely necessary to fecundation; and even if it were, that fecundation is not essentially requisite to the swelling and ripening of the figs.

5301. *The culture of the fig tree in pots* is very generally practised by such as have forcing-houses. Cuttings may be put in in March in pots of a small size, and plunged in heat; in the first season such cuttings will frequently produce one or two fruit, and there can be little doubt that, if long branches were collared into pots or boxes, in Mr. Meerna's manner (15982), they would produce considerable crops the first season. We have already (12679.) given in detail the ordinary practice of forcing the fig in pots.

5302. Monck has made some curious experiments and observations on this subject, from which he is led to conjecture, 1. That fig trees never bear figs which contain both kinds of florets in an efficient state; 2. That figs in which the anther-bearing florets only are perfect, never come to be eatable fruit; 3. That you may pronounce, from the external shape of a fig, which kind of floret prevails—the stigma-bearing in the pear-shaped (fig. 772. a) the anther-bearing in the squat figs (b); 4. That fig trees, which put forth crops of figs, and cast them, most probably do so from defect



of setting. (*Hort. Trans.*, vol. v. pp. 168, 169.)

5303. *Insects and diseases.* The fig is subject to few of either of these in this country. In forcing-houses it is liable, in common with other plants, to the attacks of the red spider, coccus, and aphides, and occasionally also on garden-walls. The remedies are obvious. In France they are attacked by a species of coccus, vulgarly called the fig-louse, which proves very injurious, and is only to be destroyed by rubbing it off with a coarse cloth.

SUBJECT. 4. Melon. — *Cucumis Melo L.*; *Monacica Monadelph. L.* and *Cucurbitacea J.* Melon, Fr.; *Melone*, Ger.; *Meleon*, Du.; *Mellone*, Ital.; and *Melon*, Span.

5304. *The melon* is a tender annual, producing one of the richest fruits brought to the dessert, and cultivated in England since 1570; but the precise time of its introduction, and the native country of the plant, are both unknown. It was originally brought here from Jamaica, and was, till the time of Miller, called the musk melon. The fruit, to be grown to perfection, requires the aid of artificial heat and glass, throughout every stage of its culture. Its minimum temperature may be estimated at 65°, in which it will germinate and grow; but it requires a heat of from 75° to 80° to ripen its fruit, which, in ordinary cases, it does in four months from the time of sowing the seed.

5306. *Varieties.* There are numerous varieties, many of which, especially those raised from seeds brought from Italy and Spain, are not worth cultivating. The sorts most generally cultivated in Britain are included under the name of cantaloupe, an appellation bestowed on them from a seat of the Pope near Rome, where this variety is supposed to have been originally produced. There are also a number of varieties of Persian melon, which are very highly esteemed; and some cultivate the winter melon, and the water melon, the last of which is a distinct genus (*Cucurbita*). The varieties of the melon, like those of most other annual fruits in general cultivation, are continually changing; and the sorts which may be fashionable at one period, may be known only historically at another. We have taken the following list from *Lindley's Guide*; vol. i. new series of the *Horticultural Society's Transactions*; and the *Gardener's Magazine*.

I. SUMMER MELONS.

1. *With red flesh and thick rind.*
1. *Black rock*: fruit very large; skin of a very deep green, but turning yellow when ripe, and covered with large knobs or carbenches; flesh of a deep orange colour; weight from 5 to 14 lbs.
2. *Dutch rock*: resembles the Black

rock, but is smaller; the weight being generally from 5 to 8 lbs.

3. *Early cantaloupe*: fruit small, ribbed, nearly round; skin whitish green, blotched with darker green; flesh deep orange, juicy, of pretty good flavour; weight from 2 to 4 lbs.
4. *Early Pielme*: fruit middle-sized, spherical, 5 or 6 inches in diameter; skin pale yellow, slightly warted;

flesh $\frac{1}{4}$ inch thick, of a yellowish-salmon colour, sweet, and well flavoured.

5. *Hardy ridge*: fruit rather small, round, depressed, strongly ribbed, irregularly warted all over its surface; skin dull yellow, mottled with dull green; flesh $\frac{1}{2}$ inch thick, bright orange-red, sweet, and well flavoured.
6. *Melon des Carmes*: fruit oblong, ta-

- perting to each end, 8 inches in diameter in the middle, and 12 inches long; skin bright orange, mottled with dark green; flesh pale salmon-colour, 3 inches thick, tender, not juicy, but sweet and good-flavoured.
7. *Melange cantaloup*: fruit sometimes round, sometimes oval, about 5 inches in diameter; skin greenish white, netted; flesh 1½ inch thick, red, but not high-coloured, soft, juicy, sweet, and delicate.
8. *Netted cantaloup*: White-seeded small; fruit round and rather small; skin pale green, very closely reticulated; flesh dark reddish orange, with a rich sugary juice.
9. *Netted succula*: fruit middle-sized, somewhat ribbed; skin dull pale green, very closely covered with reticulations; flesh deep orange colour, firm, and high-flavoured.
10. *Orange cantaloup*: fruit below the middle size, round; skin pale yellow, becoming deeper coloured when ripe, and a little netted on its surface; flesh deep orange-red, juicy, sugary, and extremely high-flavoured.
11. *Romane*: fruit middle-sized, oval, slightly ribbed; skin pale yellow, reticulated on the sides, deep yellow, firm, and well flavoured.
12. *Scarlet rock*: fruit oblate, deeply ribbed, about 5 inches long, and 7 inches in diameter; skin pale green, mottled with dark green; flesh of a reddish salmon colour, tender, juicy, sweet, and high-flavoured.
13. *Silver rock*: fruit middle-sized, oblate, about 5 inches each way; skin greenish yellow, with a few small dark salmon-coloured blotches; flesh pale salmon-colour, sweet, and well flavoured.
14. *Smooth scarlet-fleshed*: fruit nearly round, occasionally inclining to oval, about 5 inches in diameter; skin greenish yellow, spotted with small green spots, and more or less netted on its surface; flesh bright scarlet, firm, and high-flavoured.
- II. *With green flesh and moderately thick rind*.
15. *Green-fleshed*: fruit roundish, flattened at both ends, 5 inches long, and 4 inches in diameter; skin smooth, of a pale silvery green, slightly netted; flesh green, exceedingly sweet and high-flavoured; weight from 2 to 3 lbs.; a very excellent melon.
16. *Italian green-fleshed*: fruit small, round, or somewhat oval, about 4½ inches in diameter; skin pale greenish white; flesh dark green, but pale towards the inside near the seeds, about 1 inch thick, soft, juicy, very sweet and high-flavoured; weight from 2 to 3 lbs.

- III. *With green or white flesh, and thin rind*.
17. *Darce melon*: fruit oval or ovate, about 9 inches long, and 6 inches in diameter; skin closely mottled with dark sea-green upon a pale ground, rather widely netted, but is subject to become smooth; flesh white, thick, crisp, and melting; when fully ripened very sweet, but rather insipid if imperfectly matured: it is eaten raw, however, and pleasant.
18. *Gerse melon*, *Gerich melon*: a handsome green fruit; in shape it is oval or ovate, 8 inches long, and 4½ inches in diameter; the skin is closely mottled with dark sea-green, upon a pale ground, and is either netted or not; in the former case, the meshes are very close, by which character it may readily be known from the Darce: when well ripened, various and numerous longitudinal fissures appear upon the rind, which are sometimes from 9 to 11 short dark green streaks, radiating from the apex; stalk very short; flesh 1½ inch or 2 inches thick, bright green, melting, very sweet, and highly flavoured; the Gerse melon is a good bearer, but tender.
19. *Green flowers*: fruit handsome, egg-shaped, 5 inches long, and 4 inches in diameter; skin, when unripe, of a very deep green, but when matured, of a fine yellowish green, with a regularly netted surface, which, on the exposed side, becomes rather yellow; flesh pale greenish white, tender and delicate, full of a highly perfumed, pleasant sweet juice; the rind is very thin; the seeds unusually large: this is a variety of much excellence: it is a great bearer, and harder than any of the Persian melons, except the *Large Gerse*.
20. *The Striped flowers*: fruit oval and much netted, dark green in broad stripes, with narrow intervals of dull white, which become fleshly yellow as the fruit ripens; pulp externally green, but more internally pale red, ex. sively juicy, and more perfectly melting than that of the famous *Isipahan melon*; juice more sweet and high-flavoured than that of any Persian variety. (*Hort. Trans.*, l. 137. 91 series.)
21. *Large Gerse*: a very handsome ribbed fruit, generally weighing 5 or 6 lbs., shaped like a diamond spire, usually 6 inches deep, and from 7 to 9 inches in diameter; at the apex is situated a corona, or circular scar, varying from 1 inch to 2 inches in diameter; skin sea-green, closely netted; flesh 1½ inch or 2 inches thick, clear green, becoming paler towards the inside, firm, juicy, very rich, and high-flavoured: this is an excellent variety, ripening early, and

specially arriving at a bearing time; it is very prolific, and produces larger fruit than any of the Persian melons: it generally produces a second crop.

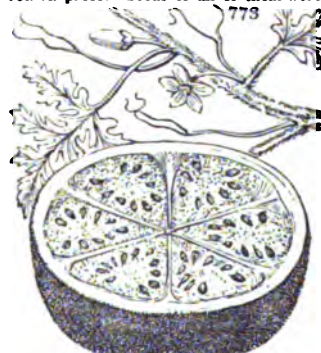
22. *Melon of Kaling*: a beautiful egg-shaped fruit, 8 inches long, 5 inches wide in the middle, and 6 inches wide at the base; skin of a pale lemon colour, minutely speckled with pale dots, regularly netted all over, with a few cracks (scaly) on the sides, from 1½ inch to 2½ inches thick, nearly white, with a copious flow of cool juice, extremely delicate, sweet, and high-flavoured; and tender in texture to a well-ripened *Burre pear*: it resembles the next sort, but differs in being closely netted all over, instead of being smooth.

23. *Sweet melon of Lophos*: fruit ovate, from 8 to 12 inches long; skin nearly smooth, of a deep sulphur colour; flesh white, entire, but a netting to its centre, crisp, sugary, and very rich; weight 5 to 6 lbs.

II. WATER MELONS.

24. *Dumpeke melon*: the first fruit produced in the season is nearly cylindrical, bluntly rounded at both ends; the skin varies from pale yellow-green to intense dark olive, and the flesh is of a reddish orange; flesh bright and deep green near the skin, pale towards the centre, quite melting, and of excellent flavour; the latter fruits become more pitted at the ends, and lose much of their reticulation on the surface, the dark parts of the skin becoming darker.
25. *Green Palencia*, *Winter melon*: fruit oval, with pointed extremities, very slightly ribbed; skin dark green, with a few small white spots, sometimes a little netted; flesh white, becoming pale straw colour as it ripens, firm, accherous, and juicy, and although not rich in pleasant. The last two sorts possess the valuable property of keeping till the winter months, if hung up by the stalk, or in nets, in a dry room.
- III. *Water Melons*. *Caribbean Oblong*: fruit in the shape of an oblong; Ser. Rumph. Am. 5. t. 166, and see Ag. 773. *Pandanus*, Fr.: *Wasser-Melone*, Ger.: *Water-melon*, Dutch: *Cucurbita*, Ital.: and *Arisae*, Ben.
26. *Early sugar water melon*: large, round; skin green when ripe; flesh yellow; excellent good.
27. *Sugar water melon of the Orient*: large; excellent flavour.
28. *Persian water melon*: skin green, flesh dark red, and very sweet.
29. *Water melon of the East*: large, green, and very sweet.
30. *Water melon of Oases*: large; skin green, and very sweet.

The above sorts of water melons are selected from a list of 14 varieties, given in the *Gardener's Magazine*, vol. vi. p. 339. Seeds of all of them were sent us by M. Faldermann, of the Botanic Garden of St. Petersburg.



ceptible effect upon the melons of Europe. Their flesh is extremely tender, rich, and sweet, with a copious flow of cool juice, which renders them extremely grateful to the palate. To these important qualities, they, in many cases, add the merit of bearing abundant crops of fruit, the appearance of which is always extremely beautiful. On the other hand, their cultivation is attended with peculiar difficulties. They are found to require a very high temperature, and dry atmosphere, and an extremely humid soil; while they are at the same time impatient of an undue supply of moisture, which causes spotting and rotting decay long before the fruit is matured. It is not, therefore, easy to maintain that necessary balance of heat and moisture, which in Persia arises out of the very nature of the climate and mode of cultivation. (*Lindley's Guide*, p. 340.)

5308. *The water melon* forms both the food and the drink of the inhabitants of Egypt for several months

in the year, and therefore it is generally considered as the melon of the Jews, mentioned in several parts of the Bible. It is much used also in the south of Italy. It may be treated like the common melon, but it requires a much larger space for the extension of its shoots. The fruit not being handsome, richly coloured externally, or highly flavoured, it is not valued for the dessert, and is therefore little, if at all, cultivated in Britain.

5809. For the *entire course of culture* of the melon, see § 3712.

SUBJECT. 5. Cucumber. — *Cucumis sativus* L.; *Monac. Monadelph. L.* and *Cucurbitaceæ J.* Concombre, Fr.; Gurke, Ger.; Komkommer, Du.; Citriuolo, Ital.; and Pepino, or Cohombro, Span.

5310. *The cucumber* is a tender annual, a native of the East Indies, introduced in 1573. The culture of the cucumber is of nearly as great antiquity as that of the vine, for Moses mentions it as abounding in Egypt when the children of Israel were there, above three thousand years ago. (*Numbers*, chap. ii.) In England it is cultivated generally and extensively, in forcing-frames and in the open air, and especially near large cities and towns. In Hertfordshire, whole fields are annually seen covered with cucumbers without the aid of dung or glass, and the produce is sent to the metropolis for pickling. In March, cucumbers fetch in the London market a guinea a dozen; in August and September, a penny a dozen. The village of Sandy, in Bedfordshire, has been known to furnish 10,000 bushels of pickling cucumbers in one week.

5311. *Use.* The green fruit is used as a salad; it is also salted when half-grown; and preserved in vinegar when young and small. In Germany and Poland, barrels of half and also full grown cucumbers, are preserved from one year to the other, by immersion in deep wells, where the uniform temperature and exclusion of air seem to be the preserving agents.

5312. *Varieties.* The principal of these are

1. *The early long prickly, Early frame.* from 5 to 7 inches long; of a green colour, with few prickles. The plant is a good bearer; and, upon the whole, this is accounted the best cucumber for the late crop; the pulp being very crisp and pleasant.
2. *Early Southgate:* resembles the former, and is by some preferred to it.
3. *Longest green prickly:* from 7 to 10 inches in length; it has dark green skin, closely set with small prickles. This is a hardy sort, but does not come early.
4. *Early short prickly:* not more than 4 inches long; the skin green, rather smooth, but with a few small black prickles. This is one of the hardest and earliest sorts, and is often preferred for the first crop.
5. *White-spined, Dutch, or White short prickly,* though not much cultivated, is recommended by some, as preferable even to the Early long prickly; it has fewer seeds; it is evidently different in taste from most other cucumbers, but of agreeable flavour.
6. *Cluster cucumber:* a very early sort, that grows upon a stem of three or four together; the fruit is seldom more than 5 inches long; it is at first of a fine green colour, but becomes yellowish as it ripens. The stems of this variety are much inclined to climb by means of their tendrils upon sticks; the leaves are small, and the plant altogether occupies but little room.
7. *Smooth green Roman:* an early sort; the fruit becomes large and long, and is quite smooth; the plants grow very strong, and require a good deal of room.
8. *White Turkey:* the stalks and leaves are larger than in the other varieties; the fruit also is very long, sometimes from 10 to 15 or even 20 inches; it is quite straight, and has a smooth skin destitute of prickles; it is produced sparingly, and late in the season.
9. *Green Turkey, Long green Turkey:* sometimes sown for the late crop. Late cucumbers, however, are much less cultivated than the early varieties; most gardeners being of opinion, that those kinds which are best for the early crops are also best for the late.
10. *Nepel:* fruit very large, usually weighs upwards of 12 lbs. weight. The measure in girth 24 inches, and in length 17 inches; flavour pleasant, and uncommon for stinging. Sent to the Horticultural Society from Calcutta by Dr. Wallich. (*Hort. Trans.*, iv. 156.)
11. *Pinnapera's:* nearly two feet long, and of superior crispness and flavour. (*Hort. Trans.*, iv. 560.)
12. *Longford:* handsome fruit, originated at Longford, near Manchester, the seed of C. F. S. Walker, Esq., and grown there sometimes to the length of 27 inches.
13. *Pinel cucumber:* a Chinese variety. (*Hort. Trans.*, v. 56.)
14. *The Pinnagins:* a large coarse variety, generally grown in the open ground; and while young, the fruit is alicial, and pickled in the manner of the mango. (*Lindley's Guide*, p. 545.)

5313. *Selection of sorts.* The early frame and the early Southgate are those principally used for early crops in frames and in the forcing-house; the green Turkey, and white Turkey, for later crops; and the long and short prickly for crops in the open air. (*Lindley's Guide*, p. 545.) The Longford prickly, which passes under a variety of names in different parts of the country, is a long and very handsome fruit, and is by many preferred for culture under glass throughout the year.

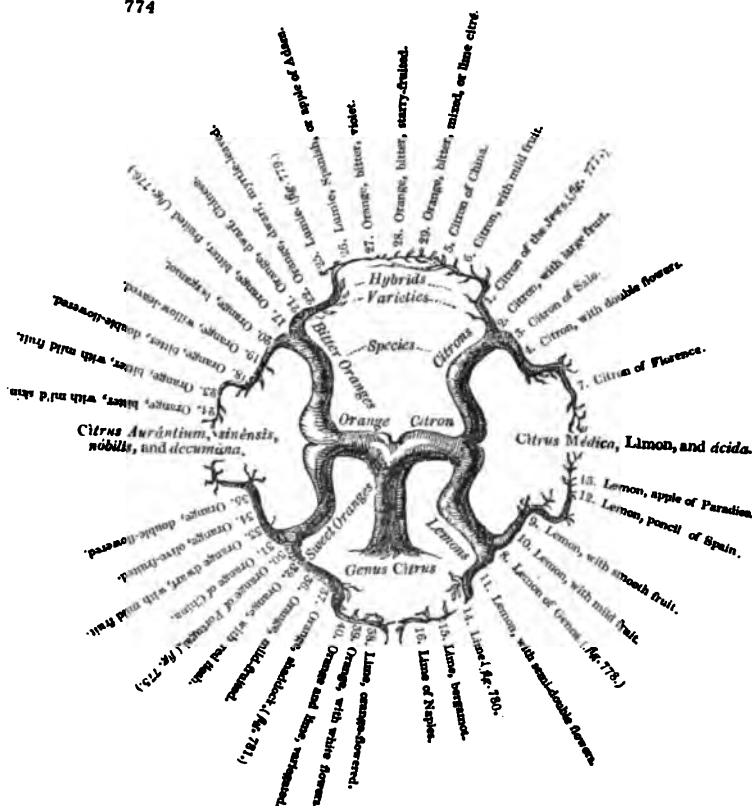
5314. *Culture.* The culture of the cucumber, as a table esculent, is chiefly carried on by artificial heat or protection, and is therefore treated of under the *Forcing Department*, § 3680. For pickling, it is chiefly cultivated in the open ground, by what is termed drilling, which forms the only branch of the culture of this vegetable reserved for this article. To have a crop in the natural ground, the seed is sown in warm compartments of rich earth, towards the end of May, or beginning of June, when the weather is settled, warm, and dry. The plants should mostly remain where sown, to produce late fruit, towards the end of July, or more generally in August and September, small for picklers, and of larger growth for ordinary consumption. Sow a portion in a warm border, and the main crop in an open compartment. Dig the ground, leaving the surface perfectly even. Trace lines with intervals of five or six feet; and in the lines mark stations three feet and a half distant; then, with a trowel at each of these spots, form shallow circular saucer-form cavities in the surface, ten or twelve inches wide, and about an inch deep in the middle. Sow in the middle of each cavity eight or ten seeds, half an inch deep. When the plants are come up, and begin to put forth the first rough leaves in the centre, thin them to three or four of the strongest in each hole. Earth these up a little, between and close round the stems, pressing them a little asunder; and give them some water, to settle the earth below and above. In their advancing growth, train out the leading runners. Supply them with requisite waterings, in dry weather, two or three times a week, or sometimes every day in very dry hot weather, in July, August, or September. At this season, water early in the morning, or late in the afternoon, towards evening.

5315. *Gathering.* "The crop comes in sometimes towards the end of July, but more generally not before August in full production; continuing till about the middle or end of September, when the plants decline. Be careful to gather the fruit in a prime state, both for pickling and other purposes. They must be quite young for pickling, not exceeding two or three inches in length." (*Abercrombie*). Those who are desirous of growing cucumbers for exhibition and prize shows, in the newest and best manner, may consult a work on this subject, by W. E. Allen, entitled, *A Treatise on an entirely original System of cultivating Cucumbers*, &c.; 8vo, pamphlet; Ipswich, 1834.

SECT. II. Exotic and Tropical Fruits well known, but neglected as such.

5316. Among *neglected exotic fruits* we include the orange tribe, one of the most beautiful, and also a very useful class of fruits. The culture of oranges and lemons for

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It is a middle-sized evergreen tree, with a greenish-brown bark; and, in its wild state, with prickly branches. The fruit is nearly round, from two to three inches in diameter, and of a gold colour. It is a native of India and China, but now cultivated in most countries of Europe; in the open air in Italy and Spain; and in conservatories or green-houses in Britain and the north of Europe. The orange is supposed to have been introduced into Italy in the fourteenth century, above a thousand years after the citron. In England, the tree has been cultivated since 1623. Parkinson, writing at that time, says, "it hath abiden with some extraordinary looking and tending, when neither citron nor lemon trees could be preserved any length of time."

5323. *The orange trees of Beddington in Surrey*, introduced from Italy by a knight of the noble family of the Carews (*Gibson's edit. of Cam. Brit.*), were the first that were brought into England; they were planted in the open ground, placed under a movable cover during the winter months, and they had been growing there before 1665. It has been said, that these trees were raised by Sir Francis Carew, from seeds brought to England by Sir Walter Raleigh; but as such trees would not have readily borne fruit, Professor Martyn thinks it much more likely that they were plants brought from Italy. Bradley says, they always bore fruit in great plenty and perfection; that they grew on the outside of a wall, not nailed against it, but at full liberty to spread; they were fourteen feet high, the girth of the stem to the spreading of the branches one way nine feet, and twelve feet another. These trees, Evelyn informs us, were neglected in his time during the minority of their owner, and finally entirely killed by the great frost in 1739-40.

5324. *During the latter end of the seventeenth and beginning of the eighteenth centuries*, the orange tree was a very fashionable article of growth in conservatories, when there were but few exotics of other sorts kept there. The plants were procured from Genoa, with stems generally from four to six feet in height; they were planted in large boxes, and were set out during summer to decorate the walks near the house, in the manner still practised at Versailles and the Tuilleries. About the middle of the eighteenth century, when a taste for botany and forcing exotic fruits became general, that for superb orange trees began to decline; many of these large trees have decayed through neglect; and those which are now to be found in the greater number of green-houses are generally dwarf plants bearing few fruit, and those of small size. In some places, however, are still to be found large and flourishing trees. Those at Smorgony in

Glamorganshire are the largest in Britain; they are planted in the floor of an immense conservatory, and bear abundantly. It is said that the plants were procured from a wreck on the coast in that quarter, in the time of Henry VII.

5325. *At Wormleybury, Hertfordshire, and Shipley Hall, in Derbyshire*, are very fine large orange and lemon trees, grown in borders and in boxes. (*Hort. Trans.*, vol. ii. p. 295. and vol. iv. p. 305.) At Wormleybury there is a Madras citron, which, in 1825, measured twenty-one feet in height and fifteen feet in width, and which bore in that year between three and four dozen of fruit, some of which weighed above five pounds. (*Gard. Mag.*, vol. i. p. 154.)

5326. *At the Wilderness, Kent* (Marquess Camden's), are three trees in boxes, not surpassed by any trees so grown in Europe. C. Bingham, at Ialeworth, possesses a very fine collection; and various others might be enumerated.

5327. *At Woodhall, near Hamilton*, trees of all the species of Citrus are trained against the back wall of forcing-houses, in the manner of peaches, and produce large crops of fruit. At Castle Sempie, near Paisley, there is a citron tree which, in 1830, covered a wall twenty-five feet in length, and sixteen feet high, besides returning about six feet on each end of the house. In that year it produced between seven and eight dozen of fruit, one of which, sent to us at Bayswater, measured eighteen inches and a half by nineteen and a half. The shoots produced by this tree are sometimes from seven to eight feet in length. (*Gard. Mag.*, vol. vi. p. 704.)

5328. *In the south of Devonshire*, and particularly at Saltcombe, one of the warmest spots in England, may be seen, in a few gardens, orange trees that have withstood the winter in the open air upwards of a hundred years. The fruit is as large and fine as any from Portugal. Trees raised from seed, and inoculated on the spot, are found to bear the cold better than trees imported.

5329. *At Coombe Royal*, the seat of John Luscombe, Esq., citrons, oranges, lemons, &c. are grown in the open garden against walls, and only protected during winter by frames of wood. These frames are wholly removed in summer, and partially in the day in the winter, as the trees only require to be guarded from severe frost. A more interesting sight cannot well be imagined, than that which is presented by these trees on a sunny day in summer, when the open frames furnish a display of the richest foliage, and of fruit rivaling the produce of foreign countries. The soil, which is seldom manured, is rich and light, on a slaty substratum, and seems admirably adapted for trees of the citrus tribe; the situation in which they are grown is in a sheltered valley, protected from wind. (*Gard. Mag.*, vol. x. p. 36.) Specimens of the fruit were sent to us at Bayswater, among which were, a citron weighing thirty-six ounces, a lemon weighing seven ounces and a half, and an orange weighing six ounces and a half. At Luscombe, in the same county, are also some remarkably fine citrons, shaddocks, and limes, grown in the open garden, and only protected during severe frosts. An account of some of these will be found in the *Gardener's Magazine*, vol. ii. p. 29.

5330. *Use.* As a desert fruit, the orange is well known. The varieties imported, which are most esteemed for this purpose, are the China, Portugal, and Maltese. It is also used in confectionery, both ripe, and when green and not larger than a pea: it forms various liquors and conserves, either alone or with sugars, wines, or spirits: and either the pulp or skin, or both, are used for these purposes. In cooking, it is used to aromatise a number of dishes. The juice of the Seville orange is used in medicine, in febrile and inflammatory disorders; and that of the other sorts possesses the same qualities in a lesser degree. The acid of oranges, Dr. Cullen says, unites with the bile, takes off its bitterness, and may prove useful in obviating disorders arising from its redundancy and acidity. In perfumery, the orange is used to form various perfumes and pommandes; and the flower distilled produces orange-flower water, used in cooking, medicine, and as a perfume.

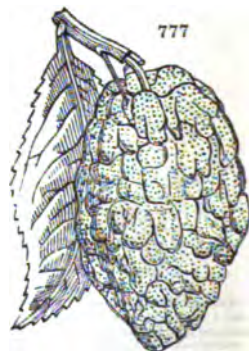
5331. *Varieties.* These are very numerous in the Eastern countries, and even in Italy and France. About forty sorts are cultivated in the neighbourhood of Paris, and about thirty in the London nurseries, of which we shall give a list. The two principal varieties are the sweet or China orange, the *orange douce* of the French, and *Portogallo* or *poma de sino* of the Italians; and the bitter or Seville, the *bigarade* of the French, and *arancio volgare* of the Italians. The Maltese orange, distinguished by its red pulp, is also a noted and much esteemed sort. The box-leaved, willow-leaved, and some others, are cultivated more as curious varieties than for their fruit.

Common orange.
Bloody-fruited.
Broad-leaved.
Bergamot large.
Bergamot small.
Cluster fruited.
Curled-leaved.
Double-flowered.
Fine-leaved.
Laurel-leaved.
Lisbon.
Maltese.
Bloody Maltese.
Monstrous.
Myrtle-leaved large.
Myrtle small.

Narrow-leaved.
Orn-fruited.
Pale-leaved.
Seville, or Bitter orange (*fig. 776.*), chiefly used for making marmalade. Hence it forms us, that the bitter orange is by far the most handy variety grown in Italy; and that in the neighbourhood of Florence, where the cold is so great that skaling is sometimes practised during 4 months of the year, there are standards in the open air from 15

to 30 feet high (*Gard. Mag.*, vii. 328.)
Spike-flowered.
Striped common.
Striped curled-leaved.
Striped gold.
Striped silver.
Striped tricolour.
Striped willow-leaved.
Sweet-skinned.
Sweet China.
Tanjierano.
Thick-leaved.
Weeping.
Willow-leaved.
Clove, or Mandarin (*C. nobi-*

lis H. K.), (*Bot. Rep.*, 608. and 811.): distinguished from the common orange by its curious form, and by the pulp adhering so loosely to the rind as to be separable from it by the slightest effort, and leaving in many places a considerable space between them. It is the most delicate of the orange tribe, whence its name, by the Portuguese, of Mandarin, or Noble orange. — Probably only a variety, though named as a species.



5332. The Citron is the *C. Médica* L. (*Gær. fru. 2. t. 131. f. 2.*); the citron of the French; the *citronier* of the Germans; the *lemon* of the Dutch; the *cedrate* of the Italians; and the *limon* of the Spaniards. (*fig. 777.*) In its wild state the tree grows to the height of about eight feet, erect and prickly, with long

reclining branches. The leaves are ovate, oblong, alternate, subserrate, smooth, pale green. The fruit or berry is half a foot in length, ovate, with a protuberance at the tip. There are two rinds, the outer thin, with innumerable milky glands, full of a most fragrant oil; the inner thick, white, and fungous. The citron was introduced into Europe from Media, under the name of *malus medica*, and was first cultivated in Italy by Palladius in the second century. The date of its introduction into England is not exactly known; it would probably be coeval with that of the lemon, which was cultivated in the botanic garden at Oxford in 1648. The fairest fruit, Miller states, was in the Duke of Argyle's garden at Whifton, where the trees were trained against a south wall, through which there were flues for warming the air in winter, and glass covers put over them, when the weather began to be cold. Thus the fruit was as large and as perfectly ripe, as it is in Italy or Spain. In Italy citrons and lemons are generally trained on walls or espaliers, because, being considerably more tender than the orange, they require, at least in the north of Italy, some protection in winter; the fruit does not ripen regularly at one time, like that of the orange, but comes successively to maturity almost every month in the year.

5333. *Use.* The fruit is seldom brought to the dessert in a raw state, but it forms excellent preserves and sweetmeats, to furnish the table when other fruits are scarce. The juice, with sugar and water, forms lemonade, a most refreshing, salubrious, and universally esteemed beverage. Its use in punch and negus is well known. It is much used in medicine, and also in perfumery and dyeing.

5334. *Varieties.* Dr. Sickler enumerates only about a dozen citrons and citronates as grown in Italy. The French nurseries have nearly twenty names in their lists. In England the six following are cultivated for sale:—

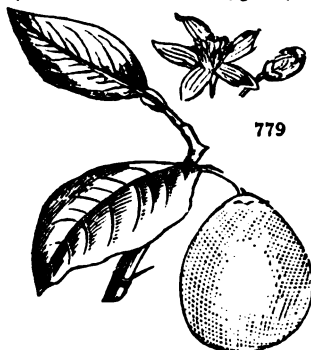
The Common citron.
The Flat-fruited.

The Rough-fruited.
The Forbidden-fruited.

The Grape-fruited Barbados.
(*Hort. Trans.*, iii. 356.)

The Round-fruited.
The Thick-leaved.

5335. The lemon is the *C. Médica* var. *Limon W.* (*Blackw.* 362.); the *limon* of the French and Spaniards; *limonier* of the Germans; *citroen* of the Dutch; and *limone* of the Italians. (*Ag.* 778.) The



distinction between the lemon and citron is very trifling. The fruit is less knobbed at the extremities, is rather longer, and more irregular, and the skin is thinner than in the citron; the wood is more knotty, and the bark rougher. Cultivated in the Oxford garden in 1648.

5336. The uses of the lemon are the same as those of the citron.

5337. *Varieties.* Dr. Sickler enumerates twenty-eight as grown in Italy. The French, according to Ville Hervé, have eleven sorts. In the London nurseries are cultivated the twelve following:—

Common.
Broad-leaved.
Chinese.
Imperial.

Pear-shaped, or Lime. (*Ag.* 779.)
Rough-fruited.
Smooth-leaved.
Striped gold.

Striped silver.
Striped three-coloured.
Upright.
Waved fruited.

5338. The lime is the *Citrus ácida* Rox. (*Brown's Jam.* 308.), by some esteemed a variety of the *C. Médica*; the *lime* of the French, Italians, and Germans. (*Ag.* 780.) The sour lemon, or lime, grows to the



height of about eight feet, with a crooked trunk, and many diffused branches, with prickles. The leaves are ovate, lanceolate, almost quite entire. Berry an inch and a half in diameter, almost globular, with a protuberance at the top; the surface regular, shining, greenish-yellow, with a very odorous rind, enclosing a very acid juice. It is a native of Asia, but has long been common in the West Indies, where it is grown both for its fruit and for fences.

5339. The uses of the lime are the same as those of the lemon, to which, in the West Indies, it is preferred; the juice being reckoned more wholesome, and the acid more agreeable to the palate.

5340. *Varieties.* By the catalogue in *Nouveau Cours*, &c., the French have two sorts of lime; and, accord-

ing to Dr. Siekler, the Italians have four varieties. The following five kinds are grown in the London nurseries:—

The Common lemon. The Wreaping.	The Blood-leaved. The West India.	The Chinese spreading.
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5341. *The shaddock*, introduced into England in 1720, is the *C. decussata* W. (*Eschsch. Am. B. t. 34. f. 2*); the orange *pompelmoene* of the French; the *pompelmoene* of the Germans; the *pompelmoene* of the Dutch; and the *arancio* *quadrato* of the Italians. (*Ag. 781*.) The tree is above the middle size, with spreading prickly branches. The berry is spheroidal, frequently retuse at each end, of an even surface, and greenish-yellow colour; pulp, red or white; juice, sweet or acid; rind, white, thick, spongy, and bitter. Tumbler says, the fruit in Japan grows to the size of a child's head, and Dr. Siekler states its weight at fourteen pounds, and its diameter as from seven to eight inches. It is a native of China and Japan, and was brought to the West Indies by Captain Shaddock, from whom it has derived its name. Dr. Macfadyen states that there are two varieties in Jamaica, one with globose fruit and white pulp, and the other with pear-shaped fruit, and red pulp. (*Bot. Miscel.*, part III. 1st series.)

5342. *Use*. The shaddock is certainly the least useful of the species enumerated, and is cultivated chiefly for show. It has the handsomest leaf of the whole tribe, and the fruit is larger than the orange. Where several sorts of oranges are presented at the dessert, it makes a striking addition to the variety. The juice is of a subacid sweetness, and excellent for quenching thirst; and the fruit, from the thickness of its skin, will keep longer in sea voyages than any of the other species of citrus.

5343. *Varieties*. The Italians, according to Dr. Siekler, have one; and the French, according to the *Nouveau Cours*, &c., four sorts. The following four are grown in the English nurseries:—

The Common shaddock.	The Rough-leaved.	The Longest-leaved.	The West India.
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5344. *Propagation of the citrus tribe*. All the sorts may be propagated by seeds, cuttings, layers, and grafting, or inoculation. In general it may be observed, that citron, lemons, shaddocks, and limes will be found easier to propagate than the oranges. Of the latter, the mandarin, sweet, bitter, and fat; the tangerine, the bloody, and the box-leaved seldom fail. The sweet lemons, forbidden fruit, and all the above-named coarse sorts, will be found to grow readily from cuttings, and to make handsome plants. Oranges do not grow readily from cuttings; and it is therefore advisable to raise them by engrafting, while the coarser sorts may be propagated by cuttings. (*Gard. Mag.*, vol. III. p. 739.)

5345. *By seed*. The object of raising plants from seed is either to obtain new varieties or stocks for grafting. To attempt raising new varieties in Britain will in general be found a tedious process, as the trees do not even in Italy show fruit for six or eight years or more; and there was in 1819, in the botanic garden at Toulon, a large handsome orange tree, of twenty-five years' growth, which had not even blossomed. Notwithstanding this, however, several varieties of the citrus tribe have been raised from seed, in Devonshire and different parts of England, with a view to obtaining new varieties, and they have blossomed in the third or fourth year.

5346. *Where trees are to be raised for stocks* to bud oranges, Miller advises to procure citron seeds, as stocks from these are preferable to any other for quickness of growth; and also that they will take best of either orange, lemon, or citron. Next to these are the Seville orange seeds; and the best of either sort are to be had from rotten fruits. Prepare in spring a good hot-bed of dung or tan, and when it is in moderate temper sow the seeds in pots of light earth; plunge them, give water frequently, and raise the glasses in the heat of the day. In three weeks the seeds will come up, and in a month's time be fit to transplant into single pots. Then renew the bed, and fill pots of five inches in diameter half full of good fresh earth, mixed with very rotten cow-dung; shake out the seedlings, and plant one in each pot, filling it up with the same earth, and replunge as before. Give a good watering at the roots, and repeat this often, as the orange tribe in a hotbed require a good supply of water. Shade in the daytime when the sun is powerful, and give air, so as not to draw the plants. By this method, with due care, the plants will be two feet high by July, when they must be hardened by degrees, by raising the glasses very high, and afterwards, in five days, taking them entirely off, shading the plants from the sun with mats or other screens. Towards the end of September, house them in a dry part of the green-house, near the glass, where they will not be liable to damp off. During winter refresh them with water, and in April now and then wash their stems and leaves, to clear them from any filth they may have contracted. Place them again in a moderate hotbed, and harden them by the beginning of June, that they may be in a right order to bud in August.

5347. *Budding*. Make choice of cuttings from trees that are healthy and fruitful, observing that the shoots are round; the buds of these being much better and easier to part from the wood than of such shoots as are flat or angular. After performing the operation, remove the plants into the green-house, or under glass frames, to defend them from wet, turning the buds from the sun; but let them have as much free air as possible, and refresh them often with water. In a month it will be observable which has taken, then untie them, and let them remain in the green-house all the winter. In spring, cut off the stocks about three inches above the buds, and place them in a moderate hotbed, giving air and water, and shading as before. By the end of July they will have made shoots of two feet or more; then harden them before the cold sets in, that they may the better stand the winter. In the first winter after their shooting, you must keep them very warm, for by forcing them in the bark-bed they will be somewhat tender; but it is very necessary to raise them to their height in one season, that their stems may be straight; for in trees which are two or more years growing to their heading height, the stems are always crooked. In the succeeding years their management will be the same as for full-grown trees.

5348. *The Italian process of raising and budding*. In the orange nurseries at Nervi, the seeds of the citron or orange, as it may happen, are sown in beds in the open ground in February or March, and in September planted out in compartments, in rows generally about eighteen inches wide, and the plants six or eight inches in the row. They are placed thus close to draw them up with clean straight stems. There they remain generally four years, and in April or May of the fifth year they are taken up, their roots within four or six inches of the tap-root, which is also shortened six or eight inches, according to the size of the tree. The stem, if it has any side shoots, is pruned clean, and sawn off horizontally, at such a height as that the section is from half an inch to an inch in diameter. The general heights are one foot, which forms the lowest growing-plants; eighteen inches for trees to be sold in Italy; from two to four feet for trees to be sent abroad; and five or six feet for extraordinary orders. These last are not so common; as the stocks require six or eight years' growth, and some care to attain that height with clean stems, and a diameter of three quarters of an inch. The plants thus pruned are budded, sometimes when out of the ground, and sometimes after planting. One bud is inserted on each side of the stock within an inch of the section. In a month buds and roots begin to push, and, in December or January following, these plants are in a fit state for taking up for exportation. After being taken up the roots, now well furnished with fibres, are enveloped in a ball of stiff clay; this is covered with moss carefully tied on, and in this way they are laid in boxes, or in casks, and sent not only to most parts of Europe, but to North and South America. The chief defect in this system is the naked horizontal section at the top of the stem, which, not being smoothed with the knife and covered with clay or any other protection, to cause the bark to grow over it, indurates and cracks with the drought; retains moisture and decays, so that in almost all trees that have been budded in this way, a dead stump or a rotten hole may be observed during the whole period of their existence. This evil is sometimes lessened by covering with a cap of lead or a patch of wax; with bark. They are, however, far too indolent and obstinate to hear of any thing new, and will persist in their present plan till the credit of Genoa for orange trees is gone, or till some strong necessity urges them

to improvement. This mode of grafting has been practised by Reeve; and by keeping the plants after the operation in a hotbed for about six weeks, they complete a growth of several inches in length. (*Gard. Mag.*, vol. III. p. 37.) An amateur grafts by any mode that pleases his fancy, but makes a point of doing it early in the season, and generally in January. He plunges the plants in a hotbed immediately after the operation; in a fortnight or three weeks the bandages may be removed, and by the end of March, or the beginning of April, the plant will have a number of blossoms on it, provided a scion has been made choice of with blossom buds. (*Gard. Mag.*, vol. III. p. 375.)

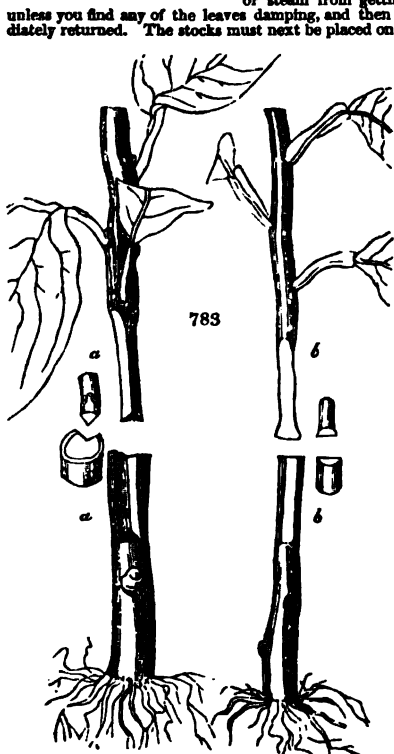
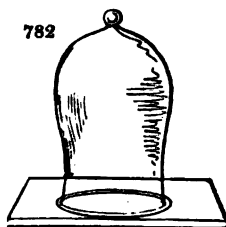
5349. *The Maltese*, aware of the defects in Italian trees, make a sloping section, paring it clean, and budding on one side only; the consequence of which is, that the section becomes covered with bark, and (what it never does in the Italian method) as sound and healthy as any part of the stem. The French graft and inoculate in a very neat manner, and indeed their orange trees, though small, are much handsomer than the Italian ones.

5350. *By grafting.* This mode is occasionally resorted to in Italy, and is that most generally adopted in the nurseries at Paris. The stocks, when of two years' growth, and not much thicker than the scion, are cut over within six inches of the ground, and are then grafted in the whip manner. The trees continue small, but have clean stems of from one to three feet, and generally make handsome plants, prolific in flowers and fruit, of a small size. Grafting, both by the whip manner and by approach, is frequently practised in England, in nearly the same circumstances of age, size, and effect as practised in France. A variety of the whip-manner is described by Cushing, in which the top of the stock is left on, but the scion is cut off as in grafting. "Form the scion as for the common whip-graft, and then, without taking off the head of the stock, cut from the clearest part of its stem an equal splice as smoothly as possible; do not tongue the scion, but tie it on neatly and firmly with matting and clay, in the manner of a graft; plunge the stock into a hotbed, and cover with a cap-glass till the scion begins to grow, and then cut away the top of the stock, and remove the matting by degrees." (*Exotic Gard.*, p. 108.)

5351. *Whip-grafting* in the common way has lately been successfully performed, even with fruit or flowers on the scion, by Nairn, who gives the following account of the process:—"Let the operator select as many orange or lemon stocks as he wishes to work, and place them on a moderate hotbed for a fortnight, by which time the sap will have risen sufficiently to move the bark; the stocks must then be cut off, about two inches above the surface of the pot, and an incision made with a sharp knife, similar to what is done for budding, separating the bark from the wood on each side. Let the scion be cut thin, in a sloping direction, and thrust between the bark and wood, and then bound tight with woollen yarn; but very great care must be taken, in binding, to prevent the bark from slipping round the stock, which, without attention, it is very apt to do. After it is properly and neatly bound, put a little loam or clay close round the stock, to the surface of the pot; then, with a glass of a proper form (Fig. 782.), to prevent the damp from dripping on the scion, cover the whole, and press it firmly into the mould, to prevent the air or steam from getting to the plant; the glass must not be taken off, or the stock only till this is remedied, when it must be immediately returned. The stocks must next be placed on a brisk hotbed of dung, and in about six weeks the glasses may be taken off, and the clay and binding removed; but it will be necessary to bind on a little damp moss, in lieu of the clay, and to keep the glasses on in the heat of the day, taking them off at night; when, in about three weeks or a month, they will be fit to be put into the greenhouse, where they will be found to be one of the greatest ornaments it can receive. I should recommend the *mandarin orange* for the first trial, as the fruit is more firmly fixed than that of any of the other sorts. I have, by the above method, had seven oranges at a time on a plant in a small 60 pot." (*Hort. Trans.*, vol. III.)

5352. *Henderson's mode of grafting* is well adapted for proving successful. Take two-year-old wood, cut into lengths of about seven inches. If the stock is much thicker than the graft (Fig. 783. a) cut a piece out of the stock of a triangular figure, about an inch and two eighths in length, regulating the depth according to the thickness of the graft, and keeping it square at the bottom. Displace two leaves at the bottom of the graft, for the convenience of getting it put on: cut the graft right across under one eye, where a leaf has been taken off; dress the graft to fit the receptacle made in the stock, observing to keep the lower end of the graft equal in thickness as above: always let three or four leaves remain untouched on the graft. After the graft is fitted in the stock, tie it up with bast matting, and put clay around it. If the grafts and stocks are about the same thickness (b), cut the stock at right angles nearly half through. Cut off the piece, keeping it equal at top and bottom: cut the lower end of the graft right across under an eye (a), and with a knife prepare the graft to fit the stock. When the grafted plants are tied up and clayed, set them at the back of the vinery or peach-house, observing to keep them away from the flues, as fire-heat is hurtful to them at first: cover them with hand-glasses, or, if a frame can be spared, it is still better. Shade them every day, but take the mats off at night; continue the shading till they begin to grow, when they may be exposed to the light. If any stock happens to be so tall and thick that it cannot be placed under a hand-glass or frame, put two or three grafts on it, set it in any convenient place in the house, and shade it with mats; it will

succeed perfectly in this way: the grafts will lose none of the old leaves; and in five or six months they will make three or four young shoots six or eight inches long."



5353. By cuttings. This method, though little practised on the Continent, where the object is large trees and fine fruit, is frequently adopted by the British gardener, whose object is generally small handsome plants. Two methods are adopted; the first is to take young succulent wood as soon as it has done growing, and the lower end has become somewhat mature. These cuttings, prepared properly (5354), are inserted with a small dibber in pots of light sandy loam, with two or three inches of gravel or broken pots at bottom. They are then covered close with a crystal bell, and plunged in a gentle heat, and shaded. The glasses are taken off only to wipe them when damp, and to remove any decaying leaves. In two months such cuttings either strike or rot off. The second method is in spring to take the shoots of last year; to prepare and plant them as above; but, after covering them with glasses, to plunge them in a cold frame, where they remain in a state of apparent inaction for three or four months, when they either form a callous excrescence at the lower end of the cutting and push at top, or die off. After preserving them in a low temperature through the winter, they are placed the succeeding spring in a gentle hotbed, where they will push freely, and make tolerable plants. The success of either mode may be facilitated by taking care to place the cuttings so as their ends may touch the bottom of the pot, or the potsherds or gravel with which that is covered. The advantages of so placing cuttings is generally known to gardeners, and has been noticed by Hawkins in the *Hort. Trans.*, vol. ii. p. 12.

5354. Henderson considers cuttings as the quickest mode of getting plants, and has practised it for thirty-seven years past on the citrus tribe; his directions are as follow:—"Take the strongest young shoots, and also a quantity of the two-year-old shoots; these may be cut into lengths from nine inches to eighteen inches. Take the leaves off the lower part of each cutting to the extent of about five inches, allowing the leaves above that to remain untouched: then cut right across, under an eye; and make a small incision in an angular direction on the bottom of the cutting. When the cuttings are thus prepared, take a pot, and fill it with sand; size the cuttings, so that the short ones may be altogether, and those that are taller in a different pot. Then, with a small dibble, plant them about five inches deep in the sand, and give them a good watering overhead, to settle the sand about them. Let them stand a day or two in a shady place, and if a frame be ready with bottom heat, plunge the pots to the brim. Shade them well with a double mat, which may remain till they have struck root; when rooted, take the sand and cuttings out of the pot, and plant them into single pots in the proper compost (see 1892). Plunge the pots with the young plants again into a frame, and shade them for four or five weeks, or till they are taken with the pots; when they may be gradually exposed to the light. From various experiments, I found that pieces of two-year-old wood struck quite well; and in place, therefore, of putting in cuttings six or eight inches long, I have taken off cuttings from ten inches to two feet long, and struck them with equal success. Although I at first began to put in cuttings only in the month of August, I now put them in at any time of the year, except when the plants are making young wood. By giving them a gentle bottom heat, and covering them with a hand-glass, they will generally strike roots in seven weeks or two months. The citron is most easily struck, and is the freest grower. I therefore frequently strike pieces eighteen inches long; and as soon as they are put into single pots, and taken with the pots, they are grafted with other sorts, which grow freely. I am not particular as to the time either of striking cuttings or of grafting." (*Calcd. Hort. Mem.*, vol. iii. p. 308.)

5355. By layers. This mode is occasionally practised both on the Continent and in England. At Monza, near Milan, there was in 1819 a very fine collection of lemon trees in boxes, trained as espaliers, which were so raised. The trees were five feet high, and each box had a portion of trellis attached to it of that height, and ten or twelve feet long, which was wholly covered with branches. Where laying is adopted, the plants may either be laid down on their sides, and laid as stools, or pots may be raised and supported under the branches to be propagated from. These branches, or their shoots of one or two years' growth, may then be cut or ringed, and bent into the pot, or down through the hole in the bottom, and treated in the usual manner, taking care to supply water with the greatest regularity. Shoots layered in March will be fit to separate from the stools as mother plants in the September following. In general, it may be observed, that the citron tribe like other fruit-bearing plants raised from cuttings or layers, though they may prove very prolific trees, yet seldom grow with such vigour, or produce such large fruit, as those propagated by budding or grafting on seedling stocks.

5356. Soil. At Genoa and Florence they are grown in a strong yellow clay, which is richly manured; and this soil is considered, by the first Italian gardeners, as best suited to their nature. At Rome and Milan the natural soil is lighter; but a strong soil is adopted generally for all the agrumet, and particularly in the garden of his Holiness the Pope. At Naples, where the trees are always planted in the open ground, the soil is lighter, and of volcanic origin. A strong soil, in imitation of that of Nervi, is recommended and adopted by the Dutch. (See *Van Ossem, Ned. Hesperides*, &c.)

5357. The French gardeners, according to Bosc (in *N. Cours d'Agr.*, in loco), in preparing a compost for the orange-tree, endeavour to compensate for quantity by quality; because the pots or boxes in which the plants are placed ought always to be as small as possible, relatively to the size of the tree. The following is the composition recommended:—To a fresh loam which contains a third of clay, a third of sand, and a third of vegetable matter, and which has lain a long time in a heap, add an equal bulk of half rotten cow-dung. The following year turn it over twice. The succeeding year mix it with nearly one half its bulk of decomposed horse-dung. Turn it over twice or three times, and the winter before using add a twelfth part of sheep-dung, a twentieth of pigeon-dung, and a twentieth of dried ordure.

5358. Miller says, the best compost for orange trees is two thirds of fresh straw from a good pasture, and one third part of neat's dung. These should be mixed together at least twelve months before using, turning it over every month, to mix it well and to rot the sward. Pass it through a rough screen before using.

5359. McPhail and Abercrombie recommend "three eighth parts of cow-dung, which has been kept three or four years; a fourth part of vegetable mould from tree-leaves; one sixth part of fine rich loam; and one twelfth part of road-grit; to this may be added one eighth part of sheep-dung." (*G. Enc.*, p. 262. *Pr. Gard.*, p. 574.)

5360. Meach has tried the following mixture (*Hort. Trans.*, vol. ii. p. 295.), with which he has "every reason to be satisfied. Well prepared rotten leaves, two or three years old, one half; rotten cow-dung, two, three, and four years old, one fourth; and mellow loam, one fourth; a small quantity of sand or road-grit may be added to this compost, which ought not to be sifted too fine."

5361. Ayres, who grows excellent table fruit of the citrus, at Shipley, uses ten parts of strong turf-loam, seven of pigeon-dung, seven of parings from the dog-kennel, or butcher's yard, and ten of sheep-dung, of good rotten horse-dung, and ten of old vegetable mould, mixed and prepared a twelvemonth before using. (*Hort. Trans.*, vol. iv. p. 310.)

5362. Henderson, of Wood Hall, a most successful cultivator of the genus Citrus, gives the following directions as to soil:—"Take one part of light brown mould from a piece of ground that has not been cropped or manured for many years; one part of peat earth, such as is used for growing heaths; two parts of river-sand, or pit-sand if it be free from mineral substances; and one part of rotted botbed dung; with one part of rotted leaves of trees. Mix them all well together, so as to form a compost soil of uniform quality." (*Calcd. Hort. Mem.*, vol. iii. p. 302.)

5363. Temperature. The standard temperature for the citrus tribe is 48°; but in the growing season they require at least ten degrees of additional heat to force them to produce luxuriant shoots. The air of the house in which the plants are kept, whether in boxes or in the ground, should never be allowed to fall under 40°; for though the orange, like the pine-apple, will endure a severe degree of cold for a few hours without injury, yet, as Meach has observed, if the leaves are once injured, the trees will require three years to recover their appearance. Ayres never suffers his orangery to be heated above 50° by fire heat, until

the end of February; when the trees show blossom, it is increased to 55°, but never allowed to exceed 60° by sun-heat, the excess of which he checks by the admission of air till the early part of June, when he "begins to force the trees, by keeping the heat in the house up as near as possible to 75°." For I do not consider (he adds) that either citrons, oranges, lemons, or limes, can be grown fine and good with less heat." (*Hort. Trans.*, vol. iv. p. 811.) The orange, Humboldt observes (*De Distrib. Plant.*, p. 168.) which requires an average temperature of 64°, will bear a very great degree of cold if continued only for a short time. This is proved by an observation of Dr. Sickler, who says, "It is remarkable how much cold and snow the common lemons and oranges will bear at Rome, provided they are planted in a sheltered situation, not much exposed to the sun. Thus I saw, in the two winters of 1806 and 1806, under my windows, on Monte Pincio, three standard orange trees in the open ground, heavily covered with snow for more than a week. The green leaves, but still more the golden fruits, nearly ripe, looked singular but beautiful amidst the snow; neither fruits nor trees had suffered, being in a sheltered place, while many branches and leaves of other trees of this kind, which were exposed to the sun, turned black and died, rendering the whole tree sickly." (*Volk. Oren. Gart.*, p. 9.) It appears that the snow had been thawed from off these trees gradually, and more by the temperature of the atmosphere than by the direct rays of the sun, or a current of heated air. This resulted from their sheltered and partially shaded situation; and, as Dr. Noehden has remarked (*Hort. Trans.*, vol. iii. p. 43.), it proves the truth of the observation of Knight, that it is more the sudden transition from cold to heat, and the contrary, than the degree of either, which destroys vegetables. Whenever orange trees or any tender exotics have been touched during night by frost, they should either be immediately shaded by mats from the next day's sun, or thawed by water at not more than 35° or 33° of temperature. In the northern regions the same treatment is successfully applied to animals. (See *Hort. Trans.*, vol. iii. p. 42. and p. 144.)

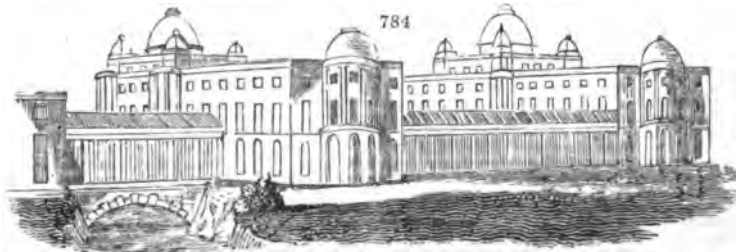
5364. *Water.* Orange trees, like other evergreens which delight in a strong soil, are not naturally fond of water; but in this country those in boxes are often much injured for want of a due supply of this material; for the earth becoming indurated, the water wets only the surface, and runs over and escapes by the sides of the pot or box; so that while the mass of earth below is dry, the surface has a same moist appearance. Mean says, "When I think, from the appearance of a plant, that the water does not freely enter by the middle or sides of the box, a sharp iron rod, about three feet long, is made use of to penetrate to the bottom of the earth, and to form a channel for the water, too little or too much of which is equally injurious to orange trees." Knight (*Hort. Trans.*, vol. ii. p. 328.) watered an orange tree with very strong liquid manure, and found it grow with equal comparative vigour to the vine and mulberry. Ayres, after the fruit is set, waters with water, in which, at the rate of three barrows of fresh cow-dung, without litter, two barrows of fresh sheep's droppings, and two pecks of quick lime have been added to every hoghead; when used, the water is about the consistence of cream. (*Hort. Trans.*, vol. v. p. 310.) The French water once after shifting with a very strong leavie; they also mulch with recent cow and horse droppings, renewing these once a month or oftener during summer, that there may be always abundance of soluble matter for the water to convey to the roots of the trees. (*Noxious Cows*, &c. art. *Orange*.) McPhail mentions a case in which very large orange trees in the border of a conservatory looked sickly; when, on digging deep into the borders to examine the cause, he found the earth quite dry, and by afterwards continuing to water them regularly he recovered them. (*G. Rem.*, p. 242.)

5365. *Air.* During the winter season, Miller observes, orange trees require a large share of air when the weather is favourable, for nothing is more injurious to these trees than stifling them. The prevention of damp, Mean observes, is as essential to the perfection of the plants as the exclusion of cold. Where these trees are kept in old-fashioned opaque-roofed green-houses, these cautions as to air and damp deserve particular attention. Ayres says, the more air orange trees have during the blossoming season, the more certain will they be of setting the fruit.

5366. *Situation relative to light.* The citrus tribe, in their wild state, are found growing as low trees in lofty woods, and on the margins of forests, and necessarily in such situations are a good deal shaded. It is also found, in this country, that the leaves are of the deepest green when they are partially shaded either by the construction of the house, or by being planted on the north side of trees of taller growth than their own.

5367. *Manner of growing the trees.* All the species may either be grown as dwarfs in moderate-sized pots or boxes; as standards with stems from two to six feet high in large boxes; as standards planted in the naked ground; and either as dwarfs or standards planted and trained against a wall or trellis under glass. The first two modes are more adapted for ornament than producing crops of large fruit; for all the art of the gardener will never make plants grow as vigorously in boxes as in the free ground. Standards planted in the free ground or floor of the conservatory combine both elegance and utility; as, in a house properly constructed, they will make handsome heads, and produce abundant crops of fruit. The last mode, or that of planting against walls or trellises, is much the most certain way of having large crops. Every part of the plant above ground can thus be brought near the glass and equally exposed to the sun's influence and that of the air and heat: they can be more readily pruned, and correctly trained, watered, and washed; and they occupy less room in proportion to the produce. The trees at Wood Hall, in West Lothian, some of those at Shipley, and at some places in Devonshire, are trained in this way. In a very few favourable situations in the South of England, as at Gerston, Luscombe, Coombe Royal, and Woodville, in Devonshire, they are trained against walls in the open garden.

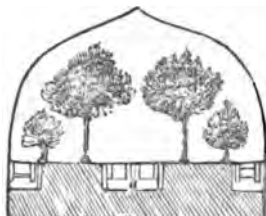
5368. *Plans for orange houses.* These must naturally depend on the mode of growing. For plants in moderate sized pots and boxes, a common green-house is the obvious habitation; for, being plants of ornament, they require merely the treatment of that department. The conservatories in Italy have generally opaque roofs, but some of the more enlightened nobles of Lombardy have lately erected splendid constructions with glass roofs, in which they combine the culture of the citrus tribe with that of other large-growing exotics. (fig. 784.)



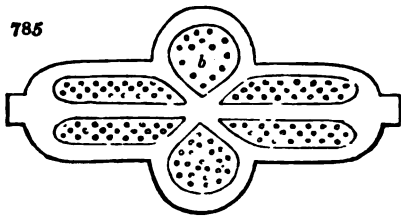
5369. For trees in large boxes, a proportionably large and lofty house is requisite; it may be opaque on the north side with a glass roof, front, and ends, of any convenient or desired length, width, and height. For one of moderate size, the height at the back wall may be fifteen feet, at front ten feet, and the width

of the house fifteen feet. The floor may be either perfectly level, and the boxes placed on it, the largest behind, so as their tops may form a slope to the front glass, as in the conservatory of Prince Borghese, at Rome; or if the trees are young, a stage may be erected for a few years, in order to raise the plants to the light: but if the trees are of a considerable size, the best way is to have square pits in the floor at regular distances, somewhat larger than each box, and in these to sink the boxes, covering them with mould, sand, or moss nearly to the level of the pavement, so that each tree so placed and dressed, will appear as if planted in a small compartment of earth. Such is the plan of the large conservatory in the royal gardens at Monza. The walk, unless where a stage is adopted, should be in the middle of the house, with corresponding doors in each end; but where the trees are young, and placed on a stage like green-house plants, the walk should be in front, as in no other situation could the eye of the spectator meet the foliage of the plants. Where the walk is in the middle, and a double row of trees on each side, as at Monza, the effect in winter is truly magnificent and gratifying.

5370. *Where the trees are to be planted as standards* in the borders or floor of the house, it is essentially requisite to the health and beauty of the plants that the building be glazed on all sides. Showers might be supplied in Loddiges's manner; best by steam, hot water, or fuses (fig. 785. a) and in winter, the



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beds (b) might be covered with turf, strewed with daisies, violets, and primroses; these would come early into flower, and if the turf were kept very short about the roots of the flowering plants, and the trees in excellent condition, only those who have seen the first-rate, regularly planted, standard orange groves of Nervi could form an idea of the effect, which, by contrast with the external winter, would be felt as luxurious, and as anticipating real spring.

5371. *Where orange trees are to be trained against the back wall or a trellis*, under the glass, the forms adopted for common peach-houses or vineries are perfectly suitable; but as by training close under the glass, as is done with vines, much of the beauty of the foliage would be lost, training on a trellis a few feet distant, with a path between it and the glass, is preferable.

5372. *Plans for tubs, pots, and boxes.* Unglazed pots of earthenware are preferable to glazed stone ware or China pots; the form need not be different from that in common use, and the size must depend on that of the plants. At Florence, where the largest and best garden-pots in Europe are made, the rim and part of the outside of pots destined for oranges and ornamental plants, are often decorated with festoons of flowers or fruit, and lions' heads, or other ornaments, which some potters near London have begun to imitate.

5373. *Tubs* may be of any size, and in these and in boxes, trees thrive better than in pots. One advantage of tubs is, that, by unhooping them, the staves are instantly removed, and the roots examined and dressed, and by having a cooper at hand they are immediately replaced; thus saving much of the trouble necessarily incurred in shifting plants in pots or boxes.

5374. *Boxes.* All boxes which are larger than the largest-sized pots should be contrived to take to pieces, in order to examine the roots, or to shift into larger boxes. Square boxes held together by an iron hoop, and taking to pieces on the principle of tubs, are most convenient for trees which do not require more than five or ten cubic feet of earth; and such as are used at the Tuilleries and by Meun († 2942.) answer very well for plants requiring from ten to sixty cubic feet. Those of Meun contain sixty-four cubic feet of compost. M'Intosh's boxes († 2943.) afford still greater facilities for removing or examining plants.

5375. *Proportioning the size of boxes to that of the plants.* The general opinion of gardeners is in favour of small pots or boxes; and where the object is dwarf plants, or merely to preserve the trees without much increasing their size or regarding their fruit, they are the most proper. But where the object is luxuriance of growth and fruit, it appears to us that the pots or boxes cannot be too large; unless, as Van Osten observes, it is meant to be ascertained that plants grow larger in pots than in the free ground. It is, however, expedient to plant at first in small boxes, and remove into larger ones by degrees. The largest boxes in use in Holland and France are four feet square, which serve for trees with stems from six to eight feet high, with globular heads of six feet in diameter, and above a century old. Henderson has "always found that the citrus tribe, and plants in general, grow best in pots or boxes, regarded as rather small in proportion to the size of the plants." (*Calcd. Mem.*, vol. iii. p. 303.)

5376. *Choice of sorts.* Where the object is principally ornament, a selection may be made from the varieties of each species at pleasure; but where the object is fruit for the dessert, the following sorts are to be preferred: the common, bloody-fruited, Bergamot, Maltese, sweet China, Scville, and Mandarin oranges; the common lemon, citron, and lime, and one or two plants of the shaddock. These include all the essential varieties of the orange tribe as far as respects fruit, variations in the leaves, and mode of growth.

5377. *Choice of plants.* For moderate-sized trees to be treated like green-house plants, such as are raised in this country or in the Parliarian nurseries are preferable; but where the object is large handsome trees in boxes, standards in the free soil, or trained trees, then plants from Genoa or Malta are decidedly preferable; indeed, no plants fitting for the purpose of standards could be elsewhere procured. Miller is of this opinion, observing, that "by much the quicker way of furnishing a green-house with large trees, is to make choice of such as are brought over every year in chests from Italy; for those which are raised from seeds in England will not grow so large in their stems under eighteen or twenty years, as those are when brought over; and although their heads are small when we receive them, yet in three years, with good management, they will obtain large heads, and produce fruit." When the plants are purchased in London, at the Italian warehouses, without names, the greater number will be found to be of the shaddock and citron kinds; as the Italian gardeners find these sorts make stronger shoots and more showy plants, and therefore send a greater number of them than of the less luxuriant, but more useful, varieties. But the best way is to send an order, through a British merchant who has a correspondent at Genoa, for named sorts, ordering so many of each class, either from the table of Dr. Sackler, or the synopsis of Gualtero.

5378. *Management in pots and boxes.* The management of dwarf English or French plants in moderate-sized pots or boxes, for the green-house stage, consists in common green-house treatment. Being potted in the proper soil, the roots are to be annually examined before the growing season in spring, and when rotted or diseased, trimmed off, and the trees repotted, or shifted into larger pots at discretion. Henderson says, "The general management of the orange trees from the middle of March till the 1st of Oc-

tober, may be discussed in a few words. I give the trees a good watering all over the leaves once a week with the engine, excepting when they are in flower. Till the end of May this watering is given about 11 o'clock in the forenoon. After the end of May, I give them a good dashing over the leaves twice a week with the engine, and now I do it in the evening. In very hot weather I repeat the engine-watering thrice a week. I never set the orange trees out of doors during summer; for, from thirty-eight years' experience, I find it is much against them, in the climate of Scotland. In hot weather I keep them in the back of the vinery, under the shade of the vines, or behind the stage of the green-house. Orange trees delight to be in the shade in sunny weather; they here grow freely, and keep a fine dark-green colour. From the frequent waterings over the leaves in summer, the pots require less water, but they must be carefully attended to, and when the plants are making their young shoots, the pots or tubs require a good supply of water. From October to March, I give them a gentle sprinkling over the leaves once in two or three weeks, but only in fresh weather, taking the opportunity of a mild day, when there is a little sun, and always in the forenoon." (*Caled. Hort. Mem.*, vol. iii. p. 355.)

5379. *For the management of Italian plants, destined to grow large trees and produce crops of fruit in boxes or tubs, the treatment requires to be more particularly detailed.*

5380. *The following are Miller's directions:—* Having furnished yourself with a parcel of trees, prepare a moderate hotbed of tanner's bark, in length and breadth according to the number of trees to be forced; then put your trees into a tub of water upright, about half way of the stems, leaving the head and upper part of the stem out of water, the better to draw up and imbibe the moisture. In this situation they may remain two or three days, according to their plumpness when you received them; then take them out and clean their roots from all filth, cutting off all broken or bruised roots, and all the small fibres which are quite dried by being so long out of the earth, and scrub the stems with a hard hair brush, cleaning them afterwards with a cloth; then cut off the branches about six inches from the stem, and having prepared a quantity of good fresh earth, mixed with very rotten neat's dung, plant your trees therein, observing never to put them into large pots; for if the pots are but big enough to contain their roots, it is sufficient as first planting. "Wrap the stems round with hay-bands from bottom to top, to prevent the sun from drying their bark; plunge the pots in the bark-bed, watering well, to settle the earth to their roots, frequently repeating the same all over their heads and stems, being very careful not to over-water them before they have made good roots, and shade from the sun in the middle of the day. If they have grown kindly, they will have made strong shoots by the beginning of June; at which time stop them, to obtain lateral branches to furnish their heads; harden them, to admit their removal into the open ground in July; house them about the end of September; and, during winter, water frequently but moderately, guarding against frost. In the following spring clean the stems and leaves of the plants, top-dress the earth, and mulch, with rotted cow-dung, round the edges of the pots, taking care that none touch the stems. Remove to a sheltered situation in the open air by the end of May. As the trees advance, stop strong irregular-growing shoots in the summer season, to force out lateral branches, to fill the head, and render it regular and free from weak trifling branches. The trees will require to be shifted and new-potted, every other year, in April. In performing the operation, having drawn the trees out of the pots, cut off all the roots round the outside of the ball of earth, and take away all mouldy roots; then with a sharp iron instrument get as much of the old earth from between the roots as possible; then set the root of the tree into a large tub of water, for about a quarter of an hour, to soak the under part of the ball of earth, then clean the stems. Re-pot the trees, and water, letting them remain in the house till they have taken root. Some useful remarks on this subject will be found in *Gard. Mag.*, vol. i. p. 182. The trees, or rather sticks bought in London, says one of the best cultivators of the orange in England, will be found to thrive rapidly by soaking them in milk-warm water for five or six hours, then planting them in pots, disproportionately small, filled with good maiden earth and vegetable mould, and plunging them into moist heat. If the sticks are become very dry and hardened by the voyage, it will be well to bind them round with wet moss, and so leave them, wetting the moss daily with warm water, till they have shot forth. (*Gard. Mag.*, vol. iii. p. 275.)

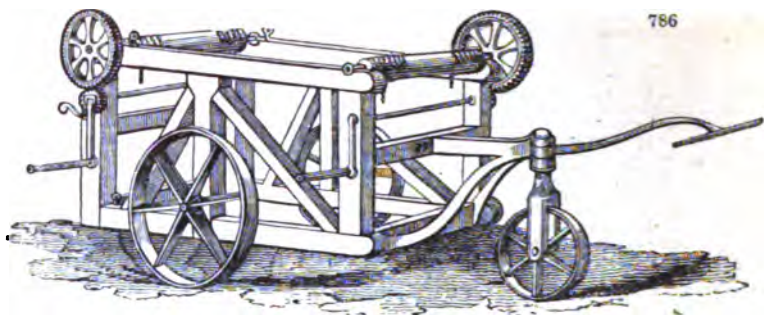
5381. *The operation of shifting, when the plants become very large, is much facilitated by adopting boxes which admit of being taken to pieces, as already described; the balls of earth can thus be slid from one box to the other, instead of being lifted out of the box. Where the boxes do not separate, the tree and ball must be lifted out by fixing one end of a rope to the stem of the tree, and passing the other over a pulley suspended from a triangle. This mode is recommended by Van Osten, while some French authors recommend a carriage-lever and rope. The tree and ball of earth are thus, by either mode, suspended in the air, the latter is examined, the roots pruned, &c.; and this done, the same or a larger box is placed directly below the ball, with a proper quantity of compost at the bottom, and into this the tree is lowered, and the sides filled with earth, &c. The worst thing attending this mode is the liability of injuring the bark of the stem by the noose of the suspending rope.*

5382. *Henderson shifts oranges only once in two years, and frequently after a long interval. "I never shift any plant till the pot is very full of roots. In shifting the oranges, I always take as much of the exhausted mould away as I can; and, on account of the light and free nature of the compost used, it comes easily from among the roots. The best season for this operation is about the beginning of March. Having turned the plants out of the pots or tubs, pick as much of the old exhausted mould from the ball as you can, without injuring the roots. They should be shifted into the pots or tubs only one size larger, and some of the plants will perhaps do better if replaced into the same pots again. Let the pots be all clean washed and dried before any plants be again put into them. Put a piece of crockery or broken pot over the hole in the bottom of the pit, with the convex side down; then cover the bottom, above the piece laid over the hole, three quarters of an inch thick, with coke made from pit-coal, broken small, about the size of peas. This both forms a drain, and prevents the entrance of worms. On the top of the charred cinders place a layer of dried moss (*Hypnum*), which prevents the compost mould from getting down amongst the coke, and lets the water pass off freely from the roots of the plants. The bottoms of the pots being prepared in this way, put in a little of the compost; then introduce the roots of the plant into the pot, and fill it up with the compost, observing to keep a little of the mould betwixt the side of the pot and the roots. The plants may be set partly in the peach-house or the vinery, and some in the green-house, which will give a longer succession of their flowers. The orange trees that are placed in the vinery or peach-house, if there be any fire-heat used at the time, must be watered as often as put in; but those put into the green-house when there is little heat, may stand a day without watering. After that space they may get a moderate watering; and this may be repeated once a week till the weather become warm, when they will require it oftener. Those placed in the vinery or peach-house will require watering very frequently, according to the degree of heat kept in the house." (*Caled. Hort. Mem.*, vol. iii. p. 304.)*

5383. *Removing old trees in pots or boxes.* Where orange trees have been ill managed, and their heads become ragged and decayed, Miller directs to restore them by cutting off the greatest part of their heads by March; drawing them out of the pots or tubs, and shaking off the earth from their roots; then cutting away all small fibres and mouldy roots; and next soaking and cleaning their roots, stems, and branches, planting them in good earth, plunging them in a hotbed, and treating them as directed for trees received from abroad.

5384. *Removal of trees in tubs or boxes.* Where a number of large trees are kept in boxes or tubs, they are generally removed from the orangery to a warm sheltered situation in the open air for three of the warmest months, and brought back again and replaced in autumn. This is not only a laborious operation, but, where the boxes and trees are large, one requiring considerable skill. The French have a machine for aiding in this operation, which we have already described, (p. 2317; but a much more scientific and commodious one for the British gardener (*fig. 786*) is thus described by Mr. Moore, in the *Gardener's*

Magazine, vol. x. This machine is of an oblong form, four feet ten inches long, four feet wide in the clear, and three feet eight inches high. It is fixed upon three cast-iron wheels, two of thirty inches, and



the other of eighteen inches, in diameter, the latter turning in a swivel, and acting as a guide to the machine. The frame is of oak with a movable back, as shown in the sketch, and it is fastened by means of four strong iron pins dropping into iron plates upon the oak frame; which differs from the others hitherto used in this country in having no bottom. When a tree is to be removed, the movable back of the machine is taken off; and the machine pushed to the box, thereby, in a manner, clipping it; the back is then to be replaced, and two iron bars, with link ends, placed under the box: four chains from the rollers are then hooked into the link ends; and the chains are afterwards wound upon the rollers by means of a cast-iron wheel and pinion attached to the axis of the same, and worked by four hand winches. This being done, the tree and box remain suspended in the centre; and there is a stopper to each pinion wheel, by the removal of which the chain is unwound, and the tree is, when required, lowered down gradually with the greatest ease. This machine possesses many advantages; namely, two men are hereby enabled to carry trees of upwards of a ton weight, which commonly require eight or ten men to effect their removal by a common truck. Also, in some instances, the entrances of orangeries, or other houses, are too contracted in height to admit of trees being removed upright; and it necessarily takes much time and labour to get them out safely by a common machine; whereas, by this one, the difficulty is entirely obviated: for, by winding the chains on one of the rollers more than the other, the head of the tree becomes depressed in proportion; and the end is effected without any additional labour whatever. (*Gard. Mag.*, vol. x. p. 136.)

5385. *Management of the citrus tribe as standards.* Prepare foreign plants as directed above, and instead of planting in pots, plant in the border or free soil. This must have been laid dry by proper drains, and if on a wet subsoil, floored, to prevent the roots from penetrating into it. On this, lay the sort of earth, or compost, most approved of, to the thickness of three or four feet; care having been taken, in constructing the house, that all the walls (excepting the north wall, if the house be opaque on that side, flues, paths, &c., be supported on pillars or piers, so as the compost may extend under them, and ten or twelve feet without the house, according to circumstances. Plant the trees either in squares, or betwixt quincunx, allowing six or eight feet between the trees, which will give thirty-six or sixty-four square feet to each plant. This distance will suffice for several years, and afterwards every other tree can be taken out. After planting, which should be finished in April, water at the root, and morning and evening sprinkle a little over the tops to assist in causing them to break freely. Apply fire, and keep the house close night and day, with a moist heat of from 55° to 60°, till the plants have made shoots of three or four inches; then begin to give a little air, gradually increasing it, but still keeping up the heat till the growth of the shoots is completed, when the sashes should be taken off to harden and colour the shoots and leaves. It will be necessary to attend to the above directions annually, for three or four years, in the growing season, in order to procure as much wood in a short time as possible. Keeping the heads open and regular, with the common routine culture, is all that is necessary at other seasons.

5386. *On walls and espaliers.* Prepare the plants and the border as before, and plant about ten or twelve feet distance, allowing a larger space for the citron, lemon, and shaddock, than for the common orange, as the former grow faster and more luxuriantly. In the growing season, observe the directions already given, continuing them annually. The fan manner of training is that generally adopted.

5387. *Pruning.* The French pay great attention to this part of the culture of the orange tribe; and, indeed, display greater art in pruning every sort of tree, than the British. They have their winter *taille*, and their *bourgeoisement*, or summer pruning, of the orange tree, as of the peach and vine. Those at Versailles and the Tuilleries are looked over every year, and receive a very elaborate pruning every sixth or eighth year. The object of this pruning is to keep the head proportioned to the capacity of the box containing the roots. The heads of these trees, notwithstanding the annual prunings, become too large, and show indications of suffering for want of nourishment, every sixth or eighth year. The shoots are then shortened to within an inch or two of the old wood, and the tree, thus almost deprived of leaves, does not produce blossoms during the next two years: it pushes, however, vigorous shoots, which are trained to form a bushy well-furnished head of the same shape and size as before. Such was the practice of the late M. Fethon, who was head gardener at Versailles for forty years. The form of the heads of the trees at Versailles is that of a cylinder, spreading out at top, of which the height is greater than the breadth; those in other places are ovate, globular, or mushroom-shaped, and some are even square and triangular. (See *Van Otten*, c. xi.) The blossoms of the orange trees in the royal gardens of France, and in most gardens of Holland and the Netherlands, are carefully picked off as they appear; as well to prevent the tree from being exhausted by bearing fruit, as for the use of the flowers for making orange flower water. Those of the Tuilleries, Neill informs us (*Hort. Tour.*), are farmed at the rate of 200. a year; and those of Versailles are let annually, in lots, and produce 195. a year, or upwards. In Holland, the flowers are commonly the perquisite of the gardener. Thus the beauty of the continental orange trees is far inferior to those of Italy or Britain, which are covered with fine large fruit.

5388. *The pruning which orange trees receive in England* does not differ, in general, from that given to any other green-house tree or shrub; and the consequence is, handsome bushes or trees, with the blossoms and fruit on the surface of the foliage. But when the orange tree is cultivated for fruit, whether as standards or against walls, the branches ought to be kept thin, like those of other fruit trees, so as to admit the sun, air, and water, freely to every part, and thus to have the blossoms and fruit regularly distributed from the centre to the extremities. This is regularly effected when the trees are flat-trained, which, where fruit is the object, is a great argument in favour of that mode of culture.

5389. *In pruning, with a view to fruit*, it must be considered, that the most useful blossoms of most sorts of citrus are produced in the form of terminating peduncles, on the wood of the current year; and hence, the grand object of the pruner ought to be to encourage the production of young wood in every part of the

tree by cutting out naked wood and shortening vigorous shoots where wood is wanting. A powerful co-operating measure is the exposition of all the parts of the tree to the light and air, which, as already observed, is only to be done in standards, by keeping the trees open, or by flat training. There are also blossoms produced by various sorts of citrus, in tufts, directly from the axils of the leaves of the wood of the preceding year: these expand earlier than the others, but generally drop off in plants kept under cover. Ayres cuts away the old and least promising branches, in February, to make room for younger and more productive wood, and shortens very strong branches to keep the trees in proper shape. After the fruit is set, it ought to be thinned, seldom leaving more than one on a peduncle. In France they thin the flowers, which, by that means, they are enabled to use for distillation. The thinned fruit is used in confectionery. Mean observes, "In regard to the necessity of thinning the fruit, lest the trees should exhaust themselves, it appears to me to depend on the state of the trees: if they are flourishing, I never observed that it was at all required, either here or at Bromley Hill, where the orange trees are very fine, and loaded with peculiarly large fruit." Ayres thins when the fruit are about the size of greengage plums, and never leaves two fruit together. Will standard trees, pruned with a view to fruit, be equally beautiful with the compact geometrical-headed trees of Paris and the old conservatories of this country? Those who prefer a full-bottomed periwig to a natural disposition of the hair will not think so. The two beauties, or effects, are of different kinds; the latter has utility to recommend it; the former, associations of the pomp and formal grandeur of past times. Quintinye and other French authors direct the wounds or sections made in pruning orange trees, to be covered with a composition to exclude the air; which deserves to be attended to, as the growth of the bark is otherwise very slow over wounds in these trees.

5390. *Messure*. About Genoa, the best cultivated orange groves are manured annually. In France and this country, the best practitioners stir the surface and apply a top-dressing of rich compost when the trees begin to grow, generally in April or May. Ayres top-dresses in June.

5391. *Gathering the fruit*. In the Italian gardens, and those at Hibern in France, where the fruit of the orange is raised for sale, it is gathered every year, generally in May. If not then gathered, it will hang on the tree for one or two years longer; but when the young fruit is green and swelling, the old ripe becomes somewhat shrivelled, and if then gathered is found almost void of juice. But as the new fruit begins to arrive at maturity, the juice begins to return to the old fruit; so that both old and new crops are in perfection together the following May. In this way, at Genoa, the orange is sometimes allowed to remain on the tree three years, and being then gathered, has a peculiar subacid sweetness and flavour, and is sold at a very high price to connoisseurs at Milan, Turin, and other places. The lemon differs from the orange in that it ripens irregularly, and drops off when ripe. It is therefore gathered at almost every season. The orange tree, kept in conservatories, generally requires fifteen months to ripen its fruit, and hence, both green and ripe fruit are together on the tree. Some authors assert, that the leaves remain on the same period with the fruit; but Quintinye says, "on a vigorous plant they will remain three or four years." In Britain they often remain three years on moderately strong plants without fruit. Saunders gathers the China orange just as the fruit begins to colour, and keeps them in a warm room about a fortnight previously to sending them to table: by this method, he says, the skin becomes very soft, and the juice more delicious than if the fruit were to ripen on the tree. (*Gard. Mag.*, vol. vii. p. 225.) In gathering for the table in this country, the fruit should not be pulled with the hand, but carefully cut off with a few leaves attached, and, thus garnished, sent to the dessert. By allowing them to hang two years, the trees will at all times have green and yellow fruit, which, in connection with their shining green leaves and fragrant blossoms, will form, early in spring, one of the most splendid of horticultural scenes.

5392. *Insects*. Plants of the citrus tribe are attacked by the red spider and the brown naked coccus (*C. hesperidum*). The red spider, according to Mean, may be destroyed by applying copious washings with the engine, and then shutting up the house, for three or four hours, until the heat is 70°. (*Hort. Trans.* vol. ii. p. 296.) Henderson kills the aphid by fumigation. Washing the stems and leaves with a brush and water, is the best method of destroying the brown coccus. Grey keeps his trees clear from this insect by giving them three dressings, every year, with the following mixture:—Take soft soap, half a pound, flower of sulphur, quarter of a pound, mix, add to these six quarts of water, hot, but not boiling, and keep stirring the mixture till the soap is dissolved. When the liquor is cold, take a sponge and wash every leaf on the upper and under side with it, and also the shoots and such parts of the stem as are likely to be infested. In three days all the insects will be found dead, when the trees must be syringed with pure water, till every part of them is perfectly clean. The trees will now look healthy, and keep clean for about four months, when the operation must be repeated. (*Gard. Mag.*, vol. iv. p. 247.)

SUBJECT. 2. *Pomegranate*.—*Punica Granatum* L. (*Bot. Mag.* 634.); *Icos. Monog.* L. and *Grandæa* J. *Grenadier*, Fr.; *Granatenbaum*, Ger.; *Granaatboom*, Dutch; *Melagrano*, Ital.; and *Grenado*, Span.

5393. *The pomegranate* is a low deciduous tree, rising fifteen or twenty feet high, thickly clothed with twigg branches, some of which are armed with sharp thorns. The flowers are produced at the ends of the branches, in the shoots of the same year, single or three or four together; frequently one of the largest terminates the branch, and immediately under that are two or three smaller buds, which continue a succession of flowers for some months, generally from June to September. The calyx is very thick and fleshy, and of a fine red colour; the petals are scarlet. The fruit is a berry covered with a hard coriaceous rind, and beautifully crowned with the tube of the calyx, which is sharply toothed, and remains even after the fruit is ripe, contributing greatly to its singular and beautiful appearance. The fruit ripens in October, and, in a green-house, will hang on the trees till the spring or summer following. It is a native of most parts of the south of Europe and of China. In Languedoc, and some parts of Italy, it is used as a hedge plant. It was cultivated in England in 1596, by Gerarde; but though it grows very well in the open air, it seldom ripens its fruit so as to render them worth any thing. It used formerly to be kept in boxes, and housed like the orange tree, which is still the practice near Paris and in the Netherlands. Some of the orange and pomegranate trees in the orangery at Versailles, Risso informs us, are believed to be between two and three hundred years old.

5394. *Use*. The fruit having an acid pulp is very refreshing, and is eaten like the orange; its singular and beautiful appearance contributes to the variety of the dessert. It is used medicinally in fevers and inflammatory disorders; being powerfully acid and astringent.

5395. *Varieties*. The Paris nurseries propagate the following sorts: those marked thus (*) may be had in the London nurseries.

The Wild, or very acid-fruited.
The Subacid-fruited, or cultivated.*
The Sweet-fruited.
Large-flowered single red and white.

The Semidouble, and double red and white.
The Yellow-flowered.*
The Variegated-flowered.

The Proliferous: in which a shoot proceeds from the middle of the flower.

5396. *Propagation.* The single-flowering sorts may be raised from seed, and all the varieties by cuttings, suckers, or layers, or by inoculation or grafting on the wild sort. The last is considered much the best mode where fruit is the object, and the next best is by layers; but the common mode is by suckers, which these plants send up abundantly. Inoculated plants, both of the single and double sorts, may be procured from Genoa; and this is the most desirable plan where the plant is to be cultivated for its fruit.

5397. *Culture.* The directions given for raising and cultivating the orange tree may be considered as equally applicable to the pomegranate, which, with the olive, was formerly the common companion of these trees in conservatories. Miller has observed, "that both the single and double pomegranate are hardy enough to resist our most severe winters in the open air; and that, if planted against walls, the former will often produce fruit, which ripen tolerably well in warm seasons, but, ripening late, are seldom well tasted." Where it is to be grown for fruit, therefore, either the standard or flat trained mode, under glass, as recommended for oranges, should be adopted. A few trees may be introduced along with those of the citrus tribe.

5398. *Soil.* Miller recommends a strong rich soil, in which, he says, "they flower much better, and produce more fruit than if planted on dry poor ground." In regard both to soil and mode of growth, the pomegranate bears a close resemblance to the hawthorn.

5399. *Pruning and training.* As already mentioned, the flowers of this tree always proceed from the extremity of the branches produced the same year: hence all weak branches of the former year should be cut out, and the stronger shortened, in order to obtain new shoots in every part of the tree. When the trees are trained against a wall, the shoots having small leaves may be laid in four or five inches asunder. The season for the winter pruning, Miller says, is about Michaelmas; for if left till spring before they are pruned, they seldom put out their shoots so early. In summer they require no other dressing than pinching off foreright and over vigorous shoots, as it is the middling only which are fruitful. In a warm situation Miller obtained a great quantity of fruit from trained trees; which, though not very well flavoured, were of full magnitude, and made a very handsome appearance on the trees. The double and other varieties, cultivated for the sake of their flowers, should be pruned, whether in boxes or against walls, on the same principle.

SUBJECT. 3. *Olive.* — *O'lea europe'a* L. (*Fl. Græc.* i. t. 3.); *Diând. Monog.* L. and *Oléine* B. P. *Olivier*, Fr.; *Oehlbaum*, Ger.; *Olijboom*, Dutch; *Ulivo*, Ital.; and *Olivo*, Span.

5400. *The olive* is a low branching evergreen tree, rising from twenty to thirty feet, with stiff, narrow, bluish-green leaves. The flowers are produced in small axillary bunches from wood of the former year, and appear in June, July, and August. The fruit is a berried drupe, of an oblong spheroidal form, hardish thick flesh, of a yellowish-green colour, but turning black when ripe. The tree is supposed to be originally from Greece; but it is now naturalised in the south of France, Italy, and Spain, where it has been extensively cultivated for an unknown length of time, for the oil expressed from its fruit. The tree attains an incredible age. Near Terni, in the vale of the cascade of Marmora, is a plantation above two miles in extent, of very old trees, and supposed to be the same plants mentioned by Pliny, as growing there in the first century. The olive appears to have been cultivated in the botanic garden of Oxford, in 1648, and is generally treated as a green-house plant. With protection from severe frost, Miller says, "it may be maintained against a wall in the latitude of London." In Devonshire, some trees have stood the open air for many years. Some trees planted against a warm wall at Camden House, near Kensington, succeeded so as in 1719 to produce fruit fit for pickling.

5401. *Use.* At the dessert, and frequently, also, during dinner, unripe olives appear as a pickle; which, though to those who taste it for the first time, it appears somewhat harsh, yet it soon becomes extremely grateful, and is said to promote digestion and create an appetite. Pickled olives are prepared by steeping in an alkaline lensive, to extract a part of their bitter; they are next washed in pure water, and afterwards preserved in salt and water, to which an aromatic, as fennel, &c. is sometimes added. The ripe olive, pressed and washed with hot water, furnishes, when skinned, the well-known condiment and corrective, salad oil, employed both in food and medicine. It may be considered as the butter of Italy and Spain.

5402. *Varieties.* In the olive countries these are nearly as numerous as the sorts of the grape and fig. The French (*N. Cours*, &c. in loco) describe between thirty and forty sorts. The following are grown in English nurseries:—

The Common. | Large-leaved. | Broad-leaved. | Iron-coloured. | Twisted-leaved. | Box-leaved.

5403. *Propagation.* By seeds, cuttings, layers, suckers, and inoculation. The last mode is adopted where the culture of the olive is conducted with care; but the *oliettes*, or olive plantations, are generally furnished from suckers, which arise abundantly from the roots of old trees. In England, as a green-house plant, it is raised from cuttings; but where it is intended to grow a few trees in the forcing department, for the sake of their fruit, we would recommend procuring strong plants from Genoa; these will produce fruit in three or four years, which the others will not for a great length of time.

5404. *Culture.* Some plants used formerly to be received by the Italian merchants along with their imports of orange trees, and were planted, like them, in pots or boxes; but in order to grow the tree for fruit, the modes to be adopted are either planting as standards in the area, or training on a wall, as recommended for the orange and pomegranate. If a house is not devoted to this fruit, one might be appropriated for it and the pomegranate; giving each their respective soils, and recollecting that the olive will not bear a very high degree of heat.

5405. *Soil.* The olive will grow luxuriantly in a strong clayey richly manured soil, but will not be so prolific as in a dry, calcareous, schistous, sandy, or rocky situation; which ought to be imitated in some degree in the composition prepared for the area or border of the olive-house.

5406. *Temperature.* That suitable for the orange will agree with the olive; but it cannot bear so high a degree of heat as that plant, never being found in Africa south of Atlas, nor in the East or West Indies. It is also easily affected by cold, but not more so than the orange.

5407. *Pruning.* The object here is to have a regular distribution of wood of the former year, from the axils of the leaves of which the flowers spring out. When shoots of three or more years are shortened for this purpose, they do not produce blossoms; but wood of the preceding or current year may be short-

ened, and the shoots proceeding from them will produce blossoms in due course. Ringing, to induce fruitfulness, was practised on the olive early in the seventeenth century. (*Boer*, in *N. Cours*, &c. art. *Oliviers*.)

Synonym. 4. *Indian Fig*, or *Prickly Pear*. — *Cactus Opuntia* L., *Opuntia vulgaris* Haw. (*Knoor. Thes.* 1. t. F. a.); *Icos. Monog.* L. and *Cacti J. Raquette*, Fr.

5408. The genus *Cactus* consists of succulent plants, permanent in duration, singular and various in structure, generally without leaves, and having the stem or branches jointed, and for the most part armed with spines and bristles. The joints or branches of the *O. vulgaris* are ovate, compressed, and have very small cadaverous leaves coming out in knots on their surface, and accompanied by four short bristly spines. The branches spread near to, or trail on, the ground. The flowers come out on the upper edges of the branches in June and July. The fruit is in the form of a fig or pear, with clusters of small spines on the skin, which encloses a fleshy pulp of a red or purple colour, and agreeable subacid flavour. It is a native of Virginia and Barbary, but is now naturalised in the south of Italy, being found on the rocks at Terracina and Gaëta. It was cultivated in England by Gerard, in 1596, in the open air, but without bearing fruit. It was cultivated in the stove by Justice at Crichton near Edinburgh, in 1750, and ripened its fruit. Miller says, "it will live abroad in England in a warm situation and dry soil; but in severe winters will be destroyed if not protected from frost."

5409. *Use*. The fruit is sent to the dessert in the West Indies; and might add to the variety of exotic fruits in this country. Braddick observes (*Hort. Trans.*, vol. ii. p. 238.), that, in countries where the fruit abounds, it is considered very wholesome, and though the taste of it is not agreeable to all persons till after they have eaten of it several times, yet they soon become very fond of it.

5410. *Sorts*. There are several species of that division of the genus *Cactus*, called prickly pears or figs, which produce edible fruit in their native countries, as the great Indian fig, or upright prickly pear, (*O. Tana.*) (*Plant. grass.* 138.); oblong Indian fig (*O. Ficus indica*) (*Reich.*, vol. ii. p. 470.); Barbadoes gooseberry (*Pereskia aculeata* Haw.); (*Dill. ch.* t. 227. f. 294.); the *O. vulgaris* is deemed the most hardy, and consequently is the easiest to fruit in Britain; but there can be no doubt that the other sorts might also be brought to mature their fruit with very little expense or trouble. They are at present kept in dry stoves for the sake of variety.

5411. *Propagation and culture*. All the above sorts may be propagated from seed or cuttings; the latter mode is most common. Cut off the branches at the joints, in July, or after the plants have done flowering, and let them dry for a fortnight, that the wounded part may be healed over; then plant in small pots, and plunge in the bark bed, or in a moderate hotbed, watering sparingly, giving air to avoid damps, and shading from the midday sun.

5412. *Soil*. Miller recommends the following: — one third of light fresh earth from a pasture; a third part of sea-sand; and the other part, one half rotten tan, and half lime rubbish. These are to be mixed and laid in a heap, three or four months before using, turning it over once a month; then pass it through a rough screen, but do not sift it fine; reserving some of the small stones and rubbish to lay at the bottom of the pots, in order to keep an open passage for the moisture to drain off. The Barbadoes gooseberry requires less lime rubbish and more of vegetable earth.

5413. *Temperature*. All the sorts, except the prickly pear, require the temperature of a dry stove in winter, and an increased degree of heat, say 80° or 90°, in summer, when it is intended they should produce fruit. They may either be planted in large boxes, filled with the soil above described, with a portion of vegetable mould added; or in borders to be trained on a wall or trellis near the light. In either case, by supplying them liberally in summer, whilst in a growing state, with heat at bottom and top, air, light, and some moisture, they will thrive abundantly, and produce fruit certainly not of exquisite flavour, but agreeable and singular, and worthy of being added to the British dessert.

5414. *Culture of the prickly pear in the open air*. Braddick, having eaten, with pleasure, of this fruit in Virginia, was desirous of cultivating it here. He recollected that the plant in its wild state delighted in a dry soil, amongst rocks, near the skirts of the sunny sides of the forests; and having heard that it would stand the open air in this country, he planted it in the compost described below, placed in a sheltered situation open to the sun. "The first plant that I turned out has lived in the open ground of this country for six or seven years, during which period it has endured one exceedingly hard winter, and several trying springs; and in all, except the first two years, it has never failed to ripen its fruit and seeds, so that it may be now considered decidedly acclimatised. The compost used by me for growing the *Opuntia vulgaris* is the following: — one half is carbonate of lime, for which lime-rubbish from old buildings will answer; the remaining half consists of equal portions of London clay and peat-earth, having the acid neutralised by barilla: these are intimately blended and sifted. One square yard of this compost I conceive to be sufficient for one plant, which must be placed in the middle of a small artificial hillock, raised eighteen inches above the surface of the ground, which ground should be rendered perfectly dry, if not naturally so, by under-draining. Neither the leaves, flowers, nor fruit should ever be suffered to touch the ground, but they should, as constantly as they are produced, be kept from the earth by placing stones, pebbles, flints, or bricks under them, in imitation of artificial rockwork." (*Hort. Trans.*, p. 228.)

5415. *The Torch Thistle*, or upright cactus, of which there are four species which bear edible fruit, and the *Strawberry Pear* (*Carex triangularis* Haw.), the *poire de chardon* of the French, may also be cultivated as fruit-bearing stove plants, in the same way as recommended for the Indian fig.

SECT. III. Exotic and Tropical Fruits little known, some of which merit Cultivation for their Excellence or Rarity.

5416. *The introduction and cultivation of new exotic fruits* may be considered as a very rational and entertaining object, for such as have the means, the time, and a taste for gardening. It seems to deserve the particular attention of retired persons of solitary habits, aged or inactive, by presenting an end to be attained; it may serve as a gentle stimulus to such as, from indolence or bilious complaints, are apt to sink into a state of torpid unenjoyed existence. A few of the plants, which we shall here enumerate, have been cultivated so as to produce fruit in this country, as the granadilla, lee-chee, loquat, banana, &c.: most of the others have hitherto served only to increase the variety of our stove or green-house plants.

5417. *The Akee Tree* is the *Begonia sápidá* H. K. (*Ann. Bot.* 2. t. 16, 17.); *Oct. Monog.* L. and *Sapindi* J. (*fig.* 787.) It is a tree rising from twenty to



twenty-five feet in height, with numerous branches, and alternate pinnate leaves, like those of the common ash. The flowers are small, white, on axillary racemes. The fruit is a pome, reddish or yellow; about the size of a goose's egg, with a pulp of a grateful subacid flavour; and in the West Indies is esteemed very wholesome; and nourishing. It is a native of Guinea, and was introduced into Jamaica in 1778, and thence brought to this country in 1793.

5418. *Propagation and culture.* It may be propagated from seeds, cuttings, or layers; but as the former mode would prolong the period of culture for fruit, and the two latter produce but weak plants, the better plan would be to order a few trees to be inoculated in Jamaica, and then sent over in tubs; these might be treated as directed for orange trees (5380.), and then planted in a border of rich earth, submitted to a Jamaica climate, and flat-trained near the glass. By such treatment, there can be no doubt the akee tree would in a few years produce fruit as readily as the orange.

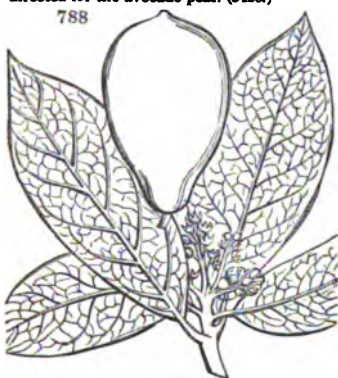
5419. *The Alligator or Avocado Pear* is the *Laúræ Péraea* L. (*Pluk. Alm.* t. 267. f. 1.); *Enacáa*. *Monog.* L. and *Laúræa* B. P. It is a stove tree, which, in the West Indies, grows to the height of thirty feet or upwards, with a trunk as large as that of our common apple tree. The leaves are, like those of laurel, of a deep green. The flowers are produced towards the extremities of the

branches. The fruit is the size of one of our biggest pears, and is held in great esteem in the West Indies; the pulp is of a pretty firm consistence, and has a delicate rich flavour; it gains upon the palate of most persons, and becomes soon agreeable even to those who cannot like it at first; but it is so rich and mild, that most people make use of some spice or pungent substance, to give it a poignancy; and for this purpose some make use of wine, some of lime-juice, but most of pepper and salt. Miller, from whom the above account is extracted, cultivated it in 1739.

5420. *Propagation and culture.* Miller gives directions for raising the tree from seeds, which, he says, may be brought over in dry sand from the countries where it is cultivated. There is nothing uncommon in the process of raising, which is conducted in a hotbed or pit; and when the plants have made their summer shoots, they are removed to the stove during winter. But where it is intended to cultivate this tree for its fruit, a better way would be to send to the Botanic Garden of St. Vincent's, and request a few stocks to be inoculated from bearing trees. These, being properly cased and packed, would arrive as safe as orange trees usually do; might be treated like them when unpacked; and planted in a border of strong rich soil, to be trained on a trellis or wall near the glass. After the plants were established, horizontal training and ringing, accompanied by a Jamaica temperature, would soon produce fruit.

5421. *The Anchovy Pear* is the *Griæ cauliflora* L. (*Sloana. Hist.* 2. t. 217. f. 1. 2.); *Polyóna*. *Monog.* L. and *Guttifera* J. (*fig.* 788.) It is a stove tree, frequently growing to the height of fifty feet in the West Indies, where it is a native. The leaves are oblong, and two or three feet long. The flowers numerous, on short peduncles, large and whitish. The drupe is ovate, and crowned with a calyx like the pomegranate, about the size and shape of an alligator's egg; it is pickled and eaten like the East Indian mango, which it greatly resembles in taste. It grows generally in low moist bottoms, or shallow waters, and has a most elegant appearance. Introduced here from Jamaica in 1768.

5422. *Propagation and culture.* It is very readily propagated from the stones, and the plants must be kept in a moist heat. To grow it for fruit, plant in a border, and train horizontally near the light, as directed for the avocado pear. (5420.)



5423. *The Durion* is the *Durio zebethinus* L. (*Rumph. Amb.* p. 99.); *Polyónáa*. *Polyóna* L. and *Carpodæa* J. (*fig.* 789.) This is a lofty East Indian tree, with leaves resembling those of the cherry, and large bunches of flowers coming out below the leaves, of a pale yellow colour. The fruit is the size of a man's head, roundish or oblong; resembling in some degree a rolled-up hedgehog, with a hard bark or rind; the fleshy part of the fruit is of a creamy substance, and of a delicate taste; but of an unpleasant heavy smell, somewhat resembling that of rotten onions; and the smell of the breath of those who eat it is infected also in a high degree; but when once a person has accustomed himself to eat of this fruit, he generally considers it the most excellent of all. Rumphius says, it is by much the most excellent fruit of India. The tree has not yet been introduced; but if a few fruitor plants were sent for from the Calcutta garden, and submitted to the general plan of culture for trees difficult to fruit, there can be no doubt of success.

5424. *The White Guava* is the *Psidium pyrifera* L. (*Rumph. Amb.* 1. t. 67.); *Icon. Monog.* L. and *Myrtidæa* J. (*fig.* 790.) It is a West Indian tree, growing to the height of seven, eight, or twelve feet, with numerous branches, and blunt, entire, smooth leaves, two or three inches long; the flowers are in solitary peduncles and sweet-smelling; fruit bigger than a hen's egg, roundish or oblong, smooth, yellow;

the rind thin, brittle, and yellow; pulp firm, full of bony seeds, flesh-coloured, sweet, aromatic, and pleasant. It is eaten with avidity both by West



ceeded by fruit about the size of a hen's egg, white, red, or rose-scented, with the flavour of a ripe apricot, and ripening from September to December.



Andoa tripétala H. K. The fruit is very highly spoken of by those who have tasted it in warm climates; but it has not been hitherto fruited in Britain. There can be no doubt whatever that this could easily be effected in our stoves, as it has already been in the Botanic Garden at Metz.

5431. *The Custard Apple* (*Andoa reticulata*), *Alligator Apple* (*A. palmata*), *Sweetsop* (*A. squamada*), and *Soursop* (*A. muricata*), are esteemed West Indian fruits. All these plants are already in our stoves, and might easily be cultivated as fruit trees.

5432. *The Mammee Tree* (*Mammea americana* L.; *Polyán. Monog. L.* and *Guttifera* J.) is a tall handsome tree, with oval, leathery leaves, and one-flowered peduncles, producing sweet white flowers an inch and a half in diameter, succeeded by roundish fruit, about the size of an egg, and in pulp and taste not unlike the apricot. It is eaten raw alone, or cut in slices with wine and sugar, or preserved in sugar. It is a native of the Caribbee Islands, and was cultivated in 1739 by Miller.

5433. *Propagation and culture.* It may be raised from the stones or seeds, and treated like other stove fruit trees. It has been cultivated by Knight, who found it rather impatient of a very high temperature. (*Hort. Trans.*, vol. iii. p. 464.)

5434. *The Lee-chee and Long-yen.* The *lee-chee* is the *Euphorbia Itchi* Desf. (*Louv. ill. t. 306*); *Ocidea Monog. L.* and *Sapindacea* J. It is a stove tree, with compound leaves, not unlike those of the common ash tree; a native of China, and introduced in 1786. The fruit is a berry, of a red colour when ripe, except in one variety, which remains green: it is much esteemed by Europeans.

5435. *The long-yen* is the *E. Longana Lam.* (*Buch. ic. t. 98*). The tree resembles the former, but the fruit is not so large, and is of a light-brown colour. "In both species the pulp of the fruit is surrounded with a tough, thin, leathery coat; it is a colourless, semitransparent substance, in the centre of which is a dark-brown seed of different sizes in the different varieties. The flavour of the pulp is slightly sweet subacid, and particularly pleasant to the taste in a warm climate. The fruit of the *lee-chee*, dried either in the sun or by fire-heat, is frequently brought to England from China. In this state the pulp is shrivelled and reduced within the coat, or shell, to half its usual size, and has a rich and sweet taste, if it has been well preserved. The fruit of the *long-yen* has been ripened by John Knight, Esq., at Lee Castle, in a lofty stove, erected for the purpose of growing tropical fruits; and a bunch was presented by him to the Hort. Society, in September, 1816, supposed to be the only one ever produced in Europe, which persons well acquainted with the *long-yen* in its native places of growth pronounced quite as good as those grown within or near the tropics." (*Hort. Trans.*, vol. ii. p. 408.) It was also fruited in the stoves at Syon, by Mr. Forrest, in 1833.

5436. *Propagation and culture.* Both species may be raised from seeds or layers, and the plants may be afterwards placed in a bed or area of rich soil, and trained or spread out near the glass. The temperature should never be under that of the pine apple.

5437. *The Lo-quat* is the *Méaphis japonica* L. (*Vent. Malin. 19*, and *Hort. Trans.*, vol. iii. tab. 11.) *Eriobárya japonica* Lindl.; *Icos. Di-Pent. L.* and *Rosacea* J. (*fig. 792*). In a wild state it is a lofty tree with thick knobbed branches, and tomentose spray or branchlets; the leaves are narrow, a span

long, bright-green and cinereous tomentose below. The flowers come in spikes at the end of the shoots in October and November. The fruit is a five-celled pome, about the size of a gooseberry, and in taste approaching to that of the apple. It ripens in May and June. It is a native of Japan, and was introduced in 1787 to Kew Gardens, where, as well as in some other places, it has produced fruit.



5438. *Propagation and culture.* It may be raised from seeds, or continued by cuttings or layers; but the best method, when it is intended to produce fruit, is to graft it on any other species of mespila. It is considered as a frame or half-hardy tree; but, to ripen its fruit with flavour, should have the temperature of the stove, in which, planted in a border of rich soil, it will add to the variety of the dessert. Sir Joseph Banks (*Hort. Trans.*, vol. i.) considers the fruit as equally good with that of the mango. Lord Bagot, who has fruited the plant in a very superior manner for several years at Blithfield, gives the following outline of his practice:—"The plan I have usually followed has been to give it a winter (out of doors) during the months of July, August, and September; and about the middle of October to replace it in a very warm situation in the tan. This summer, however, I was obliged to alter my mode; for, just at the moment when I was going to put it out for its winter, it became covered with at least twenty bunches of the finest flowers possible: I was therefore obliged to let it remain where it was. The present year's treatment, therefore, is an exception to the former practice; under that, it usually breaks into flower about the end of December, and the fruit becomes ripe in March or April. The last time my plant was in fruit, Sir William Coke, who had resided many years in Ceylon, where he is at present, was with me at Blithfield; he told me that he was in the constant habit of eating very large quantities of the fruit daily in that island, but that he had never tasted any so good, and with so much flavour, as those produced in my garden."

5439. *The Mango Tree* (*Mangifera indica* L.; *Bot. Rep.* 485; *Pent. Monog.* L. and *Terebinthaceae* J.) (*Fig.* 793.) is a large spreading tree, like the walnut,



with lanceolate shining green leaves, seven or eight inches long, having a sweet resinous smell; the flowers are white, growing in bunches at the extremity of the branches. The fruit a drupe, large, kidney-shaped, covered with a smooth, softish, resinous pale-green, yellow, or half-red skin, and containing an ovate, woody, fibrous, compressed nut or stone, within which is an ovate kernel, soft and pulpy, like a damascene plum. "When ripe, it is replete with a fine agreeable juice; it eats like an apple, but is more juicy, and some are as big as a man's fist. It is esteemed a very wholesome fruit, and, except very fine pine apples, is preferable to any fruit in India: gentlemen there eat little other fruit in the hot months. In Europe we have only the unripe fruit brought over in pickle." (*Martyn*, in *Miller's Dict.*) It is a native of the East Indies, and was introduced in 1690; but has not yet been cultivated for its fruit. According to Governor Rafles, forty varieties of mango are known in Java.

5440. *Propagation and culture.* It may be increased by cuttings, like the gardenia, which it somewhat resembles in habit, or from nuts; but as the vegetative quality of these does not seem to admit of long preservation, they must be enveloped in wax, or otherwise managed (5380), to preserve it. Miller says, the tree will not thrive in the tapit; and he recommends the dry stove, a tanper heat, and light kitchen-garden earth. This tree seems particularly deserving culture for its fruit, both on account of its quality, and the plants not requiring so much heat as most of the other unfriended Indian fruits. Knight raised some mango plants from seeds in October, 1818, which, in the following March, shot very vigorously in a temperature of 60°; he is "much inclined to believe that the mango might be raised in great abundance, and considerable perfection, in the stove, in this country; for it is a fruit which acquires maturity within a short period. It blossoms in Bengal in January, and ripens in the end of May." (*Hort. Trans.*, vol. iii. p. 463.)

5441. *The Mangosteen, Mangosteen, or Mangustin*, is the *Garcinia Mangostana* L. (*Less. Ill.* t. 405);



Dod. Monog. L. and *Gustiferæ* J. (*Fig.* 794.) It is a tree rising nearly 50 ft. high, with a taper stem, sending out many branches, not unlike a fir; with oval leaves, seven or eight inches long. The flower is like that of a single rose; the fruit round, the size of a middling orange; the shell is like that of the pomegranate, the inside of a rose-colour, divided by thin partitions as in oranges, in which the seeds are lodged, surrounded by a soft juicy pulp, of a delicious flavour, partaking of the strawberry and the grape, and is esteemed one of the richest fruits in the world. It is a native of the Molucca Islands, whence it has been transplanted to Java and Malacca. The head of the tree is in the form of a parabola, so fine and regular, and the leaves so beautiful, that it is looked upon in Batavia as the tree most proper for adorning a garden, and affording an agreeable shade. It was introduced to England in 1789. According to Dr. Garcin (*Phil. Trans.*), "it is esteemed the most delicious of the East Indian fruits, and a great deal of it may be eaten without any inconvenience; it is the only fruit which sick people are allowed to eat without scruple. It is given with safety in almost every disorder; and we are told that Dr. Solander, in the last stage of a putrid fever in Batavia, found himself insensibly recovering by sucking this delicious and refreshing fruit. The pulp has a most happy mixture of the tart and sweet, and is no less salutary than pleasant."

5442. *Propagation and culture.* It may be raised from seeds or cuttings; and in procuring the seeds from the East Indies, the same precautions must be taken as suggested for those of the mango. (5440.) Miller says, "the surest way to obtain the plants, is to sow the seeds in tubs of earth in their native country, and when the plants have obtained strength, they may be brought to Europe; but there should be great care taken to screen them from salt water in their passage, as also not to give them too much water when in a cool or temperate climate. When the plants arrive in Europe, they should be carefully transplanted each into a pot filled with light kitchen-garden earth, and plunged in the tan-bed, and shaded from the sun till they have taken new root. Then treat them as suggested for fruiting other stove plants."

5443. *The Pishamin, or European date plum (Diospyros Lotus L. (Mill. Ic. t. 116.); Polyz. Dia'c. L. and Eberdoez B. P.),* is a small tree, rising fifteen or twenty feet high, with spreading branches, and large shining lanceolate leaves. The flowers are small, of a reddish-white; the fruit is a berry half an inch in diameter, yellow when ripe, sweet, and somewhat astringent: it is used, like the medlar, in a state of incipient decay. It is a native of Italy and some parts of France; was introduced to this country in Gerard's time, and will grow in the open air, but not ripen its fruit freely.

5444. *Propagation and culture.* It may be raised from seeds sown in a hotbed and afterwards hardened, or from layers; but when it is intended to fruit the plant, it may be procured from Genoa of a good size; and, planted in a temperate forcing-house, it will not fail to mature its fruit.

5445. *The granadilla, or little pomegranate.* This name is applied to the edible fruit of five species of the *Passiflora* genus; *Monadell. Pentin. L. and Passiflora J.*; the common character of which is that of climbing herbaceous plants, woody at bottom, generally with lobed leaves, and all natives of warm climates.

5446. *The granadilla, or granadilla vine of the French,* is the *P. quadrangularis L. (Bot. Reg. 14.)* The leaves are oval and subcordate, five or six inches long and entire; the stem luxuriant and four-cornered. The flowers are odoriferous, red within, and white on the outside, and appear in August and September, both fruit and flowers growing at the same time. The fruit, Sabine describes (*Hort. Trans.*, vol. iii. p. 100.) as very large, of an oblong shape, about six inches in diameter, from the stalk to the eye, and fifteen inches in circumference. It is externally of a greenish-yellow when ripe, soft and leathery to the touch, and quite smooth; the rind is very thick, and contains a succulent pulp of a purple colour (which is the edible part), mixed with the seeds, in a sort of sac, from which it is readily separated. Wine and sugar are commonly added to it, when used. The flavour is sweet, and slightly acid, and it is very grateful to the taste, and cooling in a hot climate. It is a native of Jamaica and other West India islands, where it grows in the woods, and was cultivated by Miller in 1768, as a stove plant. It has since been successfully cultivated for its fruit in a few places, as at Lord Harewood's (*Hort. Trans.*, vol. iv. p. 60.), Farnley Hall, &c.

5447. *The apple-fruited granadilla, or sweet calabash,* is the *P. maliformis L. (Bot. Reg. 95.)* It has a thick triangular stem, with leaves oblong, cordate, six inches long and four broad, in the middle of a lively green. The flowers are sweet-scented, large, of a pale red and blue: "the fruit round, smooth, about two inches in diameter, of a dingy yellow colour when ripe; the coat is hard and stringy, nearly a quarter of an inch in thickness, full of a very agreeable gelatinous pale yellow pulp, in which many oblong black seeds are lodged" (*Hort. Trans.*, vol. iii. p. 101.), and is eaten like that of the former species. It is a native of the West India islands, and was introduced here, and cultivated by Miller, in 1731. It has borne fruit in the stove of the Bishop of Durham in Oxfordshire, and at Vere's, Kensington Gore.

5448. *The laurel-leaved granadilla, or water lemon, the Pomme de Liane of the French,* is the *P. laurifolia L. (Bot. Reg. 13.)* It has a suffrutescent stem, with divaricating filiform branches, oval, smooth leaves, and very long tendrils. Flowers red and violet, sweet-scented; the fruit about the size of a hen's egg, but rather more elongated, and tapering equally at both ends; when ripe, it is yellow and dotted over with white spots; it contains a whitish watery pulp, which, in the West Indies, is usually sucked through a small hole made in the rind; the rind is tough, soft, and thin; the juice has a peculiar aromatic flavour, is delicately acid, and allays thirst agreeably. It is a native of Martinique and Surinam, and was introduced here in 1690. It is grown in the stove, but has not yet been cultivated for its fruit.

5449. *The purple-fruited granadilla (Hort. Trans., vol. iii. pl. iii.) (p. 795.)* is by some botanists considered as a variety of *P. incarnata*, but by Sabine, who thus describes it (*Hort. Trans.*, vol. iii. p. 99.), as a distinct species. "The stem is thick and woody, the leaves three-lobed, and of considerable size; the flowers proceeding from the axilla of the leaves, fragrant, and of a white colour, tinged with purple. The fruit when unripe is green, but as it ripens changes to a dark livid purple, and much resembles the fruit of the purple egg-plant. The shape is elliptic, an inch and a half in diameter, and two inches from the stalk to the top; the pulp is orange-coloured, and the seeds numerous; the taste acid, and the flavour somewhat like that of the orange. It is a native of the Brasilia, was introduced from Portugal by Boehm, in 1810, and has produced fruit abundantly in the stoves at Walton on Thames, at the royal gardens at Windsor, and other places. Such is the rapid growth of this species, that a single plant will in one season extend in a line over upwards of forty feet of glass, on which space it will produce from 400 to 500 fruit."

5450. *The flesh-coloured granadilla, or May apple, is the P. incarnata L. (Abb. in Geor. t. 12.)* The root is perennial, sending up annually a number of herbaceous shoots, with three-lobed leaves, and sweet-scented flowers, variegated with purple, and appears from July to September. The fruit when ripe is about the size of an apple, orange-coloured, with a sweetish yellow pulp. It is a native of Virginia, was cultivated in the open air by Parkinson in 1629, and afterwards by Miller in the stove, with whom it bore fruit.

5451. *Propagation and culture.* All the sorts may be propagated from seed, layers, and even cuttings; but layers come soonest into bearing. Having procured plants with good roots, plant such as are intended to fruit in a border in the stove, and train them to a trellis near the glass; they will in general produce fruit the second year. The seedlings of the purple-fruited sort will produce fruit the first year. All the species will fruit even in large pots; but Sabine says, the "best method is, to plant them in an angle of the bark-bed, which has been parted off, either by boards or nine-inch brickwork, as low as the pit goes. At the bottom of the cavity, formed by this division, should be laid some brick rubbish, over which may be thrown a little dead tan, and the whole be then filled with equal parts of very old tan, and a compost of leaf-mould and rotten dung. Herein the roots will strike freely, and will even spread through the partition into the pit, growing into the fresh tan. Such roots may be trimmed and reduced whenever the tan is changed; but should the plant have been some time in its station, it will be as well to leave part of the old tan in the bottom of the pit, in which the protruded roots may remain undisturbed. They do not require the full heat of the pine-stove, for they flourish best in a temperature of from 65° to 70°; but they do not bring their fruit to perfection if kept in a common green-house or conservatory, though



they will grow and flower in it. The shoots, as they advance, must be trained near to and under the inclined glass of the stove: the first flowers will appear in May, and the blooming will continue until September, the fruit setting the whole time; but if it does not set well, it will be advisable to impregnate the stigmas, by applying the pollen with a feather. As they grow, the very strong shoots should be cut out, from their origin, for these do not bear fruit so abundantly as those which are less vigorous; but the fruiting branches must not be shortened on any account. The temperature must be kept up equally, during the time of flowering and fruiting; the crop will begin to come in in August, and will continue until January; but the earlier produce is the best. When the crop is all off, which will be early in January, the heat must be reduced to about 50°, so as to check or stop the growth; this being effected, the shoots must be well cut in. As little old wood as possible, besides the main stem, which rises from the pit to the glass, and a few pieces (about two or three feet of each) of the old branches, should be retained: for all that is to be trained under the glass, to bear in each year, ought to be the growth of the same season. It is found that the shoots break better, and in greater quantity, from the older wood than from that of two years' standing. In this dormant and reduced state it is to be kept during January and February, after which the necessary heat may be applied to cause it to resume its functions for the ensuing season."

5452. *The Cocoa-nut Tree* is the *Cocos nucifera* L. (*Rarb. Cor.* 1. t. 73.); *Monac's Hexin*. L. and Pálmas B. P. (Ag. 258). It is an East Indian palm; but cultivated in most places within the tropics. The trees grow to a great height, with leaves thirteen or fourteen feet long; the flowers come out round the top of the trunk of the tree in large clusters, enclosed in a spathe or sheath; and the nuts succeed them commonly ten or twelve together. Their form and use is familiar.

5453. *Propagation and culture.* The nuts are to be planted where they are designed to remain, as the tree will not bear transplanting unless when very young. In a moist heat they will push in six weeks or two months. To cultivate for fruit, plant in the centre of the area of a house, twenty-five feet wide, and either lofty, or with a movable roof, which will admit of being raised as the tree advances in height. In this way, with a strong heat, there can be no doubt this tree would produce fruit in England, but even if it did not, or did not for a great many years, the magnificence of its appearance, under such a mode of treatment, would compensate a curious horticulturist for the labour and expense. Though the cocoanuts to be obtained in the shops are supposed to be gathered before being ripe, yet they have been found to grow with no other care than planting in a large pot or box of rich earth, and plunging in a bark-bed. It may be observed here, that this is almost the only palm that could be cultivated in this country for perfecting its fruit; for, the others being dioecious plants, unless a great number were grown together, there would be no legitimate means of impregnating the female blossoms.

5454. *The Plantain Tree* (*Musa paradisiaca* L.; *Hex. Monog.* L. and *Musdecum* P. S.) rises with a soft, herbaceous, conical stalk, fifteen or twenty feet high, with leaves issuing from the top, often more than six feet long, and near two feet broad; the spike of male and female flowers appear from the centre of the leaves, and is succeeded by pudding-shaped fruits, eight or nine inches long, above an inch in diameter, pale-yellow when ripe, of a soft, sweet, luscious flavour; the spikes often so large as to weigh upwards of forty pounds. It is a native of the East Indies, and other parts of Asia, and probably of Africa, and was cultivated at Hampton Court in 1690. Gerard says, the pulp eats something like that of a musk-melon; he calls the plant Adam's apple tree, from a notion that it was the forbidden fruit of Eden; others suppose it to have been the grape brought out of the promised land to Moses. Dampier says, it is the king of all fruit, not excepting the cocoa itself. There are numerous varieties.

5455. *The Banana Tree* (*M. sapientum* L.) (Ag. 796.) differs from the plantain in having its stalks marked with dark purple stripes and spots, and the fruit is shorter and rounder. Some botanists, however, consider them as only one species. The fruit is mellowier than the other, is eaten raw or roasted, in fritters, preserves, marmalades, and the fermented juice affords an excellent wine. It has been fruited for upwards of seven years, at Wynnstay, the seat of Sir W. W. Wynne, in Denbighshire. Specimens were sent to the Horticultural Society in August, 1819, which were between four and five inches long, and possessed an agreeable, luscious, and acid flavour, and the produce from a single plant is "so abundant, as to entitle the banana to be considered as a useful fruit for the table."

5456. *Propagation and culture.* suckers rise from the root, which should be planted in light rich earth, in pots, and afterwards, if the plant is cultivated for its fruit, planted in a bed or pit of earth, kept rather moist. The plant at Wynnstay was planted in the pit of a stove about 1811. "It was then about six feet high, with a single stem. In each succeeding year it has produced a bunch of fruit; but in the present year (1819) two bunches; the first was ripe in May, the other in August, having about four dozen fruit on each bunch. The plant is now sixteen feet high, and measures three feet round at the bottom." (*Hort. Trans.*, vol. iv. p. 138.)

5457. *The Bread-fruit* is the *Artocarpus incana* L. (*Rum. Amb.* 3. t. 33.); *Monac's Monina*. L. and *Urticea J. Lima*, or *Fruit à pain*, Fr.; and *Brodbaum*, Ger. It is a stove tree growing in the South Sea Islands, to the height of a moderate-sized oak, with alternate leaves, deeply gashed, glaucous, and two feet long.

Aments on the outmost branches, violet-coloured, peduncled, male and female on the same twig. The whole tree and the fruit, before it is ripe, abounds in a very tenacious milky juice. The fruit is about the size and shape of a child's head, and the surface is reticulated, not much unlike a truffle; it is covered with a thin skin, and has a core about as big as the handle of a small knife; the eatable part lies between the skin and the core; it is as white as snow, and somewhat of the consistence of new bread. It must be roasted before it is eaten, being first divided into three or four parts; its taste is insipid, with a slight sweetness, somewhat resembling that of the crum of wheaten bread mixed with Jerusalem artichoke. Five plants were brought to England, the remainder of the stock brought from Otaheite by the unfortunate Captain Bligh in 1793. In Professor Martyn's edition of *Miller's Dictionary* will be found a variety of interesting details relative to this tree, and another species, the *A. integrifolia*, or *Jaca Tree* (Ag. 797.), which also well merits culture for its fruit.



5458. *Propagation and culture.* This tree will grow either from seeds, layers, or suckers; the latter the plants send up abundantly in their native climates. They succeed best in a rich soil; and, to induce them to produce fruit, should be treated as already advised for other stove fruits not easily fruited. As the bread-fruit tree has been introduced in the West India Islands, the shortest way would be to procure good-sized plants from Jamaica or St. Vincent's, though they may be occasionally obtained from the London nurseries.

5459. *The True Lotus (Zizyphus Lotus Lam.), the Jujube Tree (Z. Jujuba Lam.), and the Kaki (Diospyros Kaki W.).* are branching shrubs or small trees of the easiest culture in Italy, Barbary, and China, and abundant bearers. They might readily be cultivated in this country, and, as the jujube grows in hedge-rows about Genoa and Nice, it is probable it would bear fruit abundantly in a green-house. The jujube is served up in Italy as a dry sweetmeat. The fruit of the kaki are orange or apple shaped.

5460. *Other exotic fruits.* The following have been enumerated by Lindley (*Hort. Trans.*, vol. v. p. 83.), as meriting introduction, or, where already introduced, to be cultivated as dessert fruits.

5461. *Of African fruits* we might have, from Sierra Leone, the cream-fruit, country cherries, country plums and figs; from Congo, the conte, mabocche, gangi, safu, and *Adansia senegalensis*; from Loango, the casou, as large as a melon; from Madagascar, the voanato, voutaca, voascrome, asonualala, and alamotou.

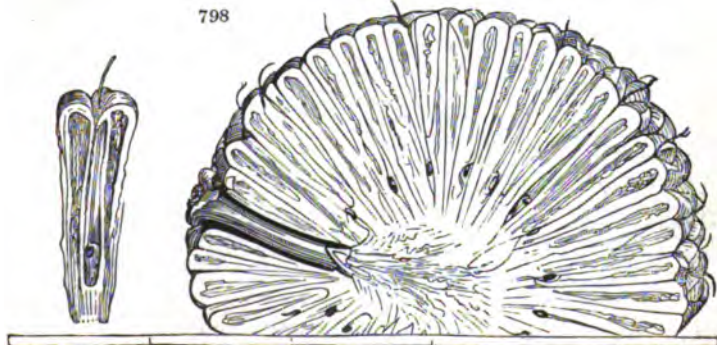
5462. *From the West Indies,* the sapodilla plum (*Achras Sapida*), country cherries which are various species of Malpighia, the callimato tree (*Chrysobalanus Ilex*), the star apple (*Chrysophyllum Caimito*), the country plums (*Spondias*) various species, the sea-side grape (*Coccoloba uvifera*), the garlic pear (*Crateva Tâpia*), and various species of *Cactus*. Most of these fruits are cultivated both in the West India Islands and on the American continent, and plants of all of them may be had from the London nurseries.

5463. *From South America* numerous fruits may be introduced: from Guiana, the tapaculo (*Cárica microcarpa*), the pinaou (*Adansia punctata*), the pinalous (*A. longifolia*), the marmalade-box of Stedman (*Sorinam*, vol. ii. p. 330.); from Brasil, Peru, &c. the acocon (*Lebnia glycydarpa*), the queule or keule (*Gomortia nitida*), and others of less note.

5464. *From Asia* the first fruits in the world have been obtained, and others are yet to introduce. From the Indian Archipelago, the lanshe (*Lansium domesticum*), a fruit considered as next to the mangosteen and durian, the rose-water jambu (*Eugenia aquea*), and other species; the blimbing (*Averrhoa Carambola*), the cheremi (*A. acida*), the rambutan (*Nephelium lappaceum*), the tomi-tomi (*Flacourtia inermis*), the *Xanthochymus dulcis*, *Sandoricum indicum*, and some others. From the continent of India, the maredoo, or elephant-apple (*Egle Marmelos*), the yellanga (*Fernalis elephantum*), the lattí am (*Wilughbia edulis*), the iwara mamady (*Xanthochymus pictorius*), the caraunda (*Coriaria Cardenas*), the launzan (*Buchanania latifolia*), and others. From China and Japan many new sorts of pears and peaches, it is supposed, may be obtained, and probably also apples and other European fruits; the *Pomaceæ* and *Prunaceæ* occupying the place in higher latitudes which the *Myrtaceæ*, *Guttiferae* and *Terebinthaceæ* do in countries nearer the equator. From the Society Islands, the Otahite apple (*Spondias cytherea*), &c. Though we think it probable that few or none of these, grown in this country, would be found to equal our best peaches, pears, and plums, or even gooseberries and strawberries; yet we cannot but wish to see this or the contrary proved by the wealthy and curious horticulturist.

5465. *Of the wild fruits of North America,* there are probably some that might be improved by cultivation, so as to render them fit for culinary purposes or the desert. Among these it is possible that the *Maclicra aurantiaca* Nutt. (*Monaecia Tetránd. L.* and *Urticeæ* Juss.) (fig. 798.) may be included. This tree

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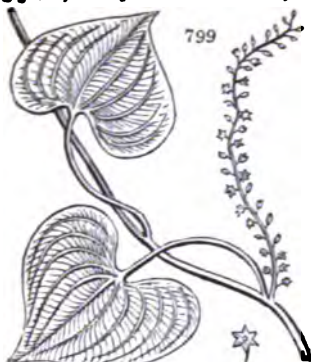
was introduced in 1818, and it is of the easiest culture in the open air. The *Sallabúria* has not yet been fruited in this country, though, as in the case of the *Maclicra*, we have long had both the male and female plants. The fruit appears to be eaten in China. The fruit of *Hippophae argentea* L. *Shepherdia argentea* Nutt., a native shrub of North America introduced in 1750, is eaten in its native country, where it is called by the Indians rabbit-berry, and the beef-suet tree. The shrub is of slow growth in this country, but we believe it has produced fruit in Messrs. Loddiges's arboretum. The fruit of the *Shepherdia rhamnoides* (*H. rhamnoides* L.) is much eaten by the Tartars. (See *Gard. Mag.*, vol. vii. p. 570.) A number of other trees and shrubs might be enumerated, the fruit of which is well deserving to be experimented on. One which just occurs to us, is a raspberry from Nepal (*Rubus micranthus* D. Don), which was introduced in 1822, and of the fruit of which, at Highclere, a very excellent preserve is made. There are doubtless several fruits, natives of Nepal, deserving of cultivation in our gardens; and several varieties of gooseberries and currants in the north-west coast of North America, which by culture might come to rival our common popular fruits.

SECT. IV. Exotic and Tropical Esculents, not hitherto cultivated as such.

5466. *Of exotic esculents,* some, as the yam and sweet potato, are worthy of being experimented on with a view to their naturalisation as articles of food; and even as furnishing a variety of esculent root, they deserve to be grown and sent to table, where there is a complete or extensive garden establishment.

5467. *The West Indian Yam* (the *inhame* of the Portuguese, and *igname* of the French) is the name applied to several species, with their numerous varieties, of the genus *Dioscorea* L., *Diosc. Batatas* L. and *Dioscoreæ* J. They are climbing, perennial, herbaceous plants, with tuberous roots, and axillary flowers

in spikes or racemes. The name yam is more particularly applied to the *D. sativa*. (*Rheed. Mal. 8. t. 51.*) (*Ag. 799.*) This plant has tender stalks, climbing to the height of eighteen or twenty feet, and furnished with smooth-nerved roundish leaves. From the base of the leaves arise spikes of small flowers of no beauty. The root is flat, brownish, a foot broad, and nearly palmated like those of some of the *Orchidaceæ*. It is a native of, and cultivated extensively in, Africa and the East and West Indies, and was introduced here from the latter country in 1733. The roots are mealy, easy of digestion, palatable, and not inferior to sago. They are now in use, either for delicacy of flavour or nutriment. They are often instead of bread, either roasted on the cinders or boiled; the flour is also made into bread and puddings.



5468. The *D. alata* (*Rheed. Mal. 7. t. 36.*), or *Winged Yam*, is in equal, if not more universal cultivation than the former species. Its roots are frequently three feet long, and weigh thirty pounds. Of both these species there are numerous varieties, differing in the size and form of their roots.

5469. *Propagation and culture.* They may be propagated like the common potato, and cultivated in nearly the same manner as the forced potato. Beware (*Hist. of Jamaica*) "that the roots must be cut so as to leave a little of the skin to each piece, for by that alone they germinate; the roots having no apparent buds or eyes, but casting out their weakly stems from every part of the surface alike. They are planted commonly in August, and are ripe in November or December following."

5670. The *Spanish, or Sweet, Potato* is the *Convolvulus Batatas* L. (*Rheed. Mal. 7. t. 50.*); *Pent. Monog. L.* and *Convolvulacæ* B. P. (*fig. 800.*) It is an herbaceous perennial, with a round stem, hispid, prostrate, creeping, of a whitish green, putting out scattered oblong, acuminate tubers, purple or pale, on the outstides. The leaves are angular, on long petioles; the flowers purple or upright peduncles. It is a native of both the Indies, and was introduced here, and cultivated by Gerard in 1567. He calls the roots by some named skirrets of Peru. They flourished in his garden till winter, when they perished and rotted. Batatas were then sold at the exchange in London, and are still annually imported into England from Spain and Portugal. They were, as already observed (4065), the common potatoes of our old English writers; the *Solanum tuberosum* being then little known. The tubers of the batatas are sweet, sapid, and nourishing. They are very commonly cultivated in all the tropical climates, where they eat not only the roots but the young leaves and tender shoots boiled. There are several varieties, if not distinct species, differing in the size, figure, and taste of the roots.



5471. *Propagation and culture.* In warm climates this plant is cultivated in the same manner as our potato, but requires much more room, for the trailing stalks extend four or five feet every way, sending out large tubers, forty or fifty to a plant. In the gardens at Paris, the plants are raised in a hot-bed, and about the middle of May transplanted in the open ground, where they are earthed up, and

otherwise treated like the potato. For the culture in Paris, and also in New York, see *Gard. Mag.*, vol. v. p. 275, 276.

5472. The *Oxalis crendes* (*Jac. Sw. A. gar. 2. a. 125.* *Decan. Pentag. L.* and *Oxalidæ J.*) was introduced into England from Lima in 1823. It grows freely in the open air in the summer season, but is easily destroyed by frost. In autumn, when the weather begins to grow cold, the points of its under-ground stolones form themselves into tubers, which are edible, and contain a good deal of saccharine matter. It has been proposed to use these tubers like the potato; the foliage in salad; and the stems in tarts. The whole of the herbage, some propose to be used as fodder for cattle, and the tubers as an auxiliary to the potato and turnip in the feeding of live stock. There is abundance of room for experiments on this plant. See *Gard. Mag.*, vol. x. p. 61, where references are given to all that has been written in preceding volumes of the work on the subject.

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5473. The *Caper* (*Capparis spinosa* L.; *Polyan. Monog. L.* and *Capparidæ J.*) (*fig. 801.*) is a trailing shrub, a native of the south of Italy and Sicily, where it abounds on rocks, ruins, and old walls. It has been long cultivated in France, and was introduced in this country in 1596, as a stove plant. The part used is the flower-bud, which is chiefly imported from Sicily. It is cultivated in the neighbourhood of Paris, being trained against a low wall, and the shoots in winter laid down and covered with litter or fern, like those of the fig. In the garden at Camden House, Kensington, a caper tree stood in the open air for near a century; it had a south-east aspect, and was well sheltered from the north; it had no covering, and was generally much injured by the frost; but the roots of this plant being particularly strong and vivacious, it made strong shoots, and produced flower-buds every year. It is probable, therefore, that a plantation, so situated, if covered every autumn with litter, mats, or ferns, would succeed. Such a plantation, not trained on walls, but planted in an open compartment, would, like those near Toulon, in France, have the general appearance of a plantation of brambles, and might be yearly covered with very little trouble.

5474. *Propagation and culture.* It may either be raised from seed, cuttings, or pieces of the root. The authors of the *Cours Complet d'Agriculture* prefer the mode by cuttings, and direct them to be cut a foot long, and planted in autumn. The autumn following they will be fit to remove to a general plantation. They describe two modes of culture: one, that of planting in walls, where no farther care is wanting, but that of gathering the buds; and the other, that of planting in quincunx in open compartments, like other fruit-shrubs: the latter mode is greatly to be preferred.

5475. *The Salsilla, or Edible Alstrameria.*—*Alstrameria Salsilla* R. M. (*Bot. Mag.* 1613), and *A. edulis* (*Hort. Trans.*, vol. ii.); *Herdn. Monog.* L. and *Asphodelus* B. P. This is a herbaceous plant of great beauty, a native of Peru, and introduced in 1806. It is cultivated in the West Indies, where its roots are eaten like the potato. It was flowered here in 1811, in the Comte de Vandres's garden at Bayswater. It requires a temperature of the stove, and may be cultivated in a hotbed like the early potato.

5476. *The Bread-root.*—*Psoralea esculenta* Ph. (*Pursh. Amer.* t. 92.); *Diadelp. Decán.* L. and *Legumínosæ* J. It is a perennial herbaceous plant, a native of Missouri, and introduced here in 1811. It will grow in the open air, but requires the protection of a frame to produce abundant crops of roots, which are used like those of the potato in the countries where it is a native.

5477. *The Pi-tai, or Water-Chestnut of the Chinese.*—*Scirpus tuberosus* Rox. (*Rox.*, vol. iii. p. 26.); *Triand. Monog.* L. and *Cyperaceæ* B. P. (*Ag.* 802.) It is a stoloniferous rush, without leaves, except a slender short sheath or two at the base of each culm. On the stolons grow tubers, which are in high estimation among all ranks of the Chinese, not only as a pot-root, but as a medicine. It is eaten either boiled or raw.

5478. *Cultivation.* "The man-tai, pu-tsai, or pi-tai, of Abbé Grosier, grows in tanks; these are manured for its reception about the end of March. Thus, a tank being drained of its water, small pits are dug in its bottom; these are filled with human manure, and exposed to the sun for a fortnight; their contents are next intimately blended with the slimy bottom of the tank, and the slips or roots of the plant deposited therein; the water is now returned to the tank, and the new crop of tubers comes to perfection by the 1st of September." (*Rox. Corom.*)

5479. *The Earth Almond, or rush-nut* (*Cyperus esculentus* L.; *Triand. Monog.* L. and *Cyperaceæ* J. *Souchet comestible*, Fr.; and *Zizule di Terra*, Ital.), is a fibrous-rooted grass, with small round tubers hanging from the fibres, about the size of peas, which taste like chestnuts or almonds. It is a native of Italy and Montpellier, and is cultivated in some parts of the south of Europe and Germany for food. The tubers are planted in spring, and taken up in October, and preserved for winter use in the manner of potatoes. It might probably be cultivated in this country in dry warm situations, or in a frame. (*Rox. Jardinier.*)

5480. *The Eatable Hibiscus, or Octro.*—*Hibiscus esculentus* L.; *Monadelph. Polyan.* L. and *Malvaceæ* J. *Gombard or Gombo*, Fr. This is a stove annual, a native of the West Indies, and introduced in 1692. A soft herbaceous stalk rises from three to five feet high, with crenate leaves, and axillary, pale sulphur-coloured flowers, succeeded by capsules. These, in the West Indies and the south of France, are put green into soups, or eaten with butter. In the south of France it is cultivated in the open air for this purpose; and at Paris it is treated as we do the capsicum and love-apple. A similar treatment would, no doubt, succeed in this country.

5481. *The Arracacha, of the order of Umbelliferae* J., is a South American plant, said to resemble the *Aplym* in habit; *Conium Arracacha* Hook., and probably the *Conium maculatum* Hum. The main roots divide into four or five others, which grow to the size of cows' horns. These are used in the manner of potatoes by the inhabitants of Santa Fé and the Caracas. They are light, starchy, and easy of digestion. The plant is said to thrive best in the elevated regions of mountains, where the medium heat does not exceed 59° or 60°. (*Annals of Bot.*, vol. i. p. 400.) This plant was, through the exertions of the Horticultural Society, introduced to England, but was soon afterwards lost.

5482. *Other esculents.* The Georgina is recommended to be grown for its tubers by Thibaut de Berneseud; and possibly, if they were very tender, and cooked in the most superior manner, they might be eatable. The *Dolichos Sjja*, a stove annual, the seeds of which form, or ought to form, the chief ingredient in the fish sauce of that name. The earth nut of South America (*Arachis hypogæa*), a stove annual, raised in a few places near Paris, on hotbeds, and then transplanted in the open air. The *Convolvulus reptans*, a shrubby stove plant, grown in China, in trenches filled with water, and used as a spinaceous or oleaceous plant. The *Basella nigra*, and other species, stove biennials, used for the same purpose: the European and Chinese water-caltrops (*Trapa natans* and *bicincta*), both green-house annuals, but fruited by Lambert in the stove. (*Hort. Trans.*, vol. iv. p. 563.) The *T. natans* is grown in the ponds in Holland, according to Professor Martyn, and the nuts are used there as chestnuts both by men and hogs; and Neill informs us that the canal at Versailles is covered with the plant, and that the fruit is sometimes served up at table. These, and a variety of others, the curious cultivator will find noticed in botanical works and books of travels, and will enjoy greater satisfaction in discovering them himself, than in finding them here ready named, figured, and recommended, for his experimental enquiries.

5483. *The sources of edible enjoyment afforded by a first-rate kitchen-garden* are numerous and varied; and consequently a proprietor, who spares no expense on this department, ought to be informed of what he has a right to expect, subject, however, to the drawbacks of bad situations, uncertain seasons, and unforeseen accidents. Many gardeners object to tables of this kind, as leading to unreasonable expectations, disappointments, and quarrels, and as, in short, enlightening too much their employers. On this we shall only observe, that the more a proprietor requires, the more he must conform to the conditions on which alone these products are to be expected. As to the subject of enlightening masters, much might be said in its favour, and nothing founded in right reason against it. It is only by a knowledge of gardening that a master can distinguish a bad gardener from a good one; and only from this appreciation that a good gardener

5484. *The sources of edible enjoyment afforded by a first-rate kitchen-garden* are numerous and varied; and consequently a proprietor, who spares no expense on this department, ought to be informed of what he has a right to expect, subject, however, to the drawbacks of bad situations, uncertain seasons, and unforeseen accidents. Many gardeners object to tables of this kind, as leading to unreasonable expectations, disappointments, and quarrels, and as, in short, enlightening too much their employers. On this we shall only observe, that the more a proprietor requires, the more he must conform to the conditions on which alone these products are to be expected. As to the subject of enlightening masters, much might be said in its favour, and nothing founded in right reason against it. It is only by a knowledge of gardening that a master can distinguish a bad gardener from a good one; and only from this appreciation that a good gardener

CHAP. XI.

Horticultural Productions which may be expected from a first-rate Kitchen-Garden managed in the best Style.

5485. *The sources of edible enjoyment afforded by a first-rate kitchen-garden* are numerous and varied; and consequently a proprietor, who spares no expense on this department, ought to be informed of what he has a right to expect, subject, however, to the drawbacks of bad situations, uncertain seasons, and unforeseen accidents. Many gardeners object to tables of this kind, as leading to unreasonable expectations, disappointments, and quarrels, and as, in short, enlightening too much their employers. On this we shall only observe, that the more a proprietor requires, the more he must conform to the conditions on which alone these products are to be expected. As to the subject of enlightening masters, much might be said in its favour, and nothing founded in right reason against it. It is only by a knowledge of gardening that a master can distinguish a bad gardener from a good one; and only from this appreciation that a good gardener

can be properly valued and rewarded. Community of knowledge must be better than no community at all. A man who employs a gardener, as he does a tailor, merely to supply his wants, may look on him as a very convenient person, and useful to have about his premises; but where a knowledge and taste for gardening exists in the employer, one point of union is formed between him and his servant, which must be productive of a certain degree of humanity, if not of mutual respect and consideration. It is only bad gardeners, therefore, that have to fear the dissemination of knowledge among their masters.

SECT. I. January. — The Productions of each Month arranged in the Order in which they have been treated in the preceding Chapters.

5484. *Culinary vegetables from the open garden, or garden-stove.* Strasbourg cabbage, savory, borcolini, Brussels sprouts. Kidney-beans for haricots, and Prussian and other peas. Potatoes. Jerusalem artichokes, turnip, carrot, parsnep, red beet, skirret, scorzonera, and salsfy, from the root stores and seed-room. Spinach in mild seasons; also sorrel and white chervil. Onions, leeks, garlic, shallot, and romcabole. Sea-kale from the covered beds. Lettuce, endive, celery, American and winter cress. Parsley, if protected, horseradish, and dried fennel, dill, chervil, &c. Thyme, sage, rosemary, lavender, from the open garden, and dried marjoram, savory, mint, basil, &c. from the herb-room. Rhubarb-stalks from covered roots; anise, coriander, and caraway seeds, chamomile, elecampane, blessed thistle, &c. dried. Red cabbage and samphire. Wild rocket, wild spinach, sauce-alone, and sorrel, if a mild

winter. Mushrooms from covered ridges. Sea-bell, or sweet fucus, dried.

5485. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services from the fruit-room. Some plants and morello cherries, carefully preserved on the trees. Some thick-skinned gooseberries, currants, and grapes, reserved on the trees. Some dried fruits of the same sorts on branches hung up in the fruit-room. Almonds, walnuts, chestnuts, filberts from the fruit-room.

5486. *Culinary productions and fruits from the forcing department.* Kidney-beans. Potatoes. Sea-kale. Small salads. Parsley. Fennel. Rhubarb. Mushrooms. Pines, winter melons, grapes, strawberries, cucumbers occasionally. Oranges, lemons, and pomegranates. Malay apple, loquats, and ice-cream Yams and Spanish potatoes.

SECT. II. February

5487. *Culinary vegetables from the open garden, or garden-stove.* Scotch or Strasbourg cabbage, savoy, borcolini, Brussels sprouts, and, if a mild winter, cabbage and cauliflower. Haricot-beans, and soup-peas from the seed-room. Potatoes, Jerusalem artichokes, turnip, carrot, parsnep, red beet, skirret, scorzonera, and salsfy. Spinach, if a mild winter. Onions, leeks, garlic, shallot, and romcabole. Sea-kale from covered beds. Lettuce, endive, celery, American and winter cress. Parsley, if protected, horseradish, and dried fennel, dill, chervil, &c. Thyme, sage, rosemary, and lavender, from the open garden; dried marjoram, basil, &c. from the herb-room. Rhubarb-stalks from covered roots, anise, coriander and caraway seeds, from the seed-room; chamomile, &c. from the herb-room. Red cabbage, samphire. Nettle and thistle tops;

towards the end, sorrel-leaves, and if a mild winter, sauce alone. Mushrooms from covered ridges.

5488. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services from the fruit-room. Some plants from branches hung up in the fruit-room. Dried grapes and currants from branches hung up in the fruit-room. Almonds, walnuts, chestnuts, filberts, from the fruit-room. Bloss from dried branches hung up in the fruit-room.

5489. *Culinary productions and fruits from the forcing department.* Kidney-beans. Potatoes. Sea-kale, asparagus. Small salads. Parsley, mint, chervil. Rhubarb. Mushrooms. A pine occasionally; grapes, cucumbers, strawberries. Oranges, lemons, olives, pomegranates.

SECT. III. March.

5490. *Culinary vegetables from the open garden, or garden-stove.* Brussels sprouts, borcolini, of sorts, especially the early greens, and Broda kale, broccolis. Haricot-beans and soup-peas, from the seed-room. Potatoes. Jerusalem artichokes, turnip, carrot, red beet, parsnep, skirret, scorzonera, and salsfy. Spinach occasionally, if mild. Onions from the root-room; Welsh onions, ciboules from the garden; garlic, shallot, romcabole from the root-room. Sea-kale from covered beds. Lettuce, endive, celery, American and winter cress; also water-cress, burnet, and others. Parsley, horseradish, and dried fennel, dill, chervil, &c. Thyme, sage, rosemary, from the open garden; dried marjoram, basil, mint, savory, &c. from the herb-room. Rhubarb-stalks from covered roots; anise, coriander, caraway, and other seeds, chamomile,

blessed thistle, and other dried herbs. Samphire. Mushrooms from covered ridges. Common and red dulse, sea-bell, and pepper-dulse.

5491. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services from the fruit-room. Some dried grapes. Almonds, walnuts, chestnuts, filberts from the fruit-room.

5492. *Culinary productions and fruits from the forcing department.* Kidney-beans. Potatoes, radishes. Sea-kale, asparagus. Small salads, onions. Parsley, mint, chervil, sweet marjoram. Rhubarb. Mushrooms. A pine occasionally; grapes, cucumbers, strawberries. Oranges, shadocks, lemons, olives, preserved pomegranates.

SECT. IV. April.

5493. *Culinary vegetables from the open garden, or garden-stove.* Brussels sprouts, borcolini, broccolis, colicaverts. Haricot-beans, and soup-peas from the seed-room. Potatoes, Jerusalem artichokes, yellow turnip, carrot, red beet, parsnep, skirret, scorzonera, and salsfy. Spinach, orache, wild spinach, sorrel, fat hen, herb-patience. Bulbed and young onions, ciboules, and Welsh onions; garlic, shallots, romcabole, &c. from the stores. Sea-kale and asparagus at the end of the month; top-tops, campion-tops, and thistle-tops throughout the month. Lettuce, endive, celery, American and winter cress; burnet, water-cress, and other salads. Parsley, purslane, tarragon from the garden; horseradish, and dried herbs from the herb-room; mint, rosemary, and lavender, from the open garden. Other kitchen herbs of this class from the herb-room. Rhubarb-stalks from covered plants; angelica, elecampane, and thistle-stalks from the garden. The seeds and

dried herbs of this class from the stores. Samphire and heads of arach marigold. Nettle, campion, thistle, toryer, biddock, ox-tongue, sauce-alone, and other tops; chickweed, wild rocket, sea-bell, and other leaves. Mushrooms from covered ridges.

5494. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, services, from the fruit-cellar. Some dried grapes from the fruit-room. Almonds, walnuts, chestnuts, filberts, from the fruit room or cellar.

5495. *Culinary productions and fruits from the forcing department.* Kidney-beans, peas. Potatoes, carrots, radishes. Sea-kale, asparagus. Small salads, lettuce, onions. Parsley, purslane, mint, &c. Rhubarb. Mushrooms. A pine occasionally; grapes, cherries, peaches, cucumbers, melons, strawberries. Oranges, lemons, lime, pomegranates.

SECT. V. May.

5496. *Culinary vegetables from the open garden, or garden-stove.* Early cabbages, cauliflower, broccolis, and colicaverts. Haricot-beans, and soup-peas from the seed-room and sometimes, though rarely, young peas, towards the end of the month, from a warm border. Potatoes and Jerusalem artichokes from pits, or cold cellars, and carrots and red beet from cellars or the open ground, if not destroyed by the frost; young radishes. Spinach, orache, wild spinach, sorrel, and herb-patience in perfection. Housed onions, and winter leeks; young onions, ciboules, and chives, garlic and shallot from cold rooms. Asparagus and sea-kale in perfection. Lettuce, endive, celery, succory, young radishes, and all the salads in perfection; winter radish, lamb-lettuce. Parsley, purslane, horseradish, tarragon, and all this class, either fresh or from the herb-room. Thyme, sage, mint, tansy, costmary, &c. from the open garden; the others from the herb-room. Rhubarb-stalks, blanched or otherwise, from the earthed-up or uncovered plants, angelica-stalks, anise, and other seeds, and the dried herbs, as before,

from the herb-room. Samphire, and heads of marsh-marigold. Charlock, fat hen, chickweed, sea-orache, sea-bell, &c. as greens; biddock and orris, as salads; good-will and vernal gram, as tea plants. Morsels from their native habitats; garden mushrooms from covered ridges in the open garden.

5497. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, from the fruit-cellar. Dried grapes from the fruit-room. Almonds, walnuts, chestnuts, filberts, from the fruit-cellar.

5498. *Culinary productions and fruits from the forcing department.* Kidney-beans, peas, beans. Potatoes, carrots, radishes. Sea-kale, asparagus. Small salads. Chervil, purslane, &c. Mushrooms. A pine occasionally; grapes, peaches, melons, cucumbers, cherries, figs, apples, pears, gooseberries, and strawberries. Lemons, shadocks, oranges, pomegranates. Yams.

SECT. VI. June.

5199. *Culinary vegetables from the open garden, or garden-stove.* Cabbages and cauliflowers in perfection. Kidney-beans, peas, and common beans. Old potatoes from watered pit; new potatoes, turnips, carrots, and radishes. Spinach, archoke, and sorrel, in perfection. Young onions and chives; rocambole and garlic from the root-room. Asparagus and sea-kale in perfection till the middle of the month. Small salads, lettuce, lamb-lettuce, radishes. Parsley, purslane, tarragon, horse-radish, fennel, dill, marjoram, &c. Thyme, sage, mint, savory, basil, &c. from the garden, and from the herb-room. Rhubarb-stalks, angelica. Scamphire, three sorts. Char-lick, chickweed, fat hen, archoke, and willow-herb, as pot-herbs; orpino, ladies-smock, &c. as salads; sweet cicely as a garnish;

sea-bindweed as a pickle, and butterwort; the roots of scirrus as saloop. Morels from their native habitats; and the garden mushroom from covered ridges.

5200. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, from the fruit-cellar. Some cherries towards the middle of the month. Gooseberries, currants, strawberries, and raspberries, towards the end of the month. Almonds, walnuts, chestnuts, filberts, from the fruit-cellar. 5201. *Culinary vegetables and fruits from the forcing department.* Mushrooms, pines, grapes, peaches, nectarines, figs, cherries, &c., melons, cucumbers. Shadocks, oranges, lemons.

SECT. VII. July.

5202. *Culinary productions from the open garden, or garden-stove.* Cabbages and cauliflowers in perfection. Peas, beans, sugar-peas, and kidney-beans. New potatoes, turnips, carrots, radishes. Spinach, archoke, sorrel, and white beet. Onions baked and chives, for salading. Artichokes, asparagus, ramps. Small salads, lettuce, radishes. Parsley, purslane, Indian cress, marigold, borage, fennel, &c. Thyme, sage, mint, basil, and all the others, green or dried. New seeds of caraway, &c. from the herb-room. Angelica-stalks, gourd; the aromatic seeds from the seed-room; and the herbs either from the herb-room, or open garden. Asparagus and sea-kale in beans, and pickling cucumbers. The pot-herbs and salads as in June, the seeds of some sorts of vetches, as legumes; the

cow-parasop for its different uses, and butterwort; the roots of scirrus. Morels from their native habitats; garden-mushrooms from covered regions.

5203. *Hardy fruits from the open garden, orchard, or fruit-room.* Junestang, margaret, and codlin apples; James and other pears from the trees. Some peaches, nectarines, and apricots; also cherries. Gooseberries, currants, strawberries, raspberries. Almonds, walnuts, chestnuts, filberts from the fruit-cellar. Bird-cherries, tree-cherries.

5204. *Culinary productions and fruits from the forcing department.* Mushrooms, pines, grapes, peaches, nectarines, figs, cherries, apples, melons, cucumbers, &c. Lemons.

SECT. VIII. August.

5205. *Culinary vegetables from the open garden, or garden-stove.* Cabbages, cauliflowers, broccolis. Peas, beans, sugar-peas, kidney-beans. Potatoes, turnips, carrots, radishes, Jerusalem artichoke, red beet. Spinach, white beet-chard, archoke, &c. Onions, bulb or small, baked, garlick, and sorrel. From the garden. Artichokes, asparagus, ramps. Small salads, lettuce, endive, radishes, &c. Parsley, purslane, Indian cress, marigold, borage, fennel, &c. Thyme, sage, mint, basil, and all the others, green or dried. New seeds of caraway, &c. from the herb-room. Angelica-stalks, gourd; the aromatic seeds from the seed-room; and the herbs either from the herb-room, or open garden. Asparagus and sea-kale in beans, and pickling cucumbers. Indian cress, radish-tops, kidney-beans, &c. Love-apple, capsicum, mullin cress, radish-tops, kidney-beans, and pickling cucumbers. Mushrooms and champignons

from pasture, and the open garden; truffle from commons. All the sorts of fuci in their greatest perfection for the table or pickling.

5206. *Hardy fruits from the open garden, orchard, and fruit-room.* Apples, pears. Peaches, nectarines, apricots, plums, cherries. Gooseberries, currants, strawberries, raspberries. Nuts, if desired, from the fruit-cellar; almonds, and some walnuts and filberts from the trees towards the end of the month. Tree-currants, rose-herr.

5207. *Culinary productions and fruits from the forcing department.* Mushrooms. Pines, grapes, peaches, figs, melons, cucumbers. New yams and Spanish potatoes.

SECT. IX.

September.

5208. *Culinary vegetables from the open garden, or garden-stove.* Cauliflowers, cabbages, broccolis. Peas, beans, and kidney-beans. Potatoes, turnips, carrots, parsnips, shirret, and all the roots. Spinach, beet-chard, archoke, and sorrel. Onions, shallots, garlic, rocambole, and leeks. Artichokes, cardoons, ramps. Small salads, endive, lettuce, celery, tarragon. Parsley, horse-radish, Indian cress, marigold, fennel, chervil, &c. Thyme, sage, mint, and all the class dried or green. Gourd and pumpkins; the aromatic seeds from the seed-room; and the herbs from the garden or herb-room. Love-apple, capsicum, egg-plant, samphire, red cabbage, kidney-beans, &c. pickling cucumbers. Sea-peas and various legumes of the vetch kind, dry-wort. Solomon's seal, saloop, and other

roots; heath-tops and cow-parasop. Mushrooms and champignons from their native habitats, or from the open garden. Dulse, and all the sorts of edible fuci, in perfection.

5209. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars. Peaches, nectarines, apricots, plums, cherries. Grapes, gooseberries, currants, strawberries, raspberries. Almonds, walnuts, filberts.

5210. *Culinary productions and fruits from the forcing department.* Mushrooms. Pines, grapes, melons, cucumbers, figs. Pomegranates, Indian figs, arch-thistles, and strawberry-pears. Abies, alligator and anchovy pears, guavas and granadillas, some mangoes. Yams and Spanish potatoes.

SECT. X.

October.

5211. *Culinary vegetables from the open garden, or garden-stove.* Cabbages, cauliflowers, broccolis. Peas, and kidney-beans, if the weather is dry. Potatoes, turnips, carrots, radishes, Jerusalem artichokes, red beet, shirret, salify, scorzoners. Spinach, beet-chard, sorrel. Onions, leeks, garlic, shallots, and rocambole. Artichokes, cardoons, ramps, celery. Small salads, endive, succory, lettuce, winter-cress, burnet. Parsley, horse-radish, Indian cress, marigold, fennel. Thyme, sage, mint, and all of the class green or dried. Gourd and pumpkins, aromatic seeds, and dried herbs, as in September. Love-apple, capsicum, egg-plant, red cabbage, kidney-beans.

5212. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services. Some peaches, nectarines, apricots, plums, and protected or covered morello cherries. Grapes and strawberries, raspberries, and protected or covered gooseberries and currants. Almonds from the fruit-room; and walnuts, chestnuts, and filberts from the trees. Wild services, cloudberry, bramble-berries, and cranberries.

5213. *Culinary productions and fruits from the forcing department.* Mushrooms. Pines, grapes, melons, cucumbers, figs. Pomegranates, olives, Indian figs. Yams and Spanish potatoes.

SECT. XI.

November.

5214. *Culinary vegetables from the open garden, or garden-stove.* Cabbages, cauliflowers protected by frames, broccolis, Brussels sprouts, savoy, borecole. Dried kidney-beans and peas, from the seed-room. Potatoes, turnips, carrots, radishes, Jerusalem artichokes, red beet, shirret, salify, scorzoners. Spinach, beet-chard, sorrel. Onions, leeks, garlic, shallot, rocambole. Cardoons, ramps, celery. Endive, lettuce, winter cress, burnet. Parsley, horse-radish, fennel, and dried chervil, &c. Thyme, sage, and rosemary, the others chiefly from the herb-room. Caraway, anise, and other aromatic seeds from the seed-room; the family herbs from the

herb-room. Red cabbage. The edible roots, as in October Sea-bait, ladder-locks, and other species of fuci.

5215. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services. Some protected plums and cherries from branches hung in the fruit-room. Grapes from the trees, or from branches hung in the fruit-room. Almonds, walnuts, chestnuts, filberts, from the fruit-room. Bites, from the bushes, wild services, hips, haws, cranberries, and cloudberry.

5216. *Culinary productions and fruits from the forcing department.* Mushrooms. Pines, grapes, melons, cucumbers, figs. Oranges, lemons, pomegranates, olives.

SECT. XII.

December.

5217. *Culinary vegetables from the open garden, or garden-stove.* Strawberry cabbages, cauliflowers where preserved or protected, broccolis, savoy, Brussels sprouts, borecole. Dried kidney-beans and peas, from the seed-room. Potatoes, turnips, carrots, winter radish, Jerusalem artichokes, red beet, shirret, salify, and scorzoners, from the open garden or root-room. Beet-chard, where protected. Onions, leeks, garlic, shallots, and rocambole. Cardoons, celery. Endive, lettuce, winter and American cress. Parsley, horse-radish, dried herbs. Thyme, sage, rosemary, lavender, &c. green, the others dried. The seeds of caraway, &c. from the seed-room; and the herbs of this class from the herb-room. Red cabbage. Edible roots from the stores or pits. Preserved sea-bait, and, when the weather admits of gathering, other edible fuci; the floating ferns in pickle.

5218. *Hardy fruits from the open garden, orchard, or fruit-room.* Apples, pears, quinces, medlars, services. Some protected plums and cherries from branches hung in the fruit-room. Grapes from the trees, or from branches hung in the fruit-room. Almonds, walnuts, chestnuts, filberts, from the fruit-room. Bites, from the bushes, wild services, hips, haws, cranberries, and cloudberry.

5219. *Culinary productions and fruits from the forcing department.* Kidney-beans. Potatoes. Sea kale. Small salads. Chervil, fennel, &c. Rhubarb. Mushrooms. Pines, grapes, peaches, &c. winter melons, cucumbers, figs. Oranges, lemons, pomegranates, olives.

BOOK II.

FLORICULTURE.

5520. *Floriculture* we consider as comprehending whatever relates to the culture and arrangement of plants, whether ligneous or herbaceous, grown chiefly on account of their flowers, or as objects of taste or curiosity. The culture of flowers was long carried on with that of culinary vegetables, in the borders of the kitchen-garden, or in parterres or groups of beds, which commonly connected the culinary compartments with the house. In places of moderate extent, this mixed style is still continued; but in residences which aim at any degree of distinction, the space within the kitchen-garden is confined to the production of objects of domestic utility, while the culture of plants of ornament is displayed in the flower-garden, the lawn, and the shrubbery. These, under the general term of pleasure-ground, encircle the house in small residences, and, in those on a larger scale, embrace it on one or more sides, the remaining part being under the character of park scenery. Many of the most interesting plants belonging to this branch of culture are natives of warm climates, and require the protection of glass, and artificial heat. On a limited scale, such plants are grown in the culinary-forcing-houses, or in green-houses, or botanic stoves, connected with the others in the kitchen-garden; and many of them are preserved in these houses, or in frames or pits during winter, and planted out on the lawn, or in borders, during summer. In complete residences, the culture of exotics forms a distinct department of ornamental horticulture, and the hot-houses requisite for this purpose are placed in the flower-garden, or variously arranged within the precincts of the pleasure-ground. In both departments, separation is attended with the usual advantages resulting from a division of skill, labour, and effect. Floriculture is obviously of limited interest and utility, compared to horticulture; much less has accordingly been written on it, and our view of modern practice will, therefore, be proportionably brief. The order adopted is the formation, planting, and general culture of the flower-garden; the formation, planting, and general culture of the lawn and shrubbery; the design and general culture of the floricultural hot-houses; the catalogue of plants and trees used in ornamental horticulture; and, lastly, the monthly table of floricultural productions.

CHAP. I.

Of the Formation of the Flower-garden.

5521. *The situation of the flower-garden, as of every scene devoted to flowers, should be near the house, for ready access at all times, and especially during winter and spring, when the beauties of these scenes are felt with peculiar force.* "The flower-garden," Neill observes, "should form an ornamental appendage to the mansion, and be easily accessible in all kinds of weather. There is no objection to its being seen from the windows of the house: on the contrary, this is sometimes considered as desirable." Nicol approves of having the various gardens of a place combined, and of placing them at no great distance from the house, and Repton strongly recommends this practice.

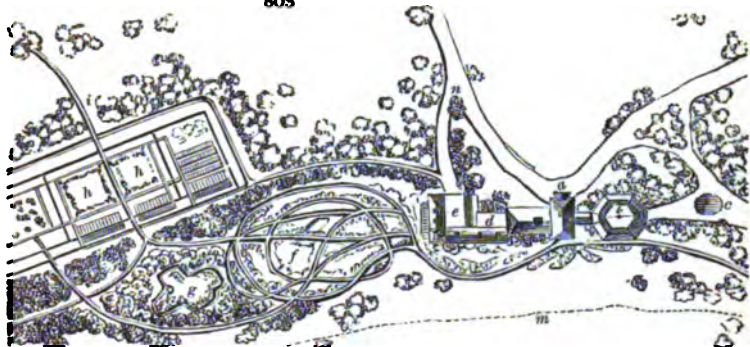
5522. *Abercrombie says, "While the kitchen-garden is concealed by buildings or plantations, the flower-garden and pleasure-ground should stand conspicuously attached to the family residence. When the horticultural establishment includes a conservatory, it is proper to have it in sight, and connected with the ornamented grounds; because the style of such a building, the plants within, and the scene without, under a tasteful arrangement, harmonise in character and effect."* The botanic garden, the range of stoves, and all the departments, a visit to which renders a walk about the grounds pleasing and interesting, should be at hand.

5523. *The author of the Florist's Manual confines her observations to the "construction of that humble flower-garden," which she calls "the common or mingled flower-garden."* "This," she says, "should be situated so as to form an ornamental appendage to the house, and, where the plan of ground will admit, placed before windows exposed to a southern or south-east aspect; and although to this position there may appear the objection of the flowers turning their petals to the sun, and consequently from the windows, this predilection in the tribe of Flora for the rays of that bright luminary will produce the same effect in whatever place our flowers may be situated, when in the vicinity of a building, as they invariably expose the front of their corols to the lights, from which both the petals of flowers, and the leaves of plants are believed to derive materials essential to their existence." She adds, "when apart from the house, the mingled flower-garden may be introduced with great advantage, if situated so as to form a portion of the pleasure-ground: in this case it should not be distant from the house, but so contrived as to terminate one of the walks of the home shrubberies." (*Flor. Man.*, p. 10. 15.)

5524. *To place the flower-garden south-east or south-west of the house, and between it and the kitchen-garden, is in general a desirable circumstance.* In a design for a villa-farm (*fig. 803.*), supposing the entrance front of the house (a) to face the north-west, then the farm-offices (b), horse-pond (c), &c. may be placed to the north-east; the kitchen-yard (d) and livery-stable-yard (e) to the south-west: against these may be placed the exotic hot-houses, looking to the flower-garden (f), and beyond this the American garden (g), and, lastly, the kitchen-garden (h), and walk to the farm (i). If concealed approaches to the farm and stable-offices (c, n) and from the kitchen-garden to the kitchen (a, e, d) be contrived, such as

arrangement will be found to combine both elegance and economy, and to admit of bringing the wire fence (m), which separates the mown from the fed lawn, near the house, without being unsightly: a desirable object in farm villas, as it saves mowing, and increases pasturage.

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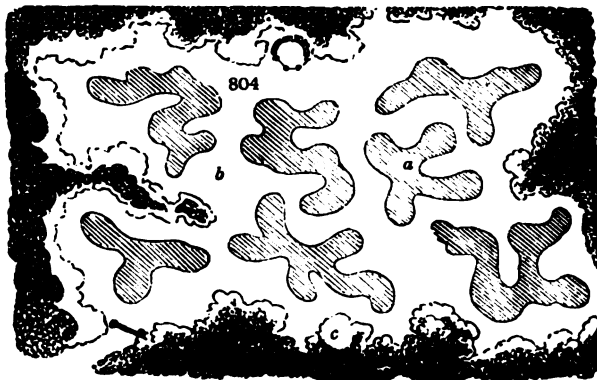


5525. *In exposure and aspect*, the flower-garden should be laid out as much as possible on the same principles as the kitchen-garden (3219.), not only on account of the advantages to be derived from the full influence of the sun during winter on the hot-house department, but also for the better enjoyment of the open-air scenes, in weather favourable for walking out of doors. It should not be naturally low in surface, nor of a wet retentive soil, nor rendered damp and gloomy by surrounding high trees, or lofty walls or buildings. If it happen that a house be nearly surrounded by a flower-garden, the variety of aspect thence afforded will be favourable to the continuance of the bloom of our flowers, far beyond what can be obtained if confined to a southern exposure. South, south-east, and east are the aspects most advantageous to the growth of flowers; and, possessing these varieties of exposure, the bloom of a garden may be protracted some weeks beyond the time it could be preserved under a single aspect.

5526. *The extent of the flower-garden depends jointly on the general scale of the residence, and the particular taste of the owner.* There is no impropriety in having a large flower-garden to a small kitchen-garden or mansion, where the taste of the owner leads to such a deviation from common rules. As moderation, however, is generally found best in the end, we concur with the author of the *Florist's Manual*, when she states, that "the compass of ground appropriated to flowers must vary according to the size of the place of which that ground forms a part, and should in no case be of great extent. If the form of ground where a parterre is to be situated is sloping, the site should be larger than when a flat surface, and the borders of various shapes, and on a bolder scale, and intermingled with grass; but such a flower-garden partakes more of the nature of pleasure-ground than of the common parterre, and will admit of a judicious introduction of flowering shrubs."

5527. *Shelter* is equally requisite for the flower as for the kitchen garden, and, where naturally wanting, is to be produced by the same means, viz. planting. The plantation on the side next the garden should begin with the lowest shrubs, and rise in gradation to the trees, which, unless on the north, or very exposed points, should not be of the tallest kinds. A few elegant shrubs, and one or two trees, may

be scattered through the scene, either in the dug compartments or in the turf glades, for the purposes of shelter and shade as well as ornament; but in general, much of either of the two former qualities are highly injurious both to the culture of flowers and the thick closeness of turf, besides rendering the garden unfit to be resorted to in the winter and spring seasons. Sometimes an evergreen hedge will produce all the shelter requisite, as in small gardens composed of earth and gravel only (fig. 803.); but where the



scene is large (fig. 804.), and composed of dug compartments (a) placed on lawn (b); the whole may be surrounded by an irregular border (c) of flowers, shrubbery, and trees.

5528. *Soil.* Most of the hardy herbaceous flowers, and the deciduous and evergreen ornamental shrubs, will succeed in a soil of common good qualities, moderately light and mellow. Negatively, the ground should not be excessively strong and clayey; and mere gravel is very intractable. (*Abercrombie.*)

5529. *Nicol* observes, that flowers in general "will thrive very well in common garden-earth of a middling texture, if broken fine, to the depth of a foot. Some, no doubt, do better in light than in heavy soils; and the contrary: and others do best in rich humid earth. Bulbous flowers, in general, do best in light sandy earth; though some require a stronger and a richer soil. In general, the soil for these should be formed at least eighteen inches deep, and should be made very fine by the spade, or be put through a coarse screen." In parterres where the finer flowers are cultivated, a variety of soils will be required according to the nature of the plants, as rich sandy loam for bulbs, loamy earth for the primula tribe, heath soil for erica, bog earth for American plants; and hence it follows that, provided the subsoil be dry, the nature of the surface stratum is of the less consequence.

5530. *Surface.* Where the extent is small, and the plants grown to be chiefly florists' flowers, or other select kinds, in beds separated by gravelled paths, a level or gentle and uniform slope will be found most suitable; but where the limits are more extensive, and turf and shrubs are introduced, a wavy surface, either naturally or rendered so by art, will have much the best effect. In reclusive scenes immediately under the eye, art may create a sort of miniature of beautiful ground. Man is but a puny object compared to those of inanimate nature. He may overlook a distant hill, separated by low ground; but a mound of less than three yards in height, placed near the eye, confines the view, and all other objects being shut out, acquires, if apparently a work of nature, a degree of importance in his imagination; winding walks, four feet below the original surface, will supply earth for accompanying them by very hills or swells eight feet high. If these hills and swells are formed and contrived so as to produce a varied and natural-like whole, with every change of position, a very suitable basis will be raised for a picturesque shrubbery or flower-garden.

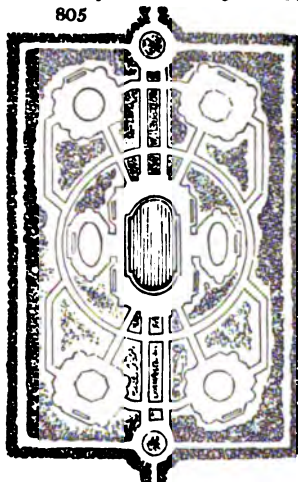
5531. *Turf or lawn* forms the general covering to the surface of flower-gardens, in the modern or English style, and on this turf the beds of soil, in which the flowers are planted, are cut out. In flower-gardens in the French style, however, and also in many English flower-gardens, turf or lawn is altogether wanting; the beds being separated by gravelled, sanded, or paved paths. One of the most beautiful flower-gardens in England, that in front of the rustic conservatory at Redleaf, is separated into beds by walks paved with brick, and having brick or stone edgings. The operation of transplanting, or laying down turf, has been already described. (§ 2914. and 2915.) When turf is to be produced by sowing grass seeds, the sorts may be, *Poa pratensis*, *Alopecurus pratensis*, *Cyberis cristata*, *Polygonum pratense*, *Elyris media*, and *Agrostis canina* and *vulgaris*, which, being all grasses of tenacious growth, are well adapted for forming persistent lawns. Where the *Festuca ovina* will grow, it is one of the very best lawn grasses; and *F. duriscula* and *rubra* are next in excellence. As the seeds of these grasses, however, cannot always be purchased, recourse must very frequently be had to *Cynodon cristatus*, *Anthoxanthum odoratum*, and the common perennial rye grass, carefully avoiding the *Dactylis glomerata*, *Holcus mollis* and *lanatus*, *Bromus*, &c., which are coarse grasses, and the seeds of which are very frequently found mixed with those of rye grass and other species in the seed shops. (See *Encyc. of Agr.*, § 5563. to 5713.)

5532. *Grassy surfaces* may be formed by cutting turfs in small pieces about two inches square, and distributing them at regular distances, say at about six inches apart every way, over a well-prepared surface. The practice is of old standing, but has been lately brought again into notice in Norfolk. (See *Sinclair's Hort. Gram. Wob.*, and *Encyc. of Agr.*, § 5714. to 5716.)

5533. *To repair and improve lawns in towns or cities, or under the shade of trees, without the aid of turf*, dig the soil to the depth of three or four inches the last week in March or the first week in April, and afterwards sow it thickly and regularly with the following seeds:—*Agrostis vulgaris* var. *tenuifolia*, *Festuca duriscula*, *F. ovina*, *Cynodon cristatus*, *Poa pratensis*, *Avena flavescens*, and *Trifolium minus*. These seeds must be mixed together in equal portions, and sown at the rate of from four to six bushels per acre. If the seeds are regularly and thickly sown, the ground will soon become green, and will remain as close and thick as any turf whatever during the whole summer; dying, however, in the succeeding winter, and requiring, therefore, to be revived every spring. (*Gard. Mag.*, vol. viii. p. 176.)

5534. *Water.* This material, in some form or other, is as essential to the flower as to the kitchen garden. Besides the use of the element in common culture, a pond or basin affords an opportunity of growing some of the more showy aquatics, while jets, drooping fountains, and other forms of displaying water, serve to decorate and give interest to the scene. Besides choice aquatics, the ponds or basins of flower-gardens may be stocked with the gold-fish.

5535. *The form of a small garden* (Fig. 805.)



will be found most pleasing when some regular figure is adopted, as a circle, oval, octagon, crescent, &c.: but where the extent is so great as not readily to be caught by a single glance of the eye, an irregular shape is generally more convenient, and it may be thrown into agreeable figures, or component scenes, by the introduction of shrubs so as to subdivide the space. "Either a square or an oblong ground-plan," Abercrombie observes, "is eligible; and although the shape must be often adapted to local circumstances, yet, when a garden is so circumscribed, that the eye at once embraces the whole, it is desirable that it should be of some regular figure."

5536. *Nicoll* says, "a variety of forms may be indulged in, without incurring censure; provided the figures be graceful, and not in any one place too complicated. An oval is a figure that generally pleases, on account of the continuity of its outlines; next, if extensive, a circle. Next, perhaps, a segment in form of a half-moon, or the larger segment of an oval. But hearts, diamonds, triangles, or squares, if small, seldom please. A simple parallelogram, divided into beds running lengthwise, or the larger segment of an oval, with beds running parallel to its outer margin, will always please." *Nicoll* concurs in this opinion.

5537. *The author of Hints on the Formation of Gardens*, &c. says, "a symmetrical form is best adapted to such parterres as are small and may be comprehended in one view; and an irregular shape to such as are of a considerable size, and contain trees, shrubs, statues, vases, seats, and buildings."

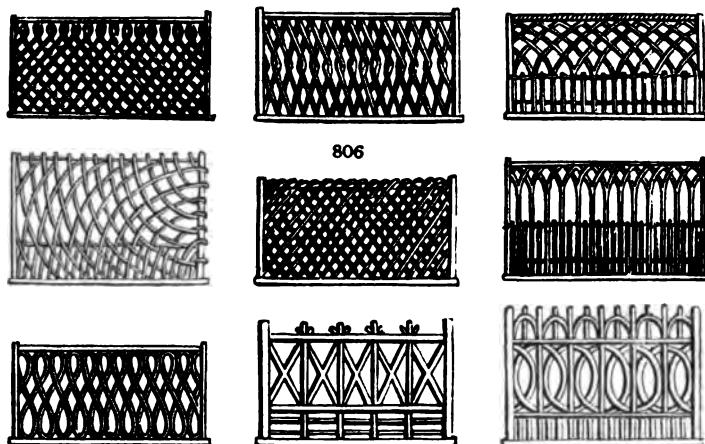
5538. *Boundary, fence, or screen.* Parterres on a small scale may be enclosed by an evergreen hedge of holly, box, laurel, privet, juniper, laurustinus, or Irish whin (*Ulex hibernicus*); but irregular figures, especially if of some extent, can only be surrounded by a shrubbery, such as we have already hinted at (§ 5527.), as forming a proper shelter for flower-gardens.

5539. *Abercrombie* says, "for the enclosure, and to afford a warm internal face for training rare trees. When one of those is not adopted, recourse may be had to a fence of whitethorn and holly," &c. (*Pract. Gard.*, 339.)

5540. *Rustic fences* formed of shoots of the oak, hazel, or larch, may often be introduced with good effect both as interior and surrounding barriers. (Fig. 806.)

5541. *Laying out the area.* This is the most difficult part of the business, and is not to be excelled in without a considerable degree of taste and experience. In laying out the area of the kitchen-garden, its destination, being utility, affords in all cases a safe and fixed guide; but the flower-garden is a matter of fancy and taste, and where these are wavering and unsettled, the work will be found to go on at random. As flower-gardens are objects of pleasure, the principle which must serve as a guide in laying them out, must be taste. Now, in flower-gardens, as in other objects, there are different kinds of tastes: these embodied are called styles or characters; and the great art of the designer is, having fixed on a style, to follow it out unmixed with other styles, or with any deviation which would interfere with the kind of taste or impression which that style is calculated to produce. Style, therefore, is the leading principle in laying out flower-gardens, as utility is in laying out the culinary-garden. As subjects of fancy

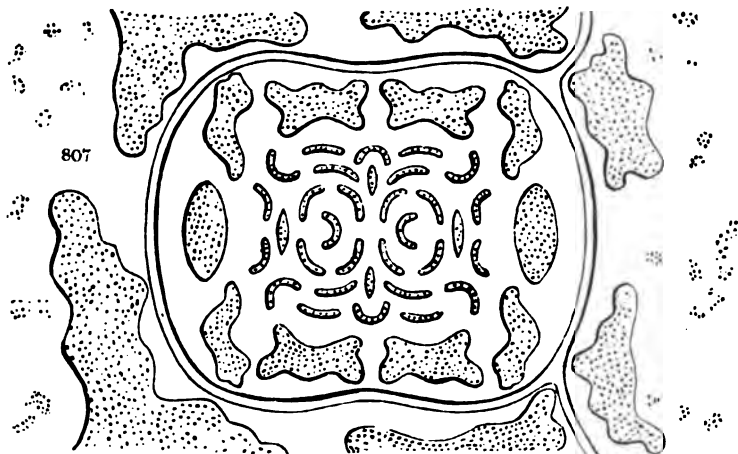
and taste, the styles of flower-gardens are various. The modern style is a collection of irregular groups and masses, placed about the house as a medium, uniting it with the open lawn. The ancient geometric



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style, in place of irregular groups, employed symmetrical forms ; in France, adding statues and fountains ; in Holland, cut trees and grassy slopes ; and in Italy, stone walls, walled terraces, and flights of steps. In some situations, these characteristics of parterres may with propriety be added to, or used instead of the modern sort, especially in flat situations, such as are enclosed by high walls in towns, or where the principal building or object is in a style of architecture which will not render these appendages incongruous. There are other characters of gardens, such as Chinese, which are not widely different from the modern ; the Indian, which consists chiefly of walks under shade, in squares of grass, &c. ; the Turkish, which abounds in shady retreats, boudoirs of roses and aromatic herbs ; and the Spanish, which is distinguished by trelliswork and fountains : but these gardens are not generally adapted to this climate, though from contemplating and selecting what is beautiful or suitable in each, a style of decoration for the immediate vicinity of mansions might be composed, preferable to any thing now in use. We recommend the reader to peruse certain passages in Cowper's *Task*, book iii. "To deck the shapely knoll," &c.

8543. *Errington*, a practical gardener, in a paper on this subject, in the *Gard. Mag.*, vol. viii. p. 562, would place the flower-garden a little on one side of the principal walk, not far from the mansion, and yet so contrived as to be almost entirely concealed from both mansion and walk. He would lay it out so as to present to the eye from the main walk, a series of bold irregular masses, united in appearance to the scenery around them by single trees, and small groups. As an example, he has given, *fig. 807*.



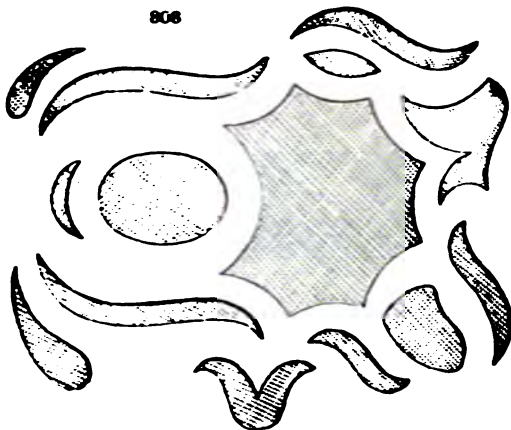
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8543. *Masaroni*, in the *Gard. Mag.*, vol. ix. p. 60, strongly recommends connection or union between the several beds or borders of a flower-garden. "Where the shape of any individual bed," he says, "can be changed at pleasure, without injuring or altering the general effect, the flower-garden cannot be considered as approaching to perfection, notwithstanding any sum which extravagance may have been pleased to throw away upon it." He gives, as an example, *fig. 808*.

8544. *Abercrombie*, *Nicol*, and most practical gardeners, seem not to understand the subject of style, and their rules amount to little more than that of subdividing the area by paths in different directions. The former author says, "If a piece of ground be set apart for the cultivation of flowers, in what style should it be laid out ? This may vary with the quantity of surface, and the object of the cultivator. In the first place, carry a border round the garden, nowhere narrower than three or four feet, unless it may be proper to contract its breadth under the windows of the house ; or unless there be a green hedge,

on any side, rooted in the level of the garden, which might be expected either to draw the earth, or to encroach on the small plants, in which case flowering shrubs in little slips of mould would do better than dwarf-stemmed flowers. In contact with the surrounding border may be either a grass-plot or a gravel walk. The latter is most convenient for approach at all seasons. If the ground be at all dilated, handsome walks crossing or leading to the centre will be also requisite: let the principal walks be five or six feet in breadth. The interior of the garden is usually laid out in oblong beds, three or four feet wide, with intervening alleys, two feet wide, or from that down to twelve inches, when it is intended to abstract as little space as possible from the cultivation of the flowers; or, the same may be obtained by circular or oval beds, with similar compartments between, of such a form as will leave the alleys of one regular width." (*Practical Gardening*, p. 340.)

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5545. According to Nival, the laying out of flower-gardens is a "matter very much of fancy. Too many gravelled alleys offend the eye, especially if they be much twisted, or run across; as it comprehends the whole at once. Their breadths should be proportioned to that of the beds; nor should they be much sunk; seldom more than an inch; otherwise they have a bad effect, and look rather like furrows than alleys. They may be edged with box, with daisies, with violets, geraniella, or thirt, according to fancy. But the edging, whatever it be, should be kept low, thin, and neat. It should seldom be allowed to rise two inches high, or spread two inches wide. A linear box-edging always pleases, if kept quite close and connected." (*Kalendar*, p. 456.)

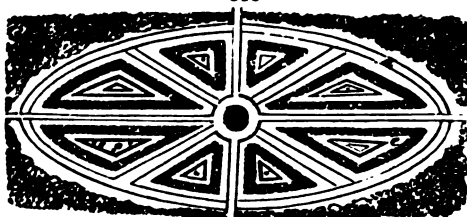
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5546. The author of the *Florist's Manual*, though she confines her directions to one style, has much more correct ideas on the subject than our practical authors. "It is more difficult," she says, "than may at first appear, to plan, even upon a small scale, such a piece of ground, nor, perhaps, would any but an experienced scientific eye be aware of the difficulties to be encountered in the disposal of a few borders interspersed with turf; the nicety consists in arranging the different parts so as to form a connected glow of colour, to effect which, it will be necessary to place the borders in such a manner that, when viewed from the windows of the house, or from the principal entrance into the garden, one border shall not intercept the beauties of another, nor, in avoiding that error, produce one still greater, that of vacancies betwixt the borders, forming small avenues, by which the whole is separated into broken parts, and the general effect lost. Another point to be attended to, is the just proportion of green turf, which, without nice observation, will be too much or too little for the colour with which it is blended; and, lastly, the breadth of the flower-borders should not be greater than what will place the roots within reach of the gardener's arm without the necessity of treading upon the soil, the mark of footsteps being a deformity wherever it appears amongst flowers." (*Flor. Man.*, p. 13.)

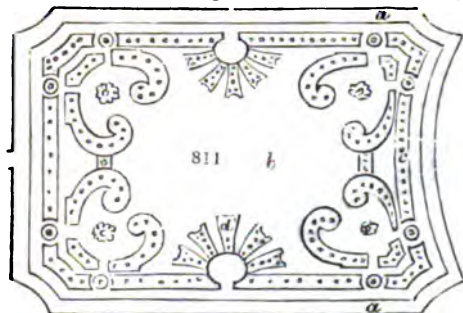
5547. The materials which form the surface of flower-gardens (Figs. 809, 810, 811.) are gravel (a), turf (b), and dug borders (c), patches (d), or compartments (e), and water (f); but a variety of other objects and materials may be introduced as receptacles for plants; as grotesque roots, rocks, flints, spar, shells, scorize in conglomerated lumps, sand and gravel of different colours; besides works of art introduced as decorations, such as baskets, vases, boxes, &c., of plain or rustic work; or tombs, or monuments, when the old French style (Fig. 812.) is imitated.

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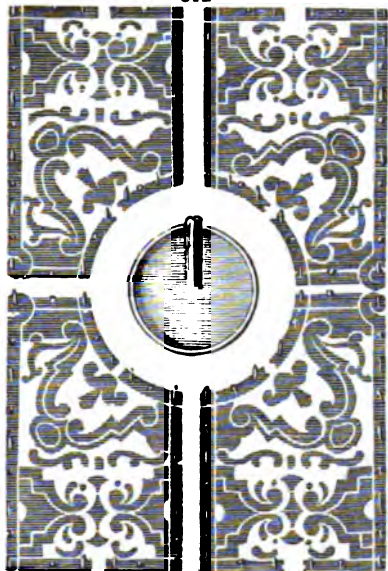
5548. Rockworks. The author of the *Florist's Manual* observes, on this subject, that "fragments of stone may be made use of, planted with such roots as flourish among rocks, and to which it might not be difficult to give a natural appearance, by suiting the kind of stone to the plant which grows naturally among its fissures. The present fashion of introducing into flower-gardens this kind of rockwork requires

the hand of taste to assimilate it to our flower-borders, the massive fabric of the rock being liable to render the lighter assemblage of the borders diminutive and meagre : on this point caution only can be given, the execution must be left to the elegant eye of taste, which, thus warned, will quickly perceive such deformity. I must venture to disapprove the extended manner in which this mixture of stones and plants is sometimes introduced, not having been able to reconcile my eye, even in gardens planned and cultivated with every advantage which elegant ingenuity can give them, to the unnatural appearance of artificial crags of rock and other stones interspersed with delicate plants, to the culture of which the fertile and sheltered border is evidently necessary, being decided that nothing of the kind should be admitted into the simple parterre that is not manifestly of use to the growth of some of the species therein exhibited. In pleasure-grounds or flower-gardens on an extensive scale, where we meet with but garden rockwork might probably be well introduced ; but to such a magnificent display of art I feel my taste and knowledge wholly incompetent." (*Flor. Man.* p. 15.) "Where neither expense nor trouble," the same author adds, "oppose their prohibitory barrier, many of the vegetable tribe may be cultivated to greater perfection, if we appropriate different gardens to the growth of different species ; as, although it is essential to the completion of our garden to introduce, on account of their scent and beauty, some of the more hardy species of the flowers termed annuals, in that situation room cannot be afforded them sufficient to their production in that full luxuriance which they will exhibit when not crowded and overshadowed by herbaceous vegetables ; and hence becomes desirable that which may be called the annual flower-garden, into which no other kind of flower is admitted besides that fugacious order, and under which is contained so great a variety of beauty and elegance, as one well calculated to form a garden, vying in brilliancy with the finest collection of hardy perennials. Also, the plants comprised under the bulbous division of vegetables, although equally essential to the perfection of the mingled flower-garden, lose much of their peculiar beauty when not cultivated by themselves, and will well repay the trouble of an assiduous care to give to each species the soil and aspect best suited to its nature. Two kinds of garden may be formed from the extensive and beautiful variety of bulbous-rooted flowers ; the first, wherein they should be planted in distinct compartments, each kind having a border appropriated to itself, thus forming, in the Eastern taste, not only the 'garden of hyacinths,' but a garden of each species of bulb which is capable of being brought to perfection without the fostering shelter of a conservatory. The second bulbous garden might be formed from a collection of the almost infinite variety of this lovely tribe, the intermixture of which might produce the most beautiful effect, and a succession of bloom to continue throughout the early months of summer. A similar extension of pleasure might be derived from a similar division of all kinds of flowers, and here the taste for borders planted with distinct tribes may be properly exercised, and, as most of the kinds of bulbs best suited to this disposition have finished their bloom before the usual time at which annuals disclose their beauties, the annual and the bulbous gardens might be so united, that, at the period when the bloom of the latter has disappeared, the opening buds of the former might supply its place, and continue the gaiety of the borders." (See on this subject, Mr. Main's *Villa and Cottage Florists' Dictionary* ; and *Gard. Mag.*, vol. vi. p. 556.)



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8549. *The green-house or conservatory is generally placed in the flower-garden, provided these structures are not appended to the house. In laying out the area, a fit situation must be allotted for this department of horticulture, and the principles of guidance laid down in treating of the situation of the culinary hot-houses (3393.) require here also to be applied. Some recommend the distribution of the botanic hot-houses throughout the flower-garden or pleasure-ground ; but we are decidedly of opinion, that much the best effect is produced when they are connected together in one scene. By the other mode they may form objects agreeable enough to look at externally ; but, to derive the full effect of their internal beauties, it appears to us that they must be examined in succession and without interruption. No arrangement can be better, in our opinion, than to connect the whole of the botanic hot-houses with the mansion as an introductory scene to the flower-garden.*

8550. *According to Neill, a green-house, conservatory, and stove should form prominent objects in the different parts of the flower-garden. The author of the Florist's Manual recommends a spring-conservatory, annexed to the house, consisting of borders sheltered by glass, and heated only to the degree that will produce a temperature, under which all the flowers that would naturally bloom betwixt the months of February and May might be collected, and thence be enabled to expand their beauties with vigour. (Flor. Man., p. 38.)*

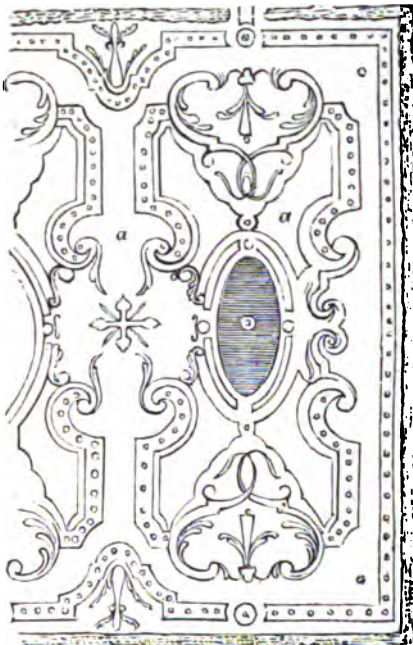
8551. *According to Nicot, "the most proper situation for the green-house and conservatory, in an extensive and well laid out place, is certainly in the shrubbery or flower-garden ; and not, as they are very generally to be found, in the kitchen-garden, combined with the forcing-houses. In smaller places, no doubt, they must be situated so as to suit other conveniences ; and we often find them connected with the dwelling-house. In this latter way they may be very convenient, especially in the winter season, and may*

answer for keeping many of the hardy kinds of exotics; but it is seldom they can be so placed and constructed, on account of their connection with the building, as to suit the culture of the finer sorts, and bring them to a flowering state. Such may rather be termed green-rooms, as being connected with the house." (*Kalendar*, p. 583.)

5552. *Abercrombie* says, "A green-house may be made a very ornamental object as a structure: its situation is, therefore, usually in a conspicuous part of the pleasure-ground, contiguous to the family residence. The front of the building should stand directly to the south, and the ends have an open aspect to the east and west." (*Pract. Gard.*, p. 587.)

5553. *Flower-nursery, and pits for forcing flowers.* To every complete flower-garden and shrubbery, a piece of ground should be set apart in a convenient and concealed situation, as a reserve-ground, or nursery of flowering plants and shrubs. The situation should, if practicable, be behind and near to the range of hot-houses, and it may at the same time include the pits for forcing flowers, and the hotbed department of the flower-garden. Here plants may be originated from seed, cuttings, pipings, and a proper stock kept up, partly in beds and partly in pots, for more easy removal, to supply blanks, and in the more select scenes, to replace such as have done flowering.

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No flower-garden can be kept in complete order without a nursery of this description; nor could the management of some sorts of florists' flowers, as the auricula, during the latter part of summer and winter, the carnation, &c., be well carried on without it. Here they may be grown, and, when in bloom, exhibited in proper stages in the main garden.

5554. *Walks.* In most styles of parterres these are formed of gravel; but in the modern sort, which consist of turf, varied by wavy dug beds, and surrounded by shrubbery, they are sometimes dispensed with. Such a flower-garden is recommended by the author of the *Flora's Mosaic*, as suitable for the "midst of pleasure-ground," and the beds "peculiarly adapted to the advantageous exhibition of flowers." The general length of the beds she recommends to be from twenty-three to twenty-five feet, and the width, in the broadest part, about four feet; the grass to be five or six feet wide between the beds, that it may be conveniently mown and rolled: all the beds a good deal raised." (p. 6.)

5555. *In extensive and irregular parterres*, one gravel-walk, accompanied by broad margins of turf, to serve as walks by such as prefer that material, should be so contrived as to form a tour for the display of the whole garden. There should also be other secondary interesting walks of the same width, of gravel and smaller walks for displaying particular details. The main walk, however, ought to be easily distinguishable from the others by its broad margins of fine turf. In general the gravel is of uniform breadth throughout the whole length of the walk; but in that sort of French parterres which they call parterres of embroidery (*fig. 813.*), the breadth of the gravelled part (*a*) varies like that of the turf. Such figures, when correctly executed, carefully planted, judiciously intermixed with basket-work, shells, partly-coloured gravels, &c., and kept in perfect order, are highly ornamental; but very few gardeners enter into the spirit of this department of their art. The French and Dutch have long greatly excelled us in the formation of small

gardens, and the display of flowers; and whoever wishes to succeed in this department ought to visit Amsterdam, Antwerp, Brussels, and Paris; and consult the old French works of Mallet, Boyceau, Le Blond, D'Argenville, &c.

5556. *Edgings.* In parterres where turf is not used as a ground or basis out of which to cut the beds and walks, the gravel of the latter is disparted from the dug ground of the former by edgings or rows of low-growing plants, as in the kitchen-garden. Various plants have been used for this purpose; but, as Neill observes, the best for extensive use is the dwarfish Dutch box, kept low, and free from bloom. Abercrombie says, "Thrift is the neatest evergreen, next to box. In other parts, the daisy, pink, London-pride, primrose, violet, gentian, and periwinkle, may be employed as edgings. Lastly, the limits between the gravel-walks and the dug-work may sometimes be marked by running verges of grass, kept close and neat. Whatever edgings are employed, they should be formed previous to laying the gravel."

5557. *Basket-edgings.* Small groups near the eye, and whether on grass or gravel, may be very neatly enclosed by a worked fence of basket-willows from six inches to a foot high. These wickerwork frames may be used with or without verdant edgings; they give a finished and enriched appearance to highly polished scenery; enhance the value of what is within, and help to keep off small dogs, children, &c. Abercrombie scarcely approves of them. He says, "Where round or oval parterres stand on a ground of lawn, it is a prevailing fashion to surround them with what are termed baskets. These are commonly made either of wood or cast-iron; those of the latter material, of course, are durable; and the others, if painted, and removed under shelter in winter, will last ten or twelve years." (*Pr. Gard.*, p. 484.) See *fig. 284.*

CHAP. II.

Of Planting the Flower-Garden.

5558. *The manner of planting the herbaceous plants and shrubs in a flower-garden depends jointly on the style and extent of the scene. With a view to planting, they may be divided into five classes, which classes are independent altogether of the style in which they are laid out. The first class is the general or mingled flower-garden, in which*

is displayed a mixture of flowers with or without flowering-shrubs, according to its size. The object in this class is to mix the plants, so that every part of the garden may present a gay assemblage of flowers of different colours during the whole season. The second class is the *massed flower-garden*, in which the flowers are planted in masses of one kind, either in separate beds, or in separate divisions of the same bed. The third class is the *select flower-garden*, in which the object is limited to the cultivation of particular kinds of plants; as florists' flowers, American plants, annuals, bulbs, &c. Sometimes two or more classes are included in one garden, as bulbs and annuals; but, in general, the best effect is produced by limiting the object to one class only. The fourth class is the *changeable flower-garden*, in which all the plants are kept in pots, and reared in a flower-nursery or reserve-ground. As soon as they begin to flower, they are plunged in the borders of the flower-garden, and, whenever they show symptoms of decay, removed, to be replaced by others from the same source. This is obviously the most complete mode of any for a display of flowers, as the beauties of both the *general* and *particular* gardens may be combined without presenting blanks, or losing the fine effect of assemblages of varieties of the same species; as of hyacinth, pink, georgina, chrysanthemum, &c. The fifth class is the *botanic flower-garden*, in which the plants are arranged with reference to botanical study, or at least not in any way that has for its main object a rich display of blossoms. On each of these gardens, or manners of arranging plants grown for their beauty or curiosity, we shall offer some remarks.

5559. The *mingled flower-garden*, or *border*, is by far the most common; it is what every gardener attempts when planting his flower-borders, and the aim of the greater number of such as form parterres, or separate scenes, for the culture of flowers, seldom goes farther. The object here is to display a gay assemblage of colours during the season of flowers, without much regard to variety of form or diversity of character in these flowers, or the plants that produce them. The great art, therefore, in this kind of flower-border, is to employ such plants as produce large heads, or masses of flowers; to plant an equal number of every colour, and such a variety in regard to time of flowering as may afford some of every colour in flower from February to October. This object does not require a great variety so much as a judicious selection; for, supposing the number four to include all the colours of flowers, and one sort to continue in bloom a month, then for nine months of the year, viz. from February to October inclusive, only thirty-six sorts will be requisite to commence, as it were, the pattern of the border. Much more may be effected by a few sorts than by a great number; for the greater the number of sorts introduced in the pattern above thirty-six, supposing it correct that one sort continues in bloom a month, the greater the blank spaces that must remain between the plants in bloom. A moderate number of select sorts, or of what are called border-flowers, and that number selected equally from the different colours, and the sorts in bloom in the nine months of blooming season, is what demands the exclusive attention of whoever would plant a mingled border, or flower-garden.

5560. *Abercrombie, Nicol*, and other practical gardeners, seem to have no distinct ideas on the subject of arranging flowers in flower-gardens; but the authors of *Hints on laying out Gardens*, and of the *Florist's Manual*, have viewed the subject in its proper light. *Nicol* also has some judicious observations on the subject. He says, "the plants are arranged in mingled flower-borders, partly according to their size, and partly according to colour. The tallest are planted in the back part, those of middling size occupy the centre, and those of humble growth are placed in front. The beauty of a flower-border, when in bloom, depends very much on the tasteful disposition of the plants in regard to colour. By intermingling plants which flower in succession, the beauty of the border may be prolonged for some weeks. In a botanic-garden the same plant cannot with propriety be repeated in the same border; but in the common flower-garden a plant, if deemed ornamental, may be often repeated with the best effect; nothing can be finer, for example, than to see many plants of double scarlet lychnis, double sweet-william, or double purple jacobaea." (*Ed. Encyc. art. Hort.*)

5561. The author of *Hints*, &c. remarks "that the beauty of parterres depends more on the materials with which they are planted than on their form; and that the prevailing error consists in crowding them with all sorts of trees and plants at random, or filling them entirely with rare species, which will ever want one principal source of beauty—health." In the *Florist's Manual* it is observed, that "the fashionable novice, who has stored her borders from the catalogue of some celebrated name with a variety of rare species; who has procured innumerable rose trees, chiefly consisting of old and common sorts, brought into notice by new nomenclature; who has set apart a portion of ground for American plants, and duly placed them in bog soil, with their names painted on large-headed pegs, becomes disappointed when, instead of the brilliant glow of her more humble neighbour's parterre, she finds her own distinguished only by paucity of colour, and fruitless expenditure. Variety of species, bog borders, and largely lettered pegs, are all good in their way, but they will not produce a *gay* flower-garden; and the simple cause of the general failure in this particular is the prevalent solicitude for rarity and variety, in preference to well-blended quantity; as, without the frequent repetition of the same plant, it will be in vain to attempt a brilliant flower-garden, and as in the judicious mixture of every common colour the art of procuring it consists. Hence, the foundation thus laid, the solicitude of those who wish to complete the superstructure must not be for rare species, but for new colour, so that the commonest primula which presents a fresh shade of red, blue, yellow, &c. ought to be esteemed more valuable than the most rare American plant which does not bring a similar advantage. In the formation of that assemblage of flowers which may be distinguished by the term of 'The Mingled Flower-Garden,' it is essential that the separate parts should, in their appearance, constitute a *whole*; and this appearance is not incompatible with any form into which the ground may be thrown, if attention be given to the manner of planting. In some gardens this appearance of a *whole* is entirely destroyed by the injudicious taste of setting apart distinct borders for pinks, hepaticas, primulas, or any other favourite kinds of flowers; also for different species of bulbs, as anemones, ranunculuses, hyacinths, &c.; these distinct borders, although beautiful in themselves, break that *whole* which should always be presented to the eye by the mingled flower-garden, as single beds, con-

taining one species only, form a blank before that species produces its flowers, and a mass of decaying leaves when the glow of their petals is no more. The reverse of this mode of planting is essential to the perfection of the mingled flower-garden, in each border of which there should be, at least, two of every species; but the precise number must be regulated by the force of colour displayed by the plant, and the size and the relative position of the borders. It will be only necessary to observe that, to whatever view the garden presents itself, the eye should not be checked by the failure, in any part of it, of the prevalent colours of the season." (p. 5.)

5562. Hogg, who may be considered an unprejudiced observer of the different tastes in disposing of flowers, has the following remarks:—"We are apt to ridicule the Dutchman, as well as the imitator of him here at home, who divide their gardens into small beds, or compartments, planting each with separate and distinct flowers: we ridicule the plan, because it exhibits too great a sameness and formality; like unto the nosegay that is composed of one sort of flowers only, however sweet and beautiful they may be, they lose the power to please, because they want variety. It must undoubtedly be acknowledged, that a park-land, no matter in what form, whether circular or square, elliptical or oblong, where all the shrubs, plants, and flowers in it, like the flowers of a tastefully arranged bouquet, are variously disposed in neat and regulated order, according to their height and colour, is a delightful spectacle, and worthy of general imitation. Yet still in some particular cases I am disposed to copy the Dutchman, and I would have my bed of hyacinths distinct, my tulips distinct, my anemones, my ranunculuses, my pinks, my carnations distinct, and even my beds of hollyhocks, double blue violets, and dwarf-larkspurs distinct, to say nothing of hedgerows of different sorts of roses. Independent of the less trouble you have in cultivating them when kept separate, you have beauty in masses, and you have likewise their fragrance and perfume so concentrated, that they are not lost in air, but powerfully inhaled when you approach them. Mrs. Siddons, the celebrated tragic actress, was a great admirer of this mode of planting, and fond of contemplating this 'beauty in masses.' She adopted this style of gardening at her late residence on the Harrow Road. Her favourite flower was the *Pirola asarifolia*, the common purple heartsease, and this she set with sparing profusion all over her garden. Her garden was remarkable in another respect, and slight with great propriety be styled a garden of evergreens, which, together with a few deciduous shrubs, were of the most sombre, sable, and gloomy cast, such as box-trees, fir, privet, phillyrea, arbutus, holly, cypress, the red cedar, laurel, Irish ivy, bay-tree, arbutus, spurge-laurel, &c. The only part of the year in which it could be viewed with any degree of satisfaction was the winter, as giving rise to a pleasing association of ideas in beholding those retain their green verdure and clothing, at a time when the rest of the surrounding trees were stripped naked and bare." (*Tr. on Flowers*, p. 68.)

5563. To give an example of the manner of planting a bed or border in the mingled style, suppose the various colours of flowers to be all included under the four common colours, red, white, blue, and yellow; that for the time of flowering we allow February and March as one division, March and April as a second, May and June as a third, July as a fourth, August as a fifth, and September and October as the sixth and last. Then suppose the border, or bed, admits of four rows in width; the lowest plants to be placed next the walk, or the eye of the spectator, and the tallest at the back, in regular gradation. Mark out the border in rows lengthwise and across, so as each plant may stand in the angle of a square, whose side is, say eighteen inches. Then begin at the first row (*fig. 814. a*), and fix on the order in which the plants are to be placed as respects their time of flowering. To distribute the plants in flower at one time as equally as possible over the border, the order of 1, 6, 2, 5, 3, 4, will, it is believed, be found the best. Next, fix as to the order of colours; and here it is of little consequence what order is fixed on, provided that order be maintained throughout the border: say that we adopt the order of red, white, blue, and yellow; then the first row to be of the lowest plants will stand thus: 1r. 6w. 2b. 5y. 3r. 4w.: that is, a red flower to come into bloom in February and March; next to it, a white flower to come into bloom in September and October; next, a blue flower to come into bloom in May and June; then a yellow flower to come into bloom in August; then a red flower to come into bloom in April and May; and lastly, a white flower to come into bloom in July. The second, third, and fourth rows (*b, c, d*) are to be arranged in the same way, observing, however, not to begin with the same month and colour, for the sake of more effectively mingling the times of flowering and colour of the flowers. Where roses or other shrubs are to be introduced, a plant must be omitted, which, however, should not be allowed to derange the order of the rest.

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a		1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1r	6w	2b			
b		1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	
c	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y
d	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y
e	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y
f	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y
g	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y
h	.....	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y	1r	6w	2b	5y	3r	4w	1b	6y	3r	5w	2b	4y

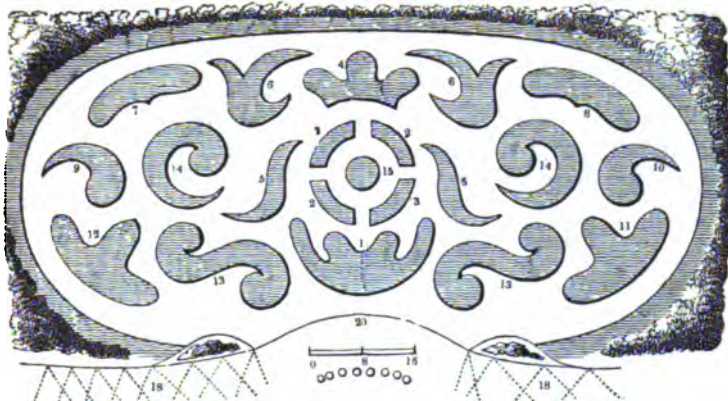
5564. If a double border, with a walk on each side (*fig. 814. a to h*) a bed-group, or compartment as a lawn, to be viewed on all sides, is to be planted, then it is only necessary to fix on the number of rows, and to keep the lowest plants in the margin and the tallest in the centre, adhering in the rows to the order of time and of colours given above, or to any order that may be fixed on, and inserting shrubs in lieu of plants where it may be deemed advisable.

5565. Flowers in borders should always be planted in rows, or in some regular form, and this appearance should be assiduously kept up by trimming off all irregular side-shoots and straggling stalks, and reducing the bulk of plants which grow too fast. Every approach to irregularity, and a wild, confused, crowded, or natural-like appearance, must be avoided in gardens avowedly artificial.

5566. With four colours, four rows, and six times of coming into flower, a mingled border may be commenced with ninety-six sorts; and the pattern may be repeated like the border of any work of art or system; but it is also evident, that it may include any number of species, provided these have the desired requisites of height, colour, and time of flowering; the second and every successive repetition of the pattern being made up of different, and not before-introduced species, but still of the heights, colours, and times of flowering required for the first example of the pattern. The safest way, however, is to adopt but a moderate number of species, and those of the showy sorts that have numerous varieties, and are of hardy vigorous growth. A suitable list for this purpose is given in the Floricultural Catalogue, under the head of Border Flowers, and the reader may increase it at pleasure from our *Hortus Britanicus*.

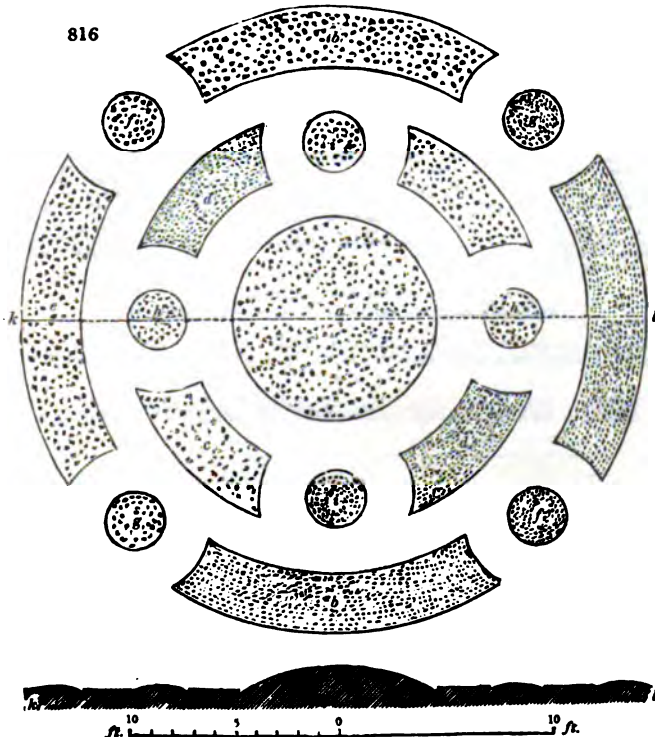
5567. The massed flower-garden is a comparatively modern invention; and, whether the principle of arranging the flowers in masses of one colour be applied in borders along walks, or in beds on lawn or gravel, the effect is striking and brilliant beyond that of any other manner of planting. We shall give two or three examples. *Fig. 814.* is a plan of flower-beds on turf, surrounded by a border for flowers;

815



1. Choice herbaceous plants; perennials.
 2. Anemones in spring; *Tigridia pavonia* in summer.
 3. Van Thol tulips, and ranunculus in spring; choice dwarf polyanthus in summer.
 4. Narcissus and jonquils in spring; *Salvia splendens* and *Fuchsia coccinea* in summer.
 5. Ten-week stocks in spring; *Clartia polchella* and Indian pink in summer.
 6. Tulips in spring; *Oenothera speciosa* in summer.
 7. A collection of campanulas.
 8. A collection of phloxes.
 9. *Fritillaria metagris* and winter acorn in spring; *Lobelia fulgens* and *L. Eliza* in summer.
 10. *Hyacinthus* in spring; *Fuchsia microphylla* in summer.
 11. *Oenothera* and China asters.
 12. Choice herbaceous plants.
 13. Crocuses and snowdrops in spring, pinks and carnations in summer.
 14. Sweet-scented and crimson China roses. 15. Sun-dial. 16. Rockwork.
 17. Edging of *Ribes sempervirens*, and within, a row of geraniums, about 100 sorts; every twelve feet a standard Noisette rose in variation.
 18. Rustic arcade, covered with ivy.
 19. Rustic covered seat.
 20. Open gravel. (See *Mag.*, vi. 425.)
- beyond which is a bank of flowering shrubs, beginning with low sorts, and gradually rising to such as are considerably higher. The following references show the mode of planting:—

816



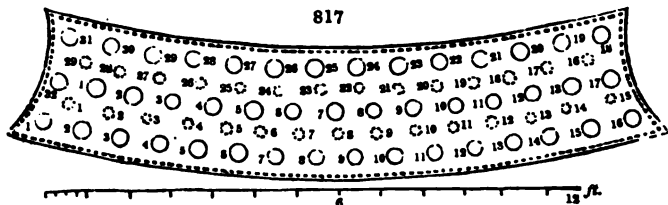
5568. A circular flower-garden is shown in fig. 816; it is placed in a recess of a shrubbery or lawn, and the exterior bed is surrounded by turf, no part of which is narrower than five feet, and beyond there is a

border of low American shrubs. The central mass (c), which is ten feet in diameter, contains a collection of China roses, including *R. semperflorens*, sanguinea, and all the varieties of *Nolletiana*; and the interstices are planted with a mixed collection of bulbs. There may be a standard purple *Nolletia* rose in the centre; and the marginal line should be of mixed hyacinths. The other beds are proposed to be planted with herbaceous plants, bulbs, and showy green-house plants, in the following manner:—

- a, Red-flowering herbaceous plants and red-flowering bulbs; the border of *Alnabla* Rosette hyacinths.
 c, White-flowering herbaceous plants and white-flowering bulbs; the border of white crocuses.
 e, Blue-flowering herbaceous plants and blue-flowering bulbs, bordered by blue or purple crocuses.
 f, Yellow-flowering herbaceous plants and yellow-flowering bulbs, bordered with yellow crocuses.
 g, Variegated house-shrub geraniums, alternating with mixed hyacinths, and bordered with mixed crocuses.
 h, Variegated ivy-leaved geraniums, alternating with mixed tulips, and bordered with mixed crocuses.

- A, *Fuchsia* coccinea, or any favourite tender annual or green-house plant, alternating with mixed *Narcissus*, and bordered with mixed dog-tooth violets.
 B, *Heliotropes*, or other favourites tender annual or green-house plants, alternating with mixed *Rosa* *Knabianum*, and bordered with mixed *Scilla* *albertica*, and *bellida*; the latter in its blue, white, and red varieties. The beds are raised a little in the centre, as is shown by the section &c. The details of one bed (Fig. 817) are given as a specimen of the manner in which the beds are proposed to be planted with herbaceous plants, alternating with bulbs, and bordered with bulbs.

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I. Herbaceous Plants with Red Flowers; equal Numbers flowering in April, May, June, July, August, and September, till destroyed by Frost.

1. Outside Row; Height of the Plants from Six Inches to Eighteen Inches.
 1. *Phlox subulata*; April.
 2. *Lychnis Viscaria* and *strep. pinn.*; May.
 3. *Antirrhinum majus*; June.
 4. *Phlox glaberrima*; June.
 5. *Festuca ovina*; August.
 6. *Stachys rectifolia*; September and October.
 7. *Erythraea flabellifolia*; April.
 8. *Aquilegia canadensis*; May.
 9. *Delphinium grandiflorum*; June.
 10. *Chelone barbata*; July.
 11. *Epilobium angustifolium*; August.
 12. *Lobelia fulgens*; September and October.
 13. *Cortusa Matthioli*; April.
 14. *Festuca ovina*; April.

15. *Dianthus caryophyllus*; June.
 16. *Phlox subulata*; July.
 17. *Malva moschata*; August.
 18. *Stachys rectifolia*; September and October.
 19. *Phlox subulata*; April.
 20. *Phlox pilosa*; May.
 21. *Geranium Wallchianum*; June.
 22. *Phlox amara*; July.
 23. *Stachys rectifolia*; August.
 24. *Epilobium angustifolium*; September and October.
 25. *Heliotropes* *arborescens* (red, single, and double); February and March.
 26. *Lychnis viscaria*; May.
 27. *Phlox subulata*; May.
 28. *Veronica coccinea*, *Donner's Hort. Cant.*; July.
 29. *Gentiana incarnata*; September and October.

30. *Phlox Knabianum*; February and March.
 31. *Festuca ovina*; April.

2. Middle Row; Height from Eighteen Inches to Two Feet Six Inches.

1. *Asperula tinctoria*; April.
 2. *Geranium macranthum*; May.
 3. *Colandrinia grandiflora*; June.
 4. *Lithyris grandiflora*; July.
 5. *Phlox subulata*; August.
 6. *Stachys rectifolia*; September and October.
 7. *Delphinium grandiflorum*; April.
 8. *Centranthus ruber*; May.
 9. *Diastema ruber*; June.
 10. *Chelone barbata*; July.
 11. *Althaea rosea*; August.
 12. *Lobelia fulgens*; September and October.
 13. *Papaver bracteatum*; June.

II. Bulbs for the intermediate Rows.

1. *Trichostema bulbocodium*; March.
 2. *Claytonia caroliniana*; April.
 3. *Trillium erythrocarpum*; May.
 4. *Lilium chalcidicum*; June.
 5. *Alium rubrum*; July.
 6. *Colchicum autumnale*; August and September.
 7. *Oxycodon*; March.
 8. *Alium roseum*; April.
 9. *Lilium coelebre*; May.
 10. *Glaucolus byzantine*; June.

11. *Tulipa montana*; July.
 12. *Alium globosum*; August and September.
 13. *Scilla bifolia* var. *rubra*; March.
 14. *Alium incanum*; April.
 15. *Arethusa bulbosa*; May.
 16. *Lilium pompilioides*; June.
 17. *Glaucolus cordatus*; July.
 18. *Alium scordium*; August and September.

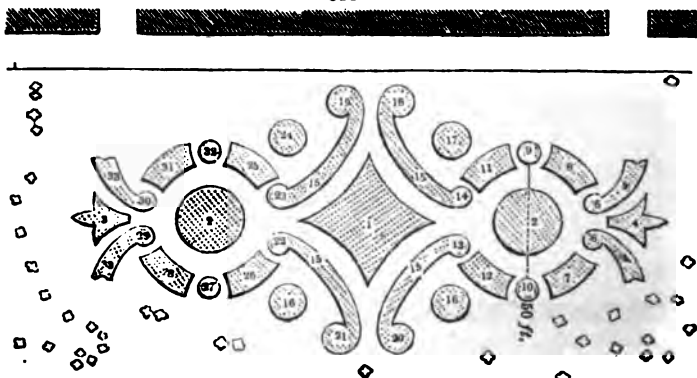
19. *Scilla umbrosa* f. *rubra*; March.
 20. *Prillaria latifolia*; April.
 21. *Lilium aurantiacum*; May.
 22. *Alium Falcata*; June.
 23. *Sophronia rosea*; July.
 24. *Colchicum autumnale*; August and September.
 25. *Lilium medium*; July.
 26. *Prillaria latifolia*; August.
 27. *Alium pulchellum*; July.

III. Row round the Margins.

Hyacinthus orientalis var. *Alnabla* Rosette. (*Gard. Mag.*, vol. vii. p. 25.)

5589. The flower-garden at Dropmore is shown in Fig. 818. In this the plants are so disposed, that when they are in flower, the corresponding forms of the figure contain corresponding coloured flowers.

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The following is a list of the plants which occupy this figure during summer, with the order in which they are disposed ; and a corresponding enumeration of the bulbs and other plants which occupy the beds during spring and winter :—

Beds.

1. *Rosa indica* (bush), bordered with
2. *R. semperflora* flore pleno, and *R. indica* minor.
3. *Pelargonium inquinans* (scarlet geranium).
4. *Verbena Lamberti*.
5. *Verbena elegans* flore pleno (double scabrous).
6. *Alonsoa incisiifolia*.
7. *Fuchsia coccinea*.
8. *Fuchsia var. flore pleno-crim.*
9. *Ruellia formosa*.
10. *Ageratum mexicanum*.

Beds.

11. *Dianthus chinensis* (Indian pink), and *Ruellia odorata* (mignonette).
12. *Lobelia splendens*.
13. *Dianthus latifolius*.
14. *Lobelia unguicularis*.
- 15 15 15 15. Choice herbaceous plants, not exceeding one foot six inches in height.
- 16 16. *Glaucium carolinense*.
17. *Pelargonium latifolius* (pink-flowered variegated ivy-leaved geranium).
18. *Anagallis grandiflora*.
19. *Anagallis Monelli*.
20. *Pelargonium caracasense*.
21. *Pelargonium*, sp. ? (Prince of Orange geranium).

Beds.

22. *Eleocharis capitata*.
23. *Eleocharis missouriensis*.
24. *Pelargonium zonale* (scarlet-flowered variegated-leaved var.).
25. *Melissa trifida*.
26. *Lobelia fulgens*.
27. *Petasia phoenicea*.
28. *Camassia coccinea*.
29. *Cistus guttatus*.
30. *Campylobasis pentagona*.
31. *Rosa damascena* (four seasons rose), and *Ruellia odorata* (mignonette).
32. *Rosa virginica* (triphylia).
33. *Tropaeolum majus* flore pleno (double nasturtium).

In Winter and Spring.

1. *Anemone coronaria*.
2. *Malcolmia maritima* (Mediterranean stock).
- 3 & 4. *Tulipa* *Gemeriana* *complanata* (hardy varieties).
5. *Delphinium Ajacis* (rocket larkspur), sown in autumn.
6. *Agrostis coccinea*.
7. *Scilla maritima* (blue harebell).
8. *Muscari combeum* var. *monstrum*.
- 9 & 10. *Tulipa suaveolens*.
11. *Tulipa Gemeriana* var. *flore pleno* (double sorts).
12. *Tulipa Gemeriana* (single sorts).

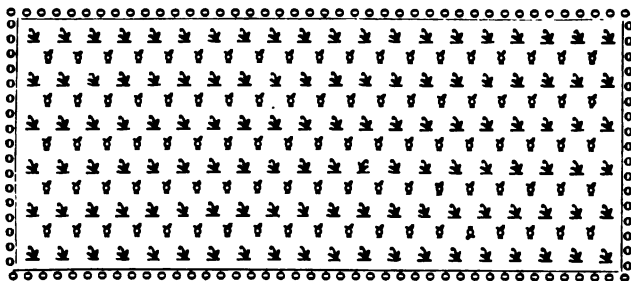
- 13 14. *Tricholoma crocata*, and *Tricholoma f. nigrata*, kept in frames in midwinter.
- 15 15 15 15. Choice herbaceous plants, not exceeding one foot six inches in height.
- 16 16. *Hyacinthus orientalis* (double blue variety), plunged in pots.
17. *Hyacinthus orientalis* (double red variety), plunged in pots.
- 18 & 19. *Hyacinthus orientalis* (single blue variety).
- 20 & 21. *Hyacinthus orientalis* (single white variety).
- 22 & 23. *Crocus vernus* and *hibernus*.
24. *Hyacinthus orientalis* (double red variety).

- 25 & 26. *Tulipa Gemeriana* (double yellow variety).
27. *Hyacinthus orientalis* (double white variety).
28. *Muscari botryoides* (grape hyacinth).
29. *Oxalis caprina*, kept in frames in midwinter.
30. *Scilla verna*.
31. *Muscari racemum*, the border of *Viola tricolor* in varieties.
32. *Hyacinthus orientalis* (double white variety).
33. *Delphinium Ajacis* (double rose larkspur).

As a general principle for regulating the plants in this figure, the winter and spring flowers ought, as much as possible, to be of sorts which admit of being left in the ground all the year ; and the summer crop should be planted in the intervals between the winter plants : or the summer crop, having been brought forward in pots under glass, or by nightly protection, may be planted out about the middle of June, after the winter plants in pots are removed. A number of hardy bulbs ought to be potted and plunged in the beds in the months of October and November ; and, when out of bloom, in May or June, removed to the reserve-garden and plunged there, in order to perfect their foliage, and mature their bulbs for the succeeding season.

5670. The Dutch flower-garden at Dropmore consists of sixteen beds, each fourteen feet in length, and six feet in width (Fig. 819) ; and the following is a list of the plants which are grown in them ; the

819



arrangement varying every year, so that the same plants may not be two years in succession on the same bed :—

In Summer (Fig. 819. 3).

1. *Eleocharis missouriensis*.
2. *Lobelia fulgens*.
3. *Anemone hortensis* (double).
4. *Ruellia formosa*.
5. *Camassia coccinea*.
6. *Fuchsia coccinea*.
7. *Verbena Lamberti*.
8. *Pelargonium zonale* (pink neesop variety).

9. *Helleborus viridiflorus*.
10. *Glaucium carolinense*.
11. *Tigridia pavonia*.
12. *Matthiola annua* (scarlet ten-week).
13. *Pelargonium Fothergillii* (scarlet neesop geranium).
14. *Salvia coccinea*.

15. *Fuchsia gracilis*.
16. *Dianthus Caryophyllus* (double carnation).
17. *Pelargonium latifolius* (pink variegated ivy-leaved geranium).
18. *Callipellis bicolor*.
19. *Pelargonium Dorevianum*.
20. *Alonsoa incisiifolia*.

In Winter and Spring (Fig. 819. 4).

1. *Narcissus poeticus*.
2. *Tulipa Gemeriana* (single varieties).
3. *Anemone hortensis*, in autumn *Lobelia decumbens*.
4. *Glaucium carolinense*.
5. *Narcissus floribundus*.
6. *Erythronium Dosa chin.*
7. *Tulipa Gemeriana* (parrot and double-yellow varieties).

8. *Narcissus Jongellii*.
9. *Hyacinthus orientalis* (double variety in all colors).
10. *Sanguinaria canadensis*, plunged.
11. *Tigridia pavonia*.
12. *Anemone coronaria* (double).
13. *Narcissus calathinus*.
14. *Tulipa Gemeriana* (var. double red, or peonia-flowered variety).

15. *Scilla verna*.
16. *Dianthus Caryophyllus*.
17. *Glaucium carolinense*.
18. *Delphinium Ajacis* (double rocket larkspur).
19. *Tulipa Gemeriana* (early clareted variety).
20. *Erantia hyemalis* (winter anemone).

A bed of the dimensions given will contain six rows of any one of the summer plants enumerated ; five rows between them of any of the winter and spring bulbs mentioned ; and a surrounding border of *Crocus*, *Trichonema*, *Bulbocodium*, *Scilla*, *Saxifraga granulata*, and similar plants, three inches from the edge of the bed, and the same distance apart from each other. The summer plants ($\frac{3}{4}$ in Fig. 819.) are readily inserted in the centre of the squares formed by the winter plants ($\frac{1}{4}$ in Fig. 819.), without the least risk of injuring the latter ; and, when finished, the summer plants will be one foot apart from the summer plants ; the winter plants one foot apart from the winter plants, and all the plants of one season six inches distant from the plants of the other season. (*Gard. Mag.*, vol. III. p. 262.)

5571. *The select flower-garden* being limited to one kind, or class, of plants, is comparatively simple, as far as respects planting. It may be devoted to florists' flowers, as the hyacinth, tulip, pink, auricula, &c.; to select flowers, as the georgina, pæony, chrysanthemum, &c.; to annuals, hardy, half hardy, and tender; to American or bog-earth shrubs and plants; to any one natural order, as the bulbous-rooted tribe; or to spring, summer, or autumn flowers, &c.

5572. *Florists' flowers and select flowers* are planted in beds or compartments of carefully prepared soil, and the arrangement in the beds is generally conducted on the principle of mixing the colours and shades of colour as much as possible. As the plants, being of the same species, generally grow of the same height, and come into flower at the same time, no particular attention is requisite in these respects.

5573. *A porterie of annuals*, as the different sorts generally come into flower about the same time, may either be arranged according to their colours and heights jointly; or, as there are numerous varieties of some sorts, as of larkspur, lupine, &c., each species with its varieties may be sown in groups or beds, by itself; and the general principle by which to determine the sorts which are to join each other, may either be colour and height, or natural character.

5574. *An American garden* combines shrubs and even low trees. These may be arranged in the mixed method, according to colour, height, and time of flowering; the trees and shrubs alone, and the plants alone, or both combined: but the most suitable way is to follow the natural orders, or genera, attending, at the same time, to keep the higher sorts farthest from the walk or side from which the group or border is to be chiefly viewed. This arrangement has an excellent effect in an American shrubbery, where the low species of heaths and other bog under-shrubs which are introduced, supply the place of herbaceous plants.

5575. *Gardens of spring, summer, or autumn flowers* may be arranged and planted in any of the modes that have been mentioned, as may gardens of any other description in which selection is the governing principle. There may, for instance, be a very interesting garden formed entirely of variegated plants; another of compound-leaved plants; of grassy-leaved plants; of sword-leaved plants; of ferns, of mosses, and so on. In the *Gard. Mag.*, vol. vii. p. 432, is a very ingenious plan for the formation of a classical garden.

5576. *The winter garden at Hampden Cottage* is thus described. The cottage is situated about the middle of the garden, which consists of one acre: it is a parallelogram, or long square, sloping gently to the east. One-fourth of this spot is converted into a winter garden. On the north side is a brick wall; on the south, plantations of evergreens; at the top, facing the east, stands the house; at bottom, being the west, is a summer-house. The wall is well clothed with bearing peaches and nectarines. About 18 inches from the wall are planted, in summer, 4 feet asunder, white roses, during the summer months, are tied up to strong sticks. About the 10th of October, when the fruit from the wall-trees has been all gathered, the chrysanthemums are loosened from the sticks, expanded, and tied to the fruit trees, generally so that they completely cover the wall, at least from 3 feet from the ground to the top, 8 feet. Not the least impediment to the ripening of the fruit is produced by the chrysanthemums, as sufficient sun and air come between them for that purpose; and they being 18 inches from the wall, there is plenty of room to manage the trees. As they decay they are cut off; for nothing is more unsightly than decayed flowers or stalks in a well-regulated flower-garden. On the south side, the back row is a perfect yew hedge; the border from which, 8 feet wide, consists of box trees, Portugal laurels, arbor vite, yellow-berried privets, Chinese privets, arbutus; symphoria, or snowberry; variegated and green hollies, of all the varieties, perhaps twenty; laurustinus, Alexandrian laurels, butcher's broom, *Alnus japonica*; phillyrea, bay, and others, all disposed according to their different heights: which border extends, in a semicircular turn, to the summer-house, on the other side of which, up to the wall, is a corresponding circular border, planted with the same mixture of evergreens. Likewise, at top, on each side of the house, there are similar borders; so that the area, or open space, is a long oval, dispersed over which there are a number of circular and oval clumps, of different sizes. In the middle of each is an evergreen, from 4 to 5 feet high, of the more choice kinds, such as scarlet arbutus, *Magnolia grandiflora*, *Eriobotrya japonica*, two or three fine hollies, &c.; and each clump has a proper number of chrysanthemums, of the harder kinds, such as the crimson-quilled, white, French white, changeable pale buff, Spanish brown, buff, rose, bright yellow, &c., each separate sort on a clump, so as to flower in masses. On each side of the summer-house there are edgings of the *Helleborus niger*, or Christmas rose. Edgings of early spring flowers are round each clump, such as *Eranthis hyemalis*, or winter aconite; hepaticas, white, blue, and red; snowdrops, Persian iris, primroses, violets, &c., and a most extensive variety of crocuses of all hues, more than twenty sorts, some of which are in bloom from the beginning of February to the end of March. Likewise the front edge of the border, by the wall, consists of crocuses, the edge of the evergreen border of *Sternbergia lutea*, which, being in the shade, bloom late, and are in full flower from the beginning of November till Christmas. In November, the wall and clumps display all the various hues of that delightful autumnal flower the chrysanthemum. Among the evergreens, the scarlet blossoms and fruit of the arbutus, the pure white of the snowberry, the yellow berries of the privet, and yellow and scarlet berries of the hollies, the blossoms of the laurustinus, the fiery berries of the pyracantha, are most conspicuous, not to mention the charming variety of colours displayed in the leaves of each kind. In December, to the end of the year, the later kinds of chrysanthemums are in bloom: indeed, they may be called the flower which links together the autumnal and spring flowers, with, perhaps, the exception of one link, which January knocks out. That certainly is the only month in which the borders are devoid of flowers; for no sooner does February commence, than Flora begins to delight the eye with the colours displayed in the winter aconite, Christmas rose, snowdrop, or some early-blooming crocus; and every succeeding fine day produces more beauties to the end of the month; and farther, to the end of March, the winter garden is one glow of the most enchanting brilliancy. (*Gard. Mag.*, vol. v. p. 26.)

5577. *The changeable flower-garden*. The essential principle of this garden consists in the power of changing its productions at pleasure, so that whenever any plant, or group of plants, begin to decay, they can be removed and their places supplied by others coming into bloom. To admit of this a large reserve-nursery is requisite, in which the plants must be kept in pots, and removed and plunged in the borders as wanted.

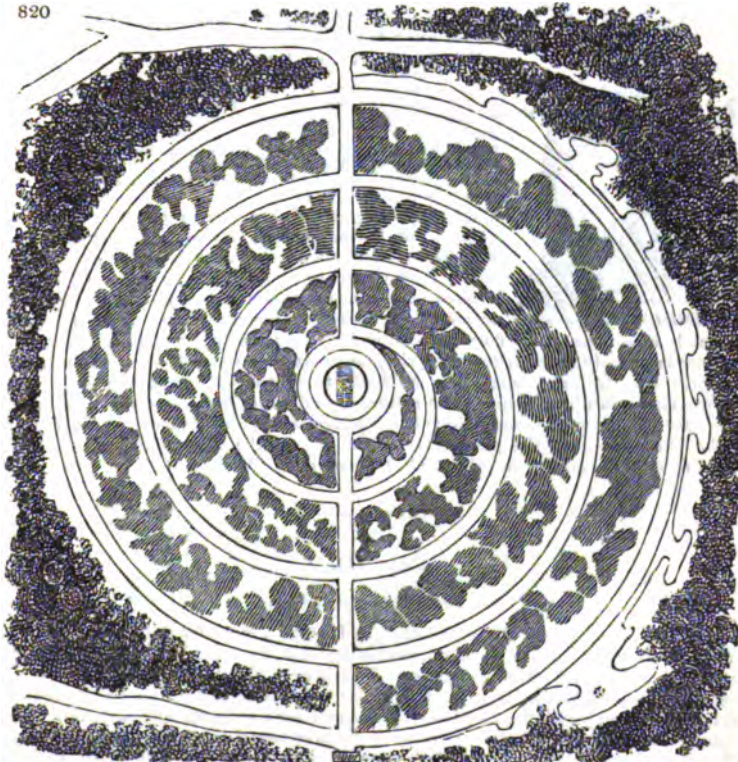
5578. *The Chinese*, Sir W. Chambers informs us (*Disert. on Orient. Gard.*, p. 96.), excel in this mode of gardening; and we have been informed by a traveller who has resided some time at Canton, that he has known a mandarin (or noble) have the whole furniture and style of his portiere changed in a single night, so as next morning to present not only a different description of flowers, shrubs, and dwarf trees, but a different arrangement of the beds and compartments. Something of the same kind is practised in the gardens of the Tuilleries in Paris, in some of the Imperial Gardens at Petersburg, and in the viceregal gardens at Monsa. Gardens of this description admit of a very perfect arrangement of the flowers, whether in the mingled manner, in select groups, or according to the natural method. It is only with such resources that a flower-gardener can "paint his way," as Sir W. Chambers says the Chinese artists do; "not scattering their flowers indiscriminately about their borders, but disposing of them with great circumspection along the skirts of the plantations, or other places where flowers are to be introduced. They reject all that are of a straggling growth, of harsh colours, and poor foliage, choosing only such as are of some duration, grow either large or in clusters, are of beautiful forms, well leaved, and of taste

that harmonise with the greens that surround them. They avoid all sudden transitions, both with regard to dimension and colour, rising gradually from the smallest flowers to the *lilly-hocks*, peonies, sun-flowers, carnation-poppies, and others of the boldest growth; and varying their tints, by easy gradations, from white, straw-colour, purple, and incarnate, to the deepest blues, and most brilliant crimsons and scarlets. They frequently blend several roots together, whose leaves and flowers unite, and compose one rich harmonious mass; such as the white and purple candytuft, larkspurs, and mallows of various colours, double poppies, lupines, primroses, pinks, and carnations; with many more the forms and colours of which accord with each other; and they use the same method with flowering shrubs, blending white, red, and variegated roses together, purple and white lilacs, yellow and white jessamine, altheas of various sorts, and as many others as they can with any propriety unite. By these mixtures they increase considerably the variety and beauty of their compositions. In their large plantations the flowers generally grow in the natural ground; but in flower-gardens, and all other parts that are highly kept, they are in pots, buried in the ground, which, as fast as the bloom goes off, are removed, and others are brought to supply their places; so that there is a constant succession for almost every month in the year, and the flowers are never seen but in the height of their beauty." (*Dis. on Orient. Gard.*, p. 96.)

5579. The botanic flower-garden being intended to display something of the extent and variety of the vegetable kingdom, as well as its resemblances and differences, should obviously be arranged according to some system or method of study. In modern times, the choice is almost limited to the artificial system of Linnaeus, and the natural method of Jussieu.

5580. *Whatever system is adopted*, the plants may either be placed in regular rows, or each order may be grouped apart, and surrounded by turf or gravel. For a private botanic garden, the mode of grouping on turf is much the most elegant; and it has this advantage, that, as the species belonging to the group are increased, it can be enlarged by appropriating a part of the turf, and any group containing few species may be filled up with repetitions for effect. The groups may be of the most irregular outlines, and those which are to contain trees may be raised or lowered in surface, according as the species may be natives of hills or valleys, and the trees and plants so dispersed as that the former shall not conceal the latter, nor present a compact lumpish appearance at the edges, or in the outline against the sky. Rockwork may be introduced in groups where there are many alpine to be grown; and bogs, ponds, and springs, imitated in others destined for aquatics, &c., as far as consistent with botanical purposes. A gravel-walk may be so contrived as to form a tour of all the groups (*fig. 820.*), displaying them on both sides; in the centre, or

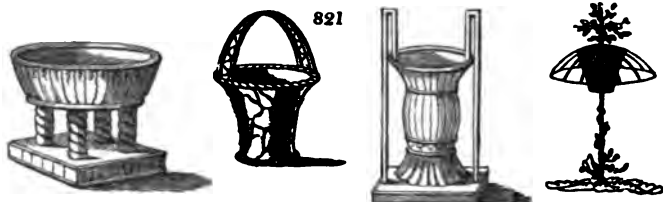
820



in any fitting part of the scene, the botanic hot-houses may be placed; and the whole might be surrounded with a sloping phalanx of evergreen plants, shrubs, and trees. The plants in such a garden should generally be neatly, but inconspicuously named, or, at all events, numbered; but naming is greatly to be preferred, as saving trouble to the spectator, and more inviting to the novice desirous of knowledge. It is hardly necessary to observe, that the above modes, or others that we have mentioned, of planting a flower-garden, are alike applicable to every form or style of laying out the garden or parterre, and that they do not interfere with any mode of enclosing or surrounding it, or of edging the walks. In the *Gardener's*

Magnific, vol. vii., a selection of plants is given, for forming in the smallest space a representative system of the whole vegetable kingdom; and in the same work, vol. viii. p. 410., and 417. to 419., is given a working plan for laying out and planting a botanic garden on a large scale, according to the natural system.

5581. *Decorations.* It is usual to employ different objects of art as decorations to flower-gardens, and the practice is founded in reason, since the works of nature and of art lend force to each other by their contrast. We have, in a former part (2608. to 2658.), enumerated the principal garden decorations. Those more especially applicable to the flower-garden are the fountain in various forms; the open and covered, or rustic seat; the statue in all its varieties of therm, bust, single figure and group, and in the various materials of stone, metal, or verdure; the arbour, the rustic vase, basket, or prop (*Figs. 821, 822.*), and a variety of others. Even the apiary and aviary, or, at least,



here and there a beehive, or a cage suspended from a tree, will form very appropriate ornaments. Sometimes inoffensive birds, as the sea-gull, may be introduced to run at large; gold-fish are very appropriate in the aquarium; and an animal which affords great amusement by its cry and song in the flower-gardens of the south of Germany, the tree-frog (*Rana arborea*), would be an acquisition in this country.



5582. *Where the old French style (Figs. 812, 813.) is imitated*, a profusion of marble and vegetable sculptures, verdant arcades, colonnades, arbours, &c., are in character; but in the more simple and modern forms (*Figs. 804, 806, and 810.*) a few stools, sofa-chairs, a pavilion-seat (*Fig. 681.*), a sun-dial, fountain, some urns, and a few good statues, will, in most cases, be sufficient. In the distribution of even these few decorations much judgment is requisite to avoid exciting ridicule, by falling into the incongruous, the absurd, or some other species of error. (See *Schimmelpenninck on Economy and Deformity*, &c.)

5583. *Time of planting herbaceous plants.* This is, in general, autumn and spring; but any perennial plant may be safely removed after it has done flowering or produced seed. With respect to biennials and annuals, they may be planted at almost any season before they have begun to throw up flower-stems. Biennials, however, are generally sown early in autumn in the flower-garden nursery, and transplanted either late in the same season or early in the following spring, to where they are to flower. Annuals are commonly sown in spring where they are finally to remain; but many sorts grow much stronger when sown in autumn. The culture of herbaceous flowers of the more valued sorts is exceedingly varied, and will be found under each species or class in the *Flower-Garden Catalogue*. For the *preparation of the soil* and the manner of performing the operation, see these articles in (Chap. IV.) *Planting the Shrubbery*.

CHAP. III.

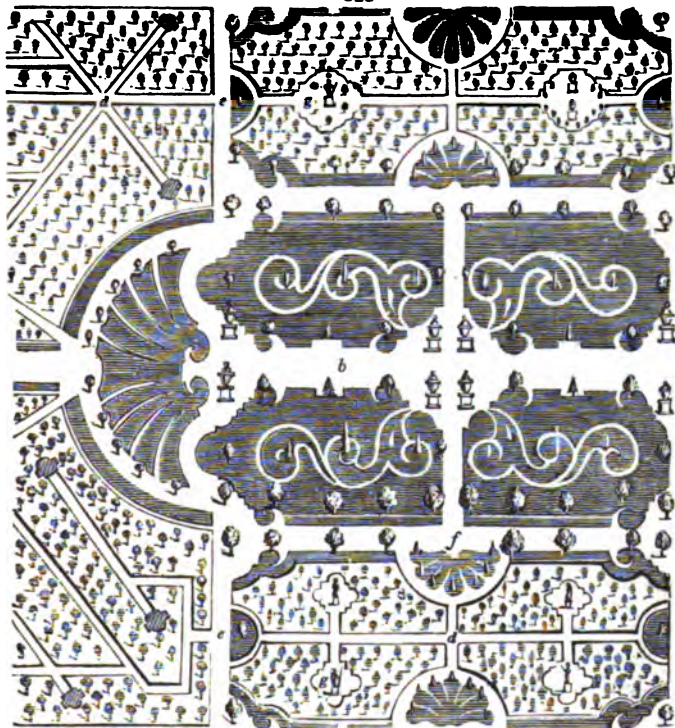
Of Forming the Shrubbery.

5584. *By a shrubbery, or shrub-garden*, we understand a scene for the display of shrubs valued for their beauty or fragrance, combining such trees as are considered chiefly ornamental, and some herbaceous flowers. The form or plan of the *modern shrubbery* is generally a winding border, or strip of irregular width, accompanied by a walk, near to which it commences with the herbaceous plants and lowest shrubs, and as it falls back, the shrubs rise in gradation and terminate in the ornamental trees, also similarly graduated. Sometimes a border of shrubbery accompanies the walk on both sides; at other times only on one side, while the other side is, in some cases, a border for culinary vegetables surrounding the kitchen-garden, but most generally it is an accompanying breadth of turf, varied by occasional groups of trees and plants, or decorations, and, with the border, forms what is called pleasure-ground.

5585. *The sort of shrubbery formed under the geometric style of gardening (Fig. 823.)* was more compact; it was called a *bosquet*, thicket or wood, and contained various compartments of turf or gravel branching

from the walks, and very generally a labyrinth. The species of shrubs in those times being very limited, the object was more walks for recreation, shelter, shade, and verdure, than a display of flowering shrubs.

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What was wanting in natural beauty and variety, however, was made up by the art of the gardener in cutting such trees and shrubs as he had into curious shapes. Shrubberies are often made for the sake of obtaining an agreeable walk to some particular place or scene, as the kitchen-garden, farm, wood, &c.; and sometimes in order to lead the spectator to different points, where views or distant prospects may be obtained. The most desirable shrubbery is one where both these objects are combined; and the least so, where the walk leads to no particular object, is shut up on both sides, and has no beauties to depend on but those of the shrubs. Hence Sir W. Chambers complains of walks *en cœd de sac*, and Knight of "the shrubbery's insipid scenes," &c. The shrubbery, however, judiciously laid out and planted, will always be a scene of considerable beauty and use about a country-seat. It is one of the principal resources for a home-walk for exercise; and, as Repton has observed, a tolerable walk, even round one's own field, is more pleasing than a better one where we have no interest. "We are greatly indebted to shrubs," Nicol observes, "for much of the pleasure and delight we enjoy in our gardens. Though they produce no eatable fruits, nor afford us any sort of nourishment, yet they are particularly conducive to our comfort. In winter, they shelter us in our walks; in summer, they shade us from the sun. They afford a great variety of flowers, a varied foliage, and are standard ornaments that give us no great trouble. They are particularly useful in the character of screens, whether against the weather, or to hide disagreeable objects, in which case they may be planted nearer to the house than forest trees. When planted in masses at a distance, they become agreeable objects, and often improve the scenery of a place. The shrubbery is often a matter of utility as well as of ornament, in which case it gives the highest satisfaction. When formed for the purpose of shutting out the office or the kitchen-garden from the view of the house; for sheltering the latter or the garden, or for connecting the house with the garden and the orchard, the shrubbery becomes useful and interesting."

5566. *In respect to situation*, it is essential that the shrubbery should commence either immediately at the house, or be joined to it by the flower-garden; a secondary requisite is, that however far, or in whatever direction it be continued, the walk be so contrived as to prevent the necessity of going to and returning from the principal points to which it leads over the same ground: but as this is a matter which must be arranged in the general disposition or laying out of the residence, it need not be here entered on.

5567. *The extent of the modern shrubbery* must depend more on the extent of that place of which it is a part than on any other principle, and it is, or ought to be, so blended with the flower-garden lawn, as scarcely to admit of its quantity being estimated apart. Where the proportion of pleasure-ground, which may be judiciously apportioned to a residence, depends so much on the ground's surface, and on the character or style of the whole seat, nothing definite can be laid down in the way of rule. The walks in the pleasure-ground should generally exceed a mile or two for the sake of recreation; but what proportion of these should be in open lawn, and what in flower-garden, or along the margin of a shrubbery, is too vague a question to receive any useful answer. Local circumstances and the character to be created must determine every thing. It may be mentioned as a characteristic distinction between the ancient and modern shrubbery, that the former was of limited extent, compact form, situated near the house, and that the length of walk was made up by repetition of parallel and cross walks. The whole of these had little distant prospect, and were generally more sheltered and shaded than is suitable for our climate; whereas, in the modern shrubbery, the length is made up by stretching out the walk to a distance; and air and ventilation, as well as views and prospects, are obtained by its being planted chiefly on one side. Such shelter

and shade as is deemed requisite for the walk is obtained by the introduction of scattered trees along its open margin.

5698. *Soil*. "Shrubs, in general," Nicol observes, "thrive very well in ordinary garden-land, and better in light than in heavy soils. Most shrubs, likewise, do well in ground a foot in depth; but it is always advisable to trench to the full depth of the soil, previous to planting, if that were even two feet. Manure is seldom bestowed on shrubs, and if the soil be not far below mediocrity, it is seldom necessary, provided the ground be otherwise well prepared, and be meliorated by trenching or digging. In the case of planting screens, where it is desirable to have them effectual as soon as possible, or in planting favourite shrubs in particular situations, every justice should be done to the soil in preparing and enriching it, either with manure or by the addition of fresh earth. Those who are curious in collections of certain shrubs, prepare or choose certain soils for them. Evergreens, for the most part, thrive well in loam of a middling texture; but some kinds do better in soft humid earth (see *Gard. Mag.*, vol. x. p. 33.), as the common *asalea* and *rhododendrons*. Some require peat, or heath soil, as *halmias*, *ericas*, &c. Deciduous shrubs, in general, thrive well in light loams or sandy soils; but certain kinds flower better in rich mellow earth, as the *moor-rose* and the *robinia*."

5699. *Walks*. "The conducting of walks," Nicol says, "through the shrubbery, is a matter both of convenience and of taste: of convenience, when the shrubbery is merely a passage from one place to another, or a narrow screen to the garden. In the former case, the walk should be simple and direct: in the latter case it may be circuitous; and if there be any variety in the ground, it ought to lead to particular points of view. The walks, however, should seldom cross one another; they should rather turn off at oblique angles; nor should one run parallel to another within view. It is proper to show off the shrubs, but too many walks perplex. Their breadths may be various. If short, they should be narrow; if long, and if a considerable reach be caught at once, they should be broad. A medium may be taken at five feet, the extremes being three and eight. They may be of turf or of gravel; but the latter is always drier and the most agreeable to walk upon in winter." In the ancient style, where the shrubbery, or umbrageous scene (*fig.* 523. *a*), often enclosed the flower-garden (*b*), both being situated in front of the house (*c*), the walks (*d*) were laid out in arbitrary geometrical shapes, crowded and numerous, to afford sufficient space for recreation, and varied by niches (*e*), *boudoirs* (*f*), salons (*g*), and other open parts to give variety.

5700. *Fences*. Local circumstances must, in almost every case, determine the sort of exterior or *boundary-fence* most proper for the shrubbery or pleasure-ground; the interior, or that on the open side, should, in almost every case, be one of the inconspicuous kind; either light iron-railings, movable hurdles of wood or iron, or the *sunk-fence*. Where the shrubbery is not a boundary plantation, a light fence may include it on both sides; but so much depends on locality and other arrangements, that the subject cannot be profitably discussed separately from that of laying out the entire residence. Under the geometric style, the business of fencing the shrubbery or woody scene, was very simple, the whole being generally surrounded by a high wall. "Fences of all kinds," Abercrombie observes, "are rather necessary and useful as instruments of shelter and security than to be chosen as materials of ornament. Whether the view terminates on the fence, or is directed beyond it, the effect on the scene, at best, is negative: thus, a fence is sometimes made higher than its proper use requires, merely to shut out something more unsightly; and, the advantage in judiciously employing that capital invention the *sunk-fence* or *As-As*, though great, is purely negative; some prospect worth retaining at considerable cost is not obstructed."

5701. *Reserve-ground for the shrubbery*. A plot of ground should be set apart for the propagation of the more tender shrubs, to fill the vacancies occasioned by death or accidents in the front of the shrub-border. This reserve-nursery will be most conveniently situated when joined to that of the flower-garden; but it may also be taken from the interior of any wide part of the plantation where it will not be seen. Here roses, merreroons, American shrubs, honeysuckles, and a variety of the more ornamental and tender sorts should always be in readiness, partly in pots and partly in nursery lines, to remove to the principal scene, either to add to its usual beauty, or to compensate for accidental defects. To the same ground may be added a space for accumulating leaves, spray, and other refuse of the shrubbery, to ferment and produce manure for the nursery in the same way as is done in the compost-grounds of the kitchen and flower-garden.

CHAP. IV.

Of Planting the Shrubbery.

5592. *On planting the shrubbery* the remarks which have been submitted as introductory to *planting the flower-garden* are applicable; and shrubs may be arranged in as many different manners as flowers. Trees, however, are permanent and conspicuous objects, and consequently produce an effect during winter, when the greater number of herbaceous plants are scarcely visible. This is more especially the case with that class called evergreens, which, according as they are employed or omitted, produce the greatest difference in the winter aspect of the shrubbery. We shall here describe three leading modes for the arrangement of the shrubbery, distinguishing them by the names of the mingled or common, the massed or grouped manner, and the systematic or methodical style of planting. Before proceeding farther it is requisite to observe, that the proportion of evergreen trees to deciduous trees in cultivation in this country, is as 1 to 12; of evergreen shrubs to deciduous shrubs, exclusive of climbers and creepers, but including roses, as 4 to 8; that the time of the flowering of trees and shrubs is from March to August inclusive, and that the colours of the flowers are the same as in herbaceous plants. These data will serve as guides for the selection of species and varieties for the different modes of arrangement, but more especially for the mingled manner.

5593. *To dispose shrubs and trees in the mingled manner*, proceed as under. The width of the space to be covered with trees, shrubs, and flowers being given, first mark it out in rows lengthways. The first row may be two feet from the margin of the turf or the edge of the walk; the second, three feet from the first; the third, four feet from the second; and so on to the back of the plantation. Suppose the width to admit of ten rows (*fig.* 594. *a* to *h*), then the six rows next the walk will occupy a space of twenty-seven feet, which may be devoted to shrubs, and the remaining three rows will occupy a space of thirty-seven feet, and may be planted with trees. Then, beginning with the first row, which is destined for the lowest class of shrubs, arrange them according to the times of their flowering, which will, as in arranging herbaceous plants, be most conveniently done at six times: viz. 1, March; 2, April, &c. to 6, August; and they will stand as in the flower-border in the order of 1, 6, 3, 5, 2, 4, and with the colours in the same

manner (a). The second row (b) is to be arranged in the same manner; and as trees, though nearly of the same size when planted, yet attain finally very different degrees of bulk, provision must be made for the plants in each row to expand year after year, till they attain their full growth. This we propose to do by planting two plants of a sort in the second row (b), three in the third, and so on (as indicated in the figure), till, in the last or tenth row (k), there will be ten plants of a sort in a line together. It is to be observed, that a deciduous and an evergreen sort (marked *d, e*, in the figure) are to be planted alternately, in order to ensure an equal mixture in respect to verdure; and that the colours (denoted by *r, w, b, g*, in the figure) are mixed as in the mingled border, to ensure a general display of mixed blossoms. The second or third year such of the plants are to be thinned out as crowd the others, reserving, however, as final plants, one of each sort (say *E* for the evergreens, and *D* for the deciduous sorts), so placed in respect to the plants in the other rows, as that the whole, when finally thinned out, may stand in quincunx. The largest trees will then occupy about 100 square feet each; and each of the shrubs in the front row about a square yard: there will be the same number of deciduous plants as evergreens: some shrubs of all the four colours in blow throughout the whole season, and a verdant aspect in summer as well as winter.

824

A. *wle wle wle wle wle wle wle wle wle wle* *b6d b6d b6d b6d b6d b6d b6d b6d b6d* *g6e g6e*
E D

B. *r6d r6d r6d r6d r6d r6d r6d r6d r6d r6d* *w3e w3e w3e w3e w3e w3e w3e w3e w3e* *soe*
D E

C. *k3e k3e k3e k3e k3e k3e k3e k3e* *g6d g6d g6d g6d g6d g6d g6d g6d* *r2e r2e r2e r2e r2e*
E D

D. *w6d w6d w6d w6d w6d w6d w6d w6d* *b4e b4e b4e b4e b4e b4e b4e b4e* *g1d g1d g1d g1d g1d*
D E

E. *r4e r4e r4e r4e r4e r4e r4e r4e* *w1d w1d w1d w1d w1d w1d w1d w1d* *b6e b6e b6e b6e b6e b6e* *g5d g5d g5d g5d g5d*
E D

F. *k5d k5d k5d k5d k5d k5d* *g6e g6e g6e g6e g6e g6e* *r2d r2d r2d r2d r2d r2d* *w4e w4e w4e w4e w4e w4e*
D E

G. *w1e w1e w1e w1e w1e w1e w1e w1e* *b6d b6d b6d b6d b6d b6d* *g6e g6e g6e g6e g6e g6e* *r5d r5d r5d r5d r5d r5d* *w2e w2e w2e w2e w2e w2e* *b4d b4d*
E D E

H. *b4e b4e b4e b4e b4e b4e* *g1e g1e g1e g1e g1e g1e* *r6d r6d r6d r6d r6d r6d* *w3e w3e w3e w3e w3e w3e* *b6d b6d*
D E

I. *b4e b4e b4e b4e b4e b4e* *g1d g1d g1d g1d g1d g1d* *r6e r6e r6e r6e r6e r6e* *w1d w1d w1d w1d w1d w1d* *b6e b6e* *g5d g5d* *r6e r6e*
E D E D E D E D E D E D E D E D E D

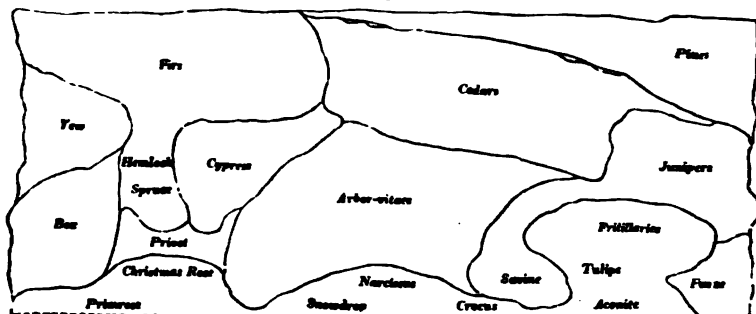
J. *k3d k3d k3d k3d k3d k3d* *g6e g6e g6e g6e g6e g6e* *r2d r2d r2d r2d r2d r2d* *w4e w4e w4e w4e w4e w4e* *b1d b1d* *g6e g6e*
D E D E D E D E D E D E D E D E D E D

5594. The distance between the rows of trees (ten feet) may in some cases be an objection, for a year or two at first; but this, we consider, will be more than counterbalanced by the opportunity afforded of cultivating the ground between them, and by the air and light admitted to their side shoots, which will the sooner fit them for producing blossoms. All formality of appearance will soon be done away by the irregular growth of the plants, and by the thinnings which must take place in, at the latest, three years after planting. If any, however, object to the appearance of rows, they may be obliterated, by introducing

some plants in the intervals, of the same sort as those in the lines adjoining; but in doing this, care must be taken never to lose sight of the shrub or tree which is finally to remain, as it is of importance to this plan (which is not natural or picturesque planting), that the regular disposition of the whole be preserved, as well with a view to the gradation of height as to the mixture of colour in the flower, and of permanent and deciduous foliage. The herbaceous plants only remain to be added. These are to be inserted one row in front of the first row of shrubs (*a*), and three or more rows (*p, q, r, s*) in the intervening spaces between the next rows. The plants are to form a quincunx with the shrubs; and the same arrangement as to height, colour, and time of flowering, adopted as in the mingled border. Such a shrubbery may be commenced with (3×6) twelve sorts of evergreen, and the same number of deciduous trees; with (6×6) thirty-six sorts of shrubs, half the number deciduous, and half evergreen; and with (9×6) thirty sorts of herbaceous plants. It may then be continued either by repeating the pattern with the same sorts, or by other sorts; or principally by the same sorts, with some others occasionally. If a show of flowers is valued, the sorts employed must be comparatively few, as the flowers of the greater number of trees and shrubs are of dull colours, or little conspicuous. The evergreen trees, in a popular sense, can hardly be said to have any flower; but still a number of them must be introduced in the back rows, to blend with horse-chestnuts, lilacs, acacias, wild cherries, wild pears, &c. &c.

5595. *The massed or grouped manner* of planting a shrubbery (*fig. 825.*) is analogous to the select manner of planting a flower-garden. Here one genus, species, or even variety, is planted by itself in considerable numbers, so as to produce a powerful effect.

825



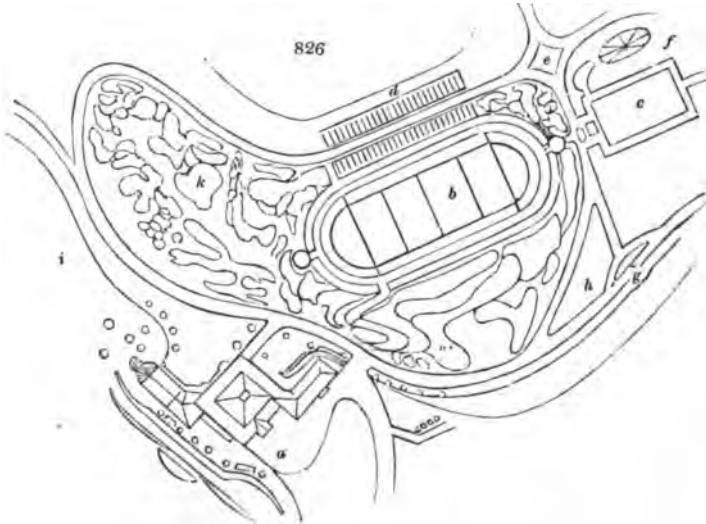
Thus the pine tribe, as trees, may be alone planted in one part of the shrubbery, and the holly, in its numerous varieties, as shrubs. After an extent of several yards, or hundreds of yards, have been occupied with these two genera, a third and fourth, say the evergreen fir tribe and the yew, may succeed, being gradually blended with them, and so on. A similar grouping is observed in the herbaceous plants inserted in the front of the plantation; and the arrangement of the whole as to height, is the same as in the mingled shrubbery.

5596. *The chief difficulty* in this manner of planting is so to select the sorts that are to succeed each other, so to blend one group or kind with those adjoining, and at the same time maintaining the requisite gradation from the front to the back of the plantation, as to preserve to the spectator in walking along, the appearance of a whole. When this is successfully accomplished, and on a large scale, no kind of shrubbery can be more beautiful in summer; but in winter it will present parts wholly without evergreens, and it will only be rich in flowers in some parts; as, for example, where the roses, spiræas, mæspilusæ, &c., are introduced. By proper contrivance, however, the evergreens, the showy flowering deciduous kinds, and the less showy deciduous sorts, may form three divisions, and the two former can be kept nearest the mansion. The best guides as to the sorts proper to adjoin each other, are the general form and mode of growth; and next, the colour and foliage. In these particulars the transition should always be gradual. Thus, among the trees, the pines, cedars, firs, and yew, form a regular gradation, and the shrubs which may be placed near them are the arbutus, juniper, furze, &c. To place groups of weeping-willow or elm adjoining the pines, and to select roses and lilacs as shrubs, would produce a harsh and incongruous effect. There is obviously much less natural affinity between herbaceous plants and shrubs than between shrubs and trees; but the groups of the herbaceous plants must harmonise among themselves on the same general principles as the trees; thus pink and carnation-looking plants (Caryophyllææ), should not be succeeded by coarse broad-leaved sorts (Boraginææ), but rather by more delicate kinds, as grasses or Primulæ. There may sometimes also be a certain species of relation between the herbaceous plants and shrubs; thus the bulbous-rooted kinds, and small early flowers, as violets, Primulæ, will be more fitly planted among evergreens and early-flowering deciduous shrubs than among late deciduous kinds.

5597. *Various other modes of massed, and also select-planted, shrubberies* may be adopted; such as collecting together all such shrubs, trees, and flowers, as flower at the same time, or have the same colour of flower, or foliage, or the same odours, or the same general shape, or the same natural habitation, as of marishes, mountains, &c., or the same country, as America, Switzerland, Sweden, &c. But the intelligent gardener, who has attended to what has been already advanced, can hardly require further instructions to form such plantations. We would suggest, as worth trial, where there is ample space, the mode of arranging by odours; the ancients are said to have paid particular attention to this in mixing their trees. Every one must have experienced a difference in this respect between walking in a pine-forest, a plantation of balsam-poplars, a birch-cope, and beside sweet-brier and juniper hedges. An arrangement of this kind, depending on the smell of the buds and leaves, rather than of the flower, would have its effect the greater part of the year, especially after showers.

5598. *Systematic or methodical planting in shrubberies* consists, as in flower-planting, in adopting the Linnæan or Jussieuan arrangement as a foundation, and combining at the same time a due attention to gradation of heights. This mode, executed on a grand scale, would unquestionably be the most interesting of all, even to general observers; but on a small scale it could not be so universally pleasing as the mingled manner, or

the mode by select grouping. The uninstructed mind might be surprised and puzzled by such an assemblage; but not perceiving the relations which constitute its excellence, they would be less pleased than by a profusion of ordinary beauties—by a great show of gay flowers and foliage. Dr. Darwin is said to have blended picturesque beauty with scientific arrangement in a dingle at Lichfield, where he disposed of a large collection of trees and plants in the Linnean manner. We have attempted the same thing in our plan for laying out the Birmingham Botanic Garden. (See *Gard. Mag.*, vol. viii. p. 407.) The same end may be attained on any description of surface, and with any form of ground-plan, provided turf be introduced, and care be taken to elongate the groups containing trees in such a way as to preserve a sufficient degree of woodiness throughout, both for shelter, shade, and picturesque effect. In this way we have arranged a spot (*fig. 826.*) of little more than an acre and a half, so as, to ordinary observers, to be



nothing more than a house surrounded by pleasure-ground; but to the botanist and painter, to be a scientific and picturesque scene. This spot combines a villa and offices (*a*), a kitchen-garden (*b*), reserve-garden and melon-ground (*c*), botanic ground for herbaceous plants (*d*), rock-work (*e*), rosarium (*f*), aquarium (*g*), American ground (*h*), besides a variety of other subordinate scenes, a scattered orchard (*i*), and the shrubbery (*k*), arranged in irregular, elongated groups on lawn, in the manner mentioned. But much the most interesting mode of arrangement would be that of Jussieu, by which a small villa of two or three acres might be raised, as far as gardening is concerned, to the *ne plus ultra* of interest and beauty. In our *Illustrations of Landscape Gardening*, plate viii., we have given a plan showing how ten acres may be laid out as a villa residence, combining at once a maximum of convenience, picturesque beauty, and botanical interest. In this design there are no duplicates of trees, shrubs, or herbaceous plants, with the exception of fruit-trees, shrubs, and plants, florist's flowers, hedge-plants, and culinary vegetables.

5599. *Natural arrangement.* It is only since the great influx of trees and shrubs from America, during the latter half of the last century, that the idea of arranging shrubs found a place in the writings on gardening. Sir W. Chambers seems to have been the first who suggested it in his account (whether correct or not, is of little consequence to our present purpose) of the practice of the Chinese gardeners. The Chinese, he says, in their plantations, do not, as is the practice of some European gardeners, plant indiscriminately every thing that comes in their way; nor do they ignorantly imagine that the whole perfection of plantations consists in the variety of the trees and shrubs of which they are composed: on the contrary, their practice is guided by many rules, founded on reason and long observation, from which they seldom or never deviate. Many trees, shrubs, and flowers, they say, thrive best in low, moist situations; many on hills and mountains: some require a rich soil, but others will grow on clay, in sand, or even upon rocks, and in the water: to some a sunny exposure is necessary, but for others the shade is preferable. There are plants which thrive best in exposed situations; but,

in general, shelter is requisite. The skilful gardener, to whom study and experience have taught these qualities, carefully attends to them in his operations, knowing that thereon depend the health and growth of his plants, and, consequently, the beauty of his plantations.

5600. *The perfection of trees for ornamental gardening* consists in their size, in the beauty and variety of their form, the colour and character of their bark, the quantity, shape, and rich verdure of their foliage, with its early appearance in the spring, and long duration in the autumn; likewise in the quickness of their growth, and their hardness to endure the extremities of heat, cold, drought, or moisture; in their making no litter, during the spring or summer, by the fall of the blossom; and in the strength of their branches to resist, unharmed, the violence of tempests.

5601. *The perfection of shrubs* consists not only in most of the above-mentioned particulars, but also in the beauty, durability, or long succession of their blossom, and in their fair appearance before the bloom, and after it is gone. We are sensible, say they, that no plant is possessed of all good qualities, but choose such as have the fewest faults, and avoid all the exotics that vegetate with difficulty in our climate; for though they may be rare, they cannot be beautiful, being always in a sickly state.

5602. *The excessive variety* of which some European gardeners are so fond in their plantations, the Chinese artists blame; observing, that a great diversity of colours, foliage, and direction of branches, must create confusion, and destroy all the masses upon which effect and grandeur depend: they observe, too, that it is unnatural; for, as in nature most plants sow their own seeds, whole forests are generally composed of the same sort of trees. They admit, however, of a moderate variety; but are by no means indiscriminate in the choice of their plants, attending with great care to the colour, form, and foliage of each, and only mixing together such as harmonise and assemble agreeably. They observe, that some trees are only proper for thickets; others, only fit to be employed singly; and others equally adapted to both these situations. The mountain cedar, the spruce and silver fir, and all others whose branches have a horizontal direction, they hold improper for thickets; because they indent into each other, and likewise press disagreeably upon the plants which back them. They never mix these horizontal-branched trees with the cypress, the oriental arbor vite, the bamboo, or other upright ones; nor with the larch, the weeping willow, the birch, the laburnum, or any of a pendent nature, observing that the intersection of their branches forms a very unpicturesque kind of network; neither do they employ together the catalpa and the acacia, the yew and the willow, the plane and the sumach, nor any such heterogeneous sorts; but on the contrary, they assemble in their large woods, the oak, the elm, the beech, the tupelo, the sycamore, maple, and plane, the chestnut, the walnut, the abele, the lime, and all those whose luxuriant foliage hides the direction of their branches; and growing in globular masses, assemble well together; forming, by the harmonious combination of their tints, one grand group of rich verdure.

5603. *In their smaller plantations* they employ trees of a smaller growth, but of the same concordant sorts; bordering them with Persian lilacs, guelder-roses, syringas, coronillas of various sorts, flowering raspberries, yellow jessamine, hypericum, the spiraea frutex, altheas, roses, and other flowering shrubs peculiar to China; and wherever the ground is bare, they cover it with white, blue, purple, and variegated periwinkle, the *Convivulus tricolor*, dwarf stocks, violets, primroses, and different kinds of creeping flowers; and with strawberries, tutsan, and ivy, which climbs up and covers the stems of the trees.

5604. *In their shrubberies* they follow, as much as possible, the same rules; observing, farther, to plant in some of them all such shrubs as flourish at one time; and in some, such as succeed each other; of which different methods the first is much the most brilliant; but its duration is short, and the appearance of the shrubbery is generally shabby, as soon as the bloom is off: they therefore seldom use it but for scenes that are to be enjoyed at certain periods; preferring the last, on other occasions, as being of long duration, and less unpleasant after the flowers are gone. (*Dissert. on Orient. Gard.*)

5605. *British practice.* Soon after Sir William Chambers's work appeared that of Whately, which contains some excellent remarks on the subject (*Obs. on Gard.*, sect. xii. xiii. xiv.), and subsequently Uvedale Price's excellent *Essays on the Picturesque*, vol. i. In 1804, we endeavoured to enforce the principle, not only in planting trees, but in arranging herbaceous plants, and the plants in botanic hot-houses. (*Obs. on Planting and Landscape Gard.* 8vo.) All these efforts were at first treated as visionary by Marshal Nicol, and other planters and gardeners. But Nicol, in the last editions of his works, allows there may be some merit in grouping; and Sang, his editor, highly approves of following nature in the arrangement of trees. (*Planter's Kalend.*)

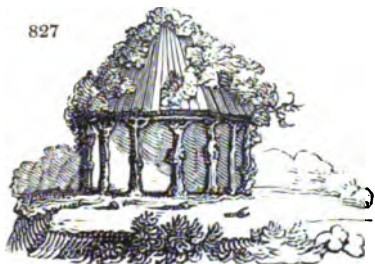
5606. *Nicol* says, "the proper disposition of shrubs, where many are to be planted, is a matter of considerable importance to the future welfare of the whole, and that whether they be mixed, or be grouped; that is to say, whether deciduous or evergreen shrubs be indiscriminately mixed, as is often done, the evergreens be planted distinctly by themselves. The arrangement of shrubs is a matter, no doubt, very much of fancy. In some parts they may be mixed, in others grouped; but, in general, there ought to be plenty of evergreens planted, in order that the whole may be the more cheerful in winter. Generally speaking, however, the method of mixing all kinds of shrubs indiscriminately prevails too much in modern shrubberies. Much more character and distinctness may be given by judiciously grouping them, than by following the common methods of planting."

5607. *Fruit-trees in shrubberies.* "In shrubberies of considerable extent, fruit-trees may be interspersed at fifteen or twenty yards' distance, by which means a good deal of fruit may be obtained, and very much beauty added to the shrubbery. In spring the blossoms of apples, cherries, and pears, are beautiful; in autumn their fruits and the foliage of cherries in particular, give a lustre and variety that highly brightens the appearance of other plants, especially of evergreens." (*Villa Gard. Direct.*, p. 16.) This mode, Sir W. Chambers tells us, is practised by the Chinese when the patron is poor; that is, their shrubbery is composed of fruit-trees and shrubs, and forms a sort of ornamental orchard. This we consider an advisable mode for an economical farm-residence; but the general introduction of fruit-trees in even mingled shrubberies, unless of the species in their wild state, as crabs, wildings of pears, cherries, quinces, raspberries, &c. we consider as likely to destroy the character of the scene. It must be recollected, too, that grafted trees, especially the apple and cherry, seldom grow so freely and produce such vigorous and natural-like heads as plants raised from seed; they are, therefore, soon overtopped by the others, or where they are placed among trees that do not grow higher than themselves, they seldom fail of producing deformed, stunted heads.

5608. *Forsyth, Abercrombie, and others*, recommend their introduction, as it appears to us, without due regard to any other object than the fruit they will produce, and the fugacious beauty of their blossoms; but their unaccommodating form, and their influence as to character in ornamental plantations, we consider as sufficient arguments against the practice in general cases.

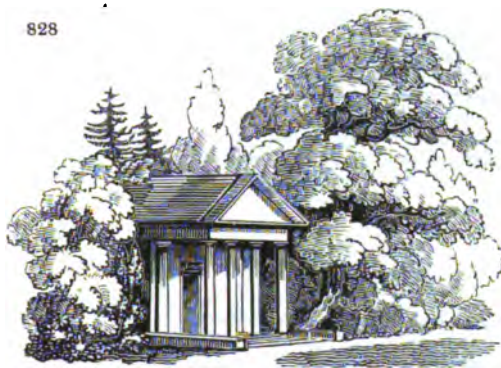
5609. *Decorations in shrubberies.* Those of the shrubbery should in general be of a more useful and imposing character than such as are adopted in the flower-garden. The green-house and aviary are sometimes introduced, but not, as we think, with propriety, owing to the unsuitableness of the scene for the requisite culture and attention. Open and covered seats are necessary, or, at least, useful decorations, and may occur here and there in the course of the walk, in various styles of decoration, from the rough bench to the rustic hut (*fig. 827.*) and Grecian temple. (*fig. 828.*) Great care, however, must be taken not to crowd these,

827



nor any other species of decorations. Buildings being more conspicuous than either statues, urns, or inscriptions, require to be introduced more sparingly, and with greater caution. In garden or ornamented scenery they should seldom obtrude themselves by their magnitude or glaring colour, and rarely be erected but for some obvious purpose of utility.

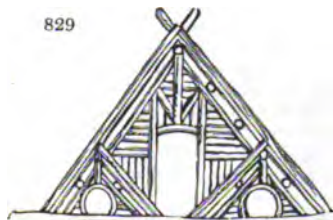
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5610. *Covered seats and shelters* are introduced of many forms, and under a great variety of names, such as root-houses, heath-houses, moss-houses, huts, shelters (*fig. 829.*), bowers, caverns, caves, grottoes, temples, mosques, &c., besides plain covered seats, either of wood or stone.

The imitation of temples or mosques is, as they must be on a small scale, generally quite ridiculous. The propriety of introducing the others depends entirely upon the

829



character of the scene. Light bowers formed of lattice-work, and covered with climbers, are in general most suitable to parterres; plain covered seats suit the general walks of the shrubbery. Most of the others may be introduced in romantic, singular, wild, or melancholy places.

5611. *Statues, whether of classical or geographical interest, urns, inscriptions, busts, monuments, &c.* are materials which should be introduced with caution. None of the others require so much taste and judgment to manage

them with propriety. The introduction of statues, except among works of the most artificial kind, such as fine architecture, is seldom or never allowable; for when they obtrude themselves among natural beauties, they always disturb the train of ideas which ought to be excited in the mind, and generally counteract the character of the scenery. In the same way, busts, urns, monuments, &c. in flower-gardens, are most generally misplaced. The obvious intention of these appendages is to recall to mind the virtues, qualities, or actions, of those for whom they were erected: now this requires time, seclusion, and undisturbed attention, which must either render all the flowers and other decorations of the ornamental garden of no effect, or, if they have effect, it can only be to interrupt the train of ideas excited by the other. As the garden, and the productions of nature, are what are intended to interest the spectator, it is plain that the others should not be introduced. This reasoning, while on the one hand it shows the absurdity

of such a practice, on the other directs that urns, monuments, &c. should only be placed in solitary, unfrequented places, where the mind is naturally led to contemplate, and where the remembrance of the virtues of great men, or the worth of relations now no more, afford proper subjects for contemplation. But even in places apparently solitary or secluded, these have been introduced in a manner so affected or improper as to furnish reason for the greatest caution in future.

5612. *A cottage*, when the walk of a shrubbery is of great extent, may sometimes be advantageously introduced in a distant part of it, with an occupant, for the purpose of keeping one apartment in order as a place of repose. Such a cottage may be designed in any style, according to the taste of the owner, and may serve a variety of useful purposes. In the *Gardener's Magazine*, in our *Encyclopedia of Cottage, Farm, and Villa Architecture*, and more especially in our *Architectural Magazine*, will be found a great variety of rustic buildings, suitable for seats and shelters in gardens and pleasure-grounds, as well as numerous ornamental cottages, in various styles, and with various degrees of accommodation.

5613. *On the subject of planting both flower-gardens and shrubberies* we may remark, with the author of the *Florist's Manual*, that it is considered in much too unimportant a light, both by gardeners and their employers. The business is almost every where performed at random, instead of being conducted with a specific object in view. To remedy this evil, gardeners should first make a correct plan of the border, parterre, or plot, of whatever kind it may be, that is to be planted; and then having determined the mode of arrangement most proper, and selected the names of plants to effect it, from the proper catalogues, the situation of every plant and its name should be determined on in the plan. This done, all these points should be correctly transferred to the ground, and a pin or stake inserted at each, numbered in correspondence with a list of the sorts. The plants being procured, should then be distributed and planted according to these stakes and numbers; and the stakes should be allowed to remain for a year or two, to make certain as to the sort to be replaced there, in the case of death or accident. If ever this branch of gardening should attain a high degree of perfection in Britain, it will probably be deemed as necessary to call in a professor to direct the arrangement of flowers and shrubs in parterres and shrubberies, as it is now to require his aid in arranging the ground-plan.

CHAP. V.

Hot-houses used in Ornamental Horticulture.

5614. *The hot-houses of floriculture* are the frame, glass case, green-house, orangery, conservatory, dry-stove, the bark or moist stove, in the flower-garden or pleasure-ground; and the pit and hot-bed in the reserve-garden. In the construction of all of these the great object is, or ought to be, the admission of light and the power of applying artificial heat with the least labour and expense. In culinary forcing-houses, it is requisite to attend to the angle of the glass roof, so as to obtain most of the sun's influence at the time the fruit within is to be ripened; but in the hot-houses of the flower-garden or pleasure-ground, the construction ought to be such as to admit as much light as possible in winter; for then in the stoves a heat is kept up by art, which is not to be found in any natural climate connected with so little light as is then afforded in our latitude. Hence, as a general principle, it may be affirmed, that the roofs of all plant or botanic hot-houses should be steep rather than flat, and, perhaps, the angle of 45° may be fixed on as the fittest average. It was adopted by Miller, both in culinary and ornamental hot-houses, and is fitter for general purposes than any other.

5615. *Ornamental hot-houses*, considered with reference to beauty of design, are still very deficient. They are too commonly left to be planned and executed by manufacturers, or tradesmen, or practical gardeners, whose ideas on the subject of art are by no means matured. Even architects have, for the most part, evinced very little taste in their designs for this class of buildings. The reason is, they have no precedent for them in the remains of antiquity; they do not fully understand their use; and, which is the greatest defect, we are persuaded that there are very few persons who call themselves architects who really understand what constitutes art. We might, in proof of this, refer to a conservatory recently erected from the designs of one of the most popular and extensively employed architects of the day, in which the interior columns supporting the roof have capitals ornamented with leaves of sheet copper, coloured green in imitation of those of a palm! What is this but a mimicry of nature? Among the numerous designs published in the first nine volumes of the *Gardener's Magazine*, there are scarcely any

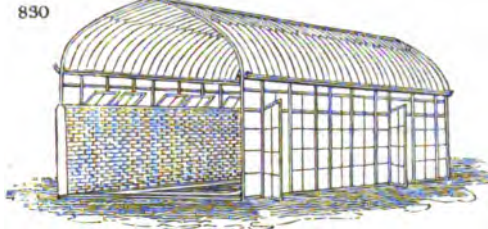
that we can quote in this chapter. What, then, can we recommend our readers to do in such a case? Our answer is, Employ an architect of mind—a man who reads; and recommend him, while he employs architectural forms, to consult the practical gardener with reference to all that relates to heat, air, light, soil, and the other requisites of vegetable culture. Some of the most architectural ornamental hot-houses erected in England are those at Alton Towers, the principal of which have been figured in the historical part of this work, and in our *Encyclopædia of Cottage, Farm, and Villa Architecture*. In the *Architectural Magazine*, and in our forthcoming *Encyclopædia of Landscape-Gardening, and Garden Architecture*, will be found a complete series of designs, made on purpose for the work, by eminent architects.

5616. *The frame* used in ornamental horticulture is generally of the same form as those of the kitchen-garden. For alpine plants this form succeeds perfectly, but for frame-shrubs the ends and front should be deeper than usual, and glazed half their depth, to admit the sun to the surface of the adjoining pots. Frames for the taller bulbous-rooted flowers should either be glazed in front and at both ends, or if opaque in those parts, should be placed on a steep surface for the same general object. Frames of every description should have a gutter or spout in front, to carry off the rain-water which drains off the sashes.

5617. *The glass case* may be variously constructed from detached sashes; it is used to protect standard trees or shrubs, and sometimes to place against walls or espaliers. (See *fig. 542*.)

5618. *The green-house* may be designed in any form, and placed in almost any situation, as far as respects aspect. Even a house looking due north, if glazed on three sides of the roof, will preserve plants in a healthy, vigorous state. The curvilinear principle applied to this class of structures admits of every combination of form, and without militating against the admission of light and air. Though we are decidedly of opinion that as iron roofs on the curvilinear principle (*fig. 830*.) become known, the clumsy shed-like

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use will be erected only in nursery and market-gardens; yet we are not to be understood as exclusively recommending our own plans, and we therefore admit of every form which has a good effect relating to the situation in which it is placed, and which is favourable to the growth of plants.

5619. *In the interior of the green-house* the principal object demanding attention is the stage, or platform for the plants. In a double-roofed house, surrounded by a path, the stage generally consists of shelves, rising from the path to the middle of the house; but in a house with a single roof it generally rises from the front path to the back, and in both cases the slope of the stage is generally though not always the same as that of the roof. In the green-houses destined for very large or tall-growing plants, as camellias, and many of the New Holland plants, no stage is requisite; and in such as are destined for small plants, as ericas and pelargoniums, the first step of the stage, when there is a path between it and the front glass, should be raised at least two feet and a half high, and it may then be continued parallel to the roof. The object of this arrangement is to bring the plants near the glass, so as they may obtain the benefit of the light in a state as little decomposed as possible. Flues, and hot-water or steam-pipes, in green-houses, are frequently carried above ground, which is inelegant, and too much in the style of the common forcing-house. They may in almost every case be conducted under the paths or stage; and by keeping them detached, so as air may circulate round them, as much heat will be given out as by the common mode. In some cases trellis-rods are placed at regular distances under the roofs of green-houses, for the purpose of training vines; but this practice is incompatible with a high degree of culture and beauty in the green-house plants, on account of the light it excludes; besides, it interferes with character. Many creepers or climbers are to be trained under the roofs, they should be of the ornamental kind; but it is generally best to train them to upright rods at the back part of the house, or rods forming intersecting arches over the back paths, or against the back wall; for by either of these modes they exclude less light, better display their foliage and flowers, and less recall the idea of the forcing-house.

5620. *The orangery* is the green-house of the last century, the object of which was to preserve large plants of exotick evergreens during winter, such as the orange tribe, myrtles, sweet bays, pomegranates, and a few others. Pelargoniums, ericas, fuchsias, and other delicate plants requiring much light, were then unknown. The orangery is generally placed near to or adjoining the house, and its elevation corresponds in architectural design with that of the mansion. Of the orangery, considered as a house for growing the orange tribe as a dessert-fruit, we have already treated.

5621. *A recent and very considerable improvement in the construction of green-houses and orangeries* consists in forming the shelves and stages of thin plates of stone, instead of boards; and very frequently the flag-stones are hollowed out, so as to leave a raised margin of half an inch or more, for the purpose of retaining moisture, preventing dripping, and raising, when the air of the house is warm, a general steam of dew. This may be considered, on the whole, as a real improvement, a proof of which is the readiness with which it has been adopted by nurserymen and practical gardeners. A substitute consists in raising marginal slips of boards to wooden shelves, and covering the boards with a thin layer of gravel or coal ashes.

5622. *The conservatory* is a term generally applied by gardeners to plant-houses, in which the plants are grown in a bed or border without the use of pots. They are sometimes placed in the pleasure-ground along with the other hot-houses, but more frequently attached to the mansion. The principles of their construction is in all respects the same as for the green-house, with the single difference of a pit or bed of earth being substituted for the stage, and a narrow border instead of surrounding flues. The power of admitting an abundance of air, both by the sides and roof, is highly requisite both for the green-house and conservatory; but for the latter, it is desirable, in almost every case, that the roof, and even the glazed sides, should be removable in summer. When the construction of the conservatory does not admit of this, the plants in a few years become etiolated, and naked below, and are no longer objects of beauty; but when the whole superstructure, excepting the north side, is removed during summer, the influence of the rains, winds, dew, and the direct rays of the sun, produce a busyness of form, closeness of foliage, and a vividness of colour, not attainable by any other means. We are decidedly of opinion, therefore, that a conservatory of any of the common forms, unless it were one devoted entirely to palms, ferns, Scitamineæ or other similarly growing plants, should always be so constructed as to admit of taking off the sashes of the roof and the front; and if it were a detached structure in the flower-garden, we should prefer a plan that would admit of the removal of every thing excepting the flues and the plants. When a conservatory is glazed on all sides, it should, if possible, be placed south and north, in order that the plants on both sides

of the pit should equally benefit from the sun; when placed against a wall, the glazed side may front any quarter except the north. But as the removal and replacing of the roof of such immense conservatories as are sometimes attached to mansions is attended with considerable expense, risk of breakage, and, what is of still more consequence, risk to the plants, if they happen to be uncovered too soon in spring, or left too long uncovered in autumn, we would recommend the polyprosopic roof (3467. and *fig.* 579.) as by far the most perfect description of a hot-house roof that has yet been devised. With such a roof, the plants within may, at any time, in a few minutes, be as completely exposed to air, rain, dew, and sun, if these exist without, as if the roof were removed; and again, in a few minutes, they may be completely shut up. The improver who shall erect an extensive conservatory of this kind, and apply to it the regulating apparatus of Kewley (*fig.* 517.), will find himself in possession of the most unique and complete plant-structure in the world.

5623. *The conservatory in comparatively humble and economical residences* (*fig.* 831.) may consist of a

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number of rectangular sashes, connected and supported by means of light iron rafters. In the beginning of summer the sashes may be removed and applied to the ripening of peaches, vines, or figs, against walls, or laid over excavations in the form of pits, containing melons, cucumbers, &c. The light iron framework may either be removed, or remain and be disguised by annual creepers, or by vines of the narrow-leaved sort. Sometimes a cistern is placed in the conservatory for growing aquatics, and containing a few gold-fish; but as there are very few exotic aquatics which will thrive in the temperature of the greenhouse, this is seldom requisite, unless as a decoration, and for the use of the water in culture, and the appearance of the fishes.

5624. *The dry stove* is chiefly devoted to the culture of succulents. In design it need not differ from the greenhouse, unless, perhaps, in the stage being placed somewhat nearer to the roof. The name and character of this structure is derived from the higher degree of heat generally kept in it, and from the air being less moist than in the bark-stove, where more water is used, and consequently more vapour generated. The volume of air to be heated by one fire in the dry-stove should not exceed two thirds of that to be heated in a greenhouse or conservatory similarly constructed and situated.

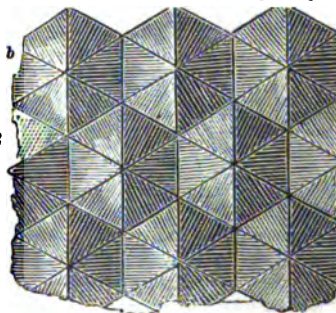
5625. *The bark or moist stove* differs from the last only in having a pit for bark or other fermenting matter instead of a stage. This pit may be from two and a half to four feet deep, according as bark or leaves are to be used, the latter material requiring the greatest depth. It is commonly surrounded by a thin brick wall; but in elegant structures, slabs of stone, or plates of slate or cast iron, are to be preferred, as a higher finish, and occupying less space. The roof, when necessary, may be supported from the iron columns from the middle of the pit. Shelves may be placed against the back wall, and occasionally a narrow-leaved creeper run up the roof.

5626. *There is a peculiarity in the construction of plant-stoves* which deserves particularly to be noticed; namely, that fewer openings for the admission of air are requisite than in any other hot-house, except the pine-stove. One reason of this is, that the degree of heat which must at all times be kept up in the enclosed atmosphere, is so much greater than that of the open air, that the difference in the specific gravity of the two fluids, when permitted to mingle by opening two or three sashes, produces a more active circulation, and sooner approaches to an equilibrium of temperature; another is, that, however numerous the openings in the hot-house roof may be, they could seldom be made use of without reducing the house to too low a temperature; and a third and last is, that the plants being mostly kept in pots, and many of them, as the palms, being of slow growth, they are not so apt to etiolate as those of the greenhouse and conservatory. Hence it is, that the roof of a botanic stove may generally be erected at less cost than that of a greenhouse or conservatory; but particularly where iron is employed, and the curvilinear principle adopted.

5627. *Houses of magnificent forms, and almost as light within as in the open day*, might thus be constructed for the growth of palms, Scitamineæ, bamboos, and other tropical trees to be planted in the ground, as in the conservatory. These might also be detached in the flower-garden, or they might form an appropriate appendage to a dwelling. Indeed, there is hardly any limit to the extent to which this sort of light roof might be carried; several acres, even a whole country residence, where the extent was moderate, might be covered in this way, by the use of hollow cast-iron columns as props, which might serve also as conduits for the water which fell on the roof. Internal showers might be produced in Loddiges's manner; or the roof might



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be of the polyprosopic kind, and opened at pleasure to admit the natural rain. Any required temperature might be kept up by the use of concealed tubes of hot water or steam, or by hot-water lakes, as suggested by us in *Mag. Nat. Hist.* vol. II. and regulated by the apparatus of Kewley. Ventilation also would be effected by the same machine. The plan of such a roof might either be flat ridges running north and south (*fig.* 832. a), or octagonal or hexagonal cones. (b).

with a supporting column at each angle, raised to the height of a hundred or a hundred and fifty feet from the ground, to admit of the tallest Oriental trees, and the undisturbed flight of appropriate birds among their branches. A variety of Oriental birds, and monkeys, and other animals, might be introduced; and in ponds, a stream made to run by machinery, and also, in salt lakes, fishes, polypi, corals, and other productions of fresh or sea water, might be cultivated or kept. Perhaps a better plan than raising the house to the height of 100 or 150 feet at once, would be to begin with 25 feet, and to raise the roof by adding to the columns as the plants advanced. (See *Gard. Mag.*, vol. ix. p. 614.) The great majority of readers will no doubt consider these ideas as sufficiently extravagant; but there is no limit to human improvement, and few things afford a greater proof of it than the comforts and luxuries man receives from the use of glass—a material, as Cuvier observes (*Magasin Encyclopédique*, 1816), manufactured from seemingly the most useless *débris* of our globe, and an insignificant plant (*Salicornia*) found on sea-shores.

5628. *The aquarium.* The greater number of exotic aquatics being stove-plants, a cistern of water for their culture is commonly placed in the bark-stove, generally at one end of the pit, and so as to be as near the light as possible. Some, however, have erected houses on purpose for this beautiful class of plants, substituting a large cistern for the bark-pit; others grow dwarf aquatics, such as the nymphææ, &c. in pits and frames, either heated by dung, leaves, or other fermenting substances, or by hot water, steam, or fires.

5629. *A propagation-house* is a requisite appendage wherever a general collection of exotic plants is maintained, and the proper situation for it is in the reserve-garden. Such a house, like the houses used by nurserymen, does not require to be so light as fruiting or flowering houses; it may be little more than a large pit with the roof very flat (say from 12° to 16°), in order that all the plants may be near the glass: it should contain a bark-pit, raised to within eighteen inches of the glass in front, and 2½ feet behind, a broad stone shelf in front, and two or more shelves in the back of the house, close under the roof, that is, over the path and flue, or steam or hot water pipes. All shelves in hot-houses, it may be observed, whether of stone or timber, ought to have narrow ledges along their edge, not less than an inch deep, by which the water which escapes through the bottoms of the pots is not only prevented from dropping, but retained to generate a salutary coolness and moisture.

5630. *Various pits and hotbeds* will be required in the reserve-department of the flower-garden, for forcing shrubs and flowers, raising annuals, &c.; the construction of which, having nothing peculiar, need not be here detailed.

5631. *The idea of cold-houses* seems to have been first suggested by Sir W. Chambers (*Dissert. on Orn. Gard.*, p. 90.), and it may be worth while to submit some hints on their construction for such amateurs in this country as may be curious in the cultivation of *Mûci*, *Jungermännie*, and other cryptogamous vegetables which grow in the lowest temperatures; and for botanists in warm climates, who may wish to cultivate not only mosses, but the more perfect plants of elevated regions or northern climates; as, for example, of the British or Swedish alps in Spain, or in the south of Italy. The simplest form of a cold-house may be a vault of rustic masonry open at one end, along the floor of which a rill of water may pass, and from every part of the ceiling water may drop on the floor or bed, and descend to the rill in the centre. This is an obvious imitation of the dripping caves sometimes found in tracts of country abounding with calcareous rocks, of which, as an example, we may cite the dripping rock at Knaresborough, and the dripping cave near Rousseau's walk at Lyons; in which last, on the 19th day of June, 1819, we found the thermometer at 48°, whilst in the open air, under the shade of an adjoining mulberry tree, it stood at 75°. Various mosses and *Jungermännie* were in luxuriant vegetation in the interior of the cave; and some sorts of ferns near its mouth. Another imitation of such caves might consist of an open grove of elms or oaks, among the lower branches of which lead pipes pierced with small holes, in Loddiges's manner (5656), might be fixed horizontally at regular distances, and these being fed, during the warmer months, with water from a proper reservoir, would supply a continual shower, which, with the assistance of the small rills furnished by the collected rain thus produced, would lower the temperature of the atmosphere sufficiently for the growth of such mosses and ferns as do not require much light; and the margin of the grove might be devoted to plants of a more perfect kind, requiring a low temperature and moist atmosphere. But a more perfect plan would be to form a house like a large pit, with a double glass roof, fronting the north. Over the outer roof should be a system of pierced pipes to keep it cool by a continual shower during sunset, and at the top of the back wall an arrangement whereby two or more separate and concentric coverings of canvass could be let down to exclude the sun during the day. Instead of flues of masonry, large tubes of lead or cast-iron should surround the house, to be kept cool by a continual stream of water passing through them. The pit might contain a large metallic cistern, filled with ice, to be renewed when thawed, &c. It would be advancing too far into the regions of speculation to particularise other minor details that would be requisite to render such a house complete; let it suffice to say, that such houses might be erected, either in Britain or the south of Europe, so as to produce a temperature of 32° throughout the year. This would admit the cultivation, in pots and in pieces of rock, of lichens, mosses, and of all the more perfect plants which grow in the regions of perpetual snow.

CHAP. VI.

General Culture and Management of the Flower-Garden and Shrubbery.

5632. *The cultivation of the flower-garden* is simple compared with that of the kitchen-garden, both from its limited extent and the general sameness of its products; but to manage it to perfection requires a degree of nicety and constant attention beyond any other open-air department of gardening. As the stalks of flowering plants shoot up, they generally require thinning, and props for support; and the blossom, both of plants and shrubs, no sooner expands than it begins to wither, and must be cut off, unless, as in some of the ornamental shrubs, they are left for the sake of the beauty of their fruit. Weeding, watering, stirring the soil, cutting off stems which have done flowering, attending to grass and gravel, must go hand in hand with these operations.

5633. With respect to the *general culture and manuring of the soil*, it should be subjected, as far as practicable, to the same process of trenching to different depths as that of the kitchen-garden. In the shrubbery this cannot be done, but it, and also the earth compartments of the flower-garden, should be turned over a spit in depth, and some vegetable mould, or very rotten cow-dung, added occasionally.

Every two or three years the plants in the flower-garden should be taken up and reduced in size, and the beds or borders trenched, say one time at two spits deep, another at three, and so on, adding enriching compost or manure completely rotted, according to circumstances. If, instead of trenching, the old earth were entirely removed, and replaced by good loam from a dry upland parterre, the improvement would be still greater. Most herbaceous plants flower well in such loam, and for the more cultivated sorts, as border pinks, auriculas, &c. that require a rich soil, a portion of enriching matter could be added to each plant as planted, and a corresponding attention paid to such as required peat-earth, sand, clay, or lime. In the shrubbery, a similar renewal of soil, and attention to the soils required by particular shrub-plants, is necessary, at least in front, where the more delicate shrubs and herbaceous plants are chiefly arranged.

5634. With respect to the *times of planting, or sowing, and manner of cropping* the flower-garden and shrubbery, the greater part of the surface being covered with shrubs or plants of perennial duration, very little cropping is required, and, as a substitute for a rotation, recourse must be had to the renewal of the soil, as recommended above. Annuals are sown at various periods from February to June, and the more hardy sorts in autumn; but for the primroses, generally in March; the half-hardy sorts are raised in hotbeds in the reserve department, and transplanted when they are to flower in April and May, and later sowings and transplantings are made, to procure a protracted display. Biennials and perennials of the fibrous or ramose rooted kinds are transplanted from the reserve department in September or in March; and such bulbous roots as are annually taken up, are generally replanted in November or February. When bulbs and other florists' flowers are cultivated in beds, a rotation may be adopted as far as respects them: thus, the hyacinth, tulip, &c., may be succeeded by annuals, and those by the *Dianthus* tribe, or *georginas*, &c.; but in borders and compartments planted in the mingled manner, as well as in shrubberies, a rotation is out of the question. Particular care is requisite to remove weak, ill-conditioned, or ill-flowering plants, and to replace them by others of the same height and colour. This may be done at all seasons of the year by the use of the transplant; but the better mode is to have always an ample stock in the reserve garden, of all the colours and heights, both of herbaceous plants and low shrubs of all the sorts (unnecessary), in pots, and whenever, when any plant is in flower, a defect appears, it can be remedied at once by turning the plant out of the pot into its situation in the border. Independently of disease or accident, fine showy species, answering in general colour and height, may thus at pleasure be substituted for such as are less showy, or less to the taste of the master.

5635. Ornamental plants, whether shrubby or herbaceous, require to be *pruned, trained, thinned, and dressed*, according to the sort of beauty or effect expected from them. If they are grown chiefly on account of their blossoms, then they must be pruned on the same general principles as fruit trees; but little more than thinning out weak and crowded shoots will be required where they are grown chiefly on account of the beauty of their foliage; and still less where the tree or bush is planted for the sake of its natural shape. It is customary in some places to apply the hedge-shears to shrubs; but this is a barbarous practice, destructive of all these beauties, which ought to be exploded, unless in cases where, in imitation of the ancient style, trees are to be trained in artificial shapes. Herbaceous plants require little pruning; but nevertheless something in this way may be occasionally required on the same general principles applied to trees. Where very large flowers are wanted, it is obviously advantageous to prevent the plant from expending its vigour in too great a number of them, or in mere shoots and leaves. Top-heavy plants, as some thistles, *solidagos*, &c., may require to be lightened, and almost all are benefited by thinning out a part of their shoots. In some annuals, thinning is effected both by eradication and pruning, and in the more delicate sorts by pinching off the young shoot, when an inch or two high. Creepers, climbers, and shrubs planted against walls or trellises, either on account of their rarity, delicacy, or to conceal the object against which they are placed, require different degrees of training; those which attach themselves naturally, as the ivy, merely require to be occasionally guided, so as to induce a regular distribution of their shoots; the others must be treated like fruit trees, training thinly, if blossoms are the object; and rather thicker, if a mass of foliage be what is chiefly wanted. Hedges and edgings require to be cut and otherwise kept in order by the obvious means. "Edgings of all sorts," Marshall observes, "should be kept in good order, as having a singularly neat effect in the appearance of a garden. The dead edgings will sometimes, and the live edgings often, want putting to rights; either cutting, clipping, or making up complete. Where there are no edgings, or but weak ones, let the earth bordering on the walks be kept firm, and now and then worked up by line in moist weather, beating it smooth with a spade." (*Introd.*, p. 57.)

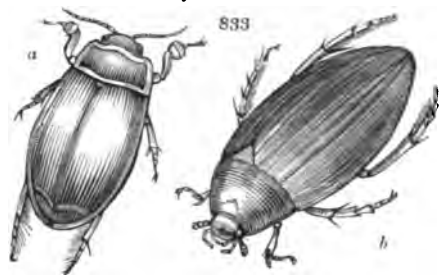
5636. *Grass-plots require to be regularly mown* at least once a fortnight, and where extraneous plants, of broad-leaved kinds, make their appearance, as plantago, crowfoots, &c., they must be carefully removed. Worms should be gathered by hand before sunrise, or their casts swept off with the wire besom (2134.), and then the ground watered with lime-water. Rolling and watering must be applied according to circumstances, and nothing neglected to insure that deep green colour and velvet texture which is, or ought to be, the characteristic of the British lawn, and which is indeed the pride of our lawns. 5637. *Walks*, whether between grass edgings, or edgings of box or other plants, ought at all times to be kept nearly brimful of gravel, and that gravel ought to be rolled till it becomes almost as hard and as smooth as a pavement of flag stones. For this purpose the roller ought either to be of solid cast iron, or loaded to a degree requisite to produce the desired effect. In general loading the roller is the better mode, because, when the gravel is rough, the light roller is more easily drawn over it, and is less likely to produce inequalities by dragging along the gravel, than the heavy roller. At the present time there is scarcely any point which so much requires reformation as the rolling of gravel walks, unless it be attending to their edgings.

5638. *Edgings to walks* are either of turf, box, or other plants, or they are architectural. In the latter case, they ought always to be distinctly marked, and to exhibit a decided line. In the former case, they ought to exhibit a decided line also; but that line ought to be delicate, so as never to give the idea of the walk being sunk in the ground. Neither ought this line to indicate the marks of the shears nor of the spade, because this is to direct attention to the means, instead of to the end. There is, as we have observed in the preceding paragraph, no part of modern ornamental gardening in which gardeners generally are so defective as in this. We recommend them to consider what we have said on the subject in the eighth and ninth volumes of the *Gardener's Magazine*.

5639. *Various tender sorts of plants and shrubs require protection* by one or other of the different utensils, structures, or contrivances destined for that purpose. Alpine plants require protection from cold, by covering with snow, or by hand-glasses, or frames, during winter; and from heat, by screens to produce shade during summer. The roots of many sorts require to be protected from frost, by ashes, rotten tan, or litter; and the tops of others, both shrubs and plants, to be guarded by fronds of fern, fir-branches, mats, or portable glass cases, from rain, hail, and cutting winds. Great care must be taken to protect pots of plants from frost; by always keeping them plunged in earth or some non-conductor; for no state in which a plant can be placed is so obnoxious to the baneful influence of congelation as that of being grown in a pot. Climbing plants require to be supported by poles or rods, as some sorts of honeysuckle, *hignonia*, *aristolochia*, &c.; by props, as pyramidal bell-flower, *Lobelia fulgens*, &c.; or by branches or spray, as the nasturtium and pea tribe. Much of the beauty of the flower-garden depends on the manner in which these operations are performed. The prevalent error consists in overdoing the thing, in employing too stout and too long rods or props, and too many thick tufty branches, instead of such as are free-grown and open. Watering must be liberally applied to almost every part of the flower-garden during fresh appearance to the soil as well as the plants, disperses their odours in the surrounding atmosphere, and tends to subdue various kinds of insects.

5640. *Water*, whether as an ornamental feature, or as an aquarium, should be kept clear both of weeds

and insects. Of aquatic weeds, the most troublesome in small aquariums are the *Conferve* and *Bysal*, which can only be removed by hand, or by entangling them with a rake or broom. The aquarium or pond may be rendered additionally ornamental by the introduction of many native aquatic insects, whose beautiful colours and airy evolutions would increase the interest of the scene. Among these may be



mentioned the different species of dragonfly (*Libellula* L.), as not only beautiful in form and colour, but very serviceable (both in their larvæ and perfect state), in keeping gnats and other small insects within due limits. As larvæ, the dragonflies live entirely in the water; and after they acquire wings, they perpetually hover and skim over the surface, on sunny days, in pursuit of flying insects. In garden ponds, where fish are preserved, care should be taken to exclude the large water-beetles, such as *Dytiscus marginalis* (Fig. 833. a), *Hydophilus piceus* (b), &c., as they are well known to feed upon the young fry. They may be captured by a small landing-net, with a long handle and very small meshes. These are the only aquatic insects that need be feared, as injurious either to fish or plants.

5641. *Insects and vermin.* These must be kept under in every part of the flower-garden and shrubbery, and we perfectly agree with the author of the *Florist's Manual*, that "the simple and laborious mode of picking away the animal, is the only one to which recourse can be had with permanent advantage. To give full efficacy to this method of rescuing plants from caterpillars, snails, &c., our attacks must be made upon them at particular seasons, which can only be done from such a knowledge of their history, as shall enable us to destroy masses, in the destruction of an individual of the species. Without, however, much research into their natural history, we may, from common observation, understand that in the winged insect we may free our plants from an innumerable tribe of those which crawl, and which, in that reptile state, have the capacity of devouring the whole product of a garden. The two periods of change of form in the caterpillar species seem to afford the most advantageous times to put an end to their existence. Nevertheless, the number of insects injurious to the flower-garden alone are very few: if we except the all-devouring aphides or plant lice, and those small but destructive caterpillars which disfigure the leaves and destroy the early buds of our roses. The caterpillar of the silvery moth (*Nectua gamma* L.), is, perhaps, the only one that indiscriminately attacks all garden plants: it is of a delicate green colour, with white stripes down the back, and one of yellow on each side of the body; it has twelve feet, and a brown head, and is generally about an inch and a quarter long. It only appears during the middle of summer, and from its size may be easily discovered.

5642. *Snails and slugs* are much more universally destructive in the flower-garden than any other vermin. The injury they occasion to young seedlings, and to plants not yet in full vigour, is well known; and the mischief they effect is easily distinguished from that occasioned by caterpillars, from the slimy track left by their bodies upon the leaves. During the day they are seldom seen, as they shelter themselves under leaves, or clods of earth, but in the night they issue forth; and, if the weather be moist or rainy, they may be seen and captured, at night, or early in the morning. The most effectual way of destroying them is to place cabbage leaves near those plants that appear to have suffered from their attacks: on examining this bait early in the morning, the slugs will be found upon it; and, by repeating this for several days, great numbers may be captured and destroyed. Any greasy matter, or even dead snails or slugs, applied to leaves or haulm of any kind will greatly increase the avidity with which the living animals resort to these baits; for it is a fact, not perhaps very generally known, except to gardeners, that live snails and slugs greedily devour dead ones. Snails and slugs may also be entrapped by placing a common garden-pot over the infected plant, to which the slugs will frequently adhere.

5643. *The cutting off flower-stalks, decaying flowers, leaves, &c.,* is to be done in most cases immediately after the flowers are faded; but there are exceptions, where the leaves on the lower part of the stem may be requisite to strengthen the root, and where, as in the case of Stipes, some convallarias, cingios, &c., the parts of the flower are persisting, or the fruit or seed-pods are objects of beauty. The leaves of bulbous-rooted plants, and such others as are not prolific in foliage, should be carefully preserved till they have begun to decay; and, indeed, the base or root-leaves of no plant whatever should be cut off till this is the case, unless for some particular object. Every single flower, as soon as the petals begin to droop, should be pinched off, and especially every flower of the double kind. Every rose, when it begins to droop, should be clipped off near to the footstalk of the one which is about to succeed it; and when the last of the corymb has done flowering, then the common footstalk should be cut off back to the first strong leaf-bud: nothing is more unsightly in a flower-garden than rose-bushes where this has not been attended to. By employing women or apprentices to go over the whole pleasure-ground every morning during the four summer months, to attend to this business, it may be completely accomplished at very little expense. These and other points of management, we know, are considered needless niceties by many gardeners: but what is a flower-garden unless it is kept with the utmost nicety? Others will tell you, they have not time for such things; but, where there is a real taste for neatness, time will be found.

5644. *Gathering flowers.* Gather, if possible, only from the reserve garden; for, if the main borders and compartments are managed as they ought to be, much gathering will disfigure the plants. Always use the knife, and prefer such as are coming into flower, rather than such as are fully expanded. If possible, gather from crowded plants, or parts of plants, so that every gathering may operate at the same time as a judicious pruning and thinning.

5645. *The French rose-gatherer* presents a refinement in floricultural instruments highly characteristic of its origin. The general form of this little engine is that of a pistol: it has a handle and trigger like it, and a cutter in the manner of the wire pliers, or flower-gatherer, disguised as a barrel. A rod, answering to the ramrod, connects the pliers with the trigger, which last, being pressed, opens the pliers, that is, charges the pistol; the operator then presents the pistol to the rose to be gathered, and so that, when the cutter operates, it may separate it at the precise point of the stalk deemed proper: things being thus adjusted, the trigger is drawn, and the deed is done. Of course, this instrument, like a number of other horticultural toys manufactured by the Parisians, is chiefly *pour les dames*.

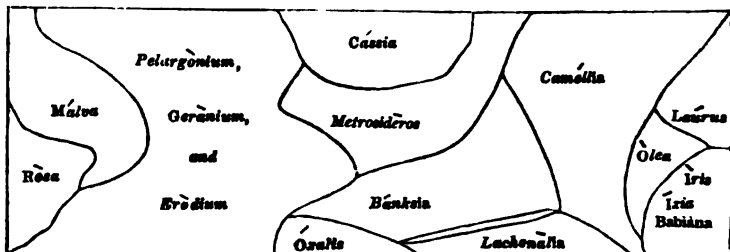
5646. *Flowers may be preserved, when gathered,* by inserting their ends in water, moist earth, or moss, and may be freshened, when withered, by sprinkling with water, and putting them in a close vessel, as under a bell-glass, hand-glass, flower-pot, or in a botanic box: if this will not do, sprinkle them with warm water, or with spirits of wine, or ether; and if this fails, insert their ends in water heated to 80° or 90°, and cover them with a glass.

5647. *Flowers may be sent to any distance* in a cylinder of tin, or other metal, about nine or ten inches in diameter, with a tube in the centre, to which they are tied as to a maypole. The tube uncorks, so as to be taken out and charged with flowers; and it is hollow, in order that it may be filled with water, for the purpose of preserving the flowers fresh. This ingenious utensil is the invention of Mr. Cooper, gardener to the Duke of Wellington, at Strathfieldsaye. (See *Gard. Mag.*, vol. ix. p. 678.)

5648. *Grafting, budding, laying, &c.* Operations of this sort require to be performed in the flower-

back (Fig. 537. *Pelargonium*, *Geranium*, and *Erodium*), and at other times, a sub-orbicular group in the front (*Oxalis*), middle (*Olea*), or back parts (*Cassia*). This is a very simple rule, easily recollected and

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5656. The following directions respecting the particular plant habitations of floriculture, are chiefly taken from Sweet's *Botanical Cultivator*, and Cushing's *Exotic Gardener*.

5659. *Frame*. Very little management is requisite for this department, as the plants kept in cold frames are so hardy, that for seven or nine months of the year the sashes do not require to be put on. All that is requisite is to expose the plants to the air the whole of every day during winter when the weather is open, by drawing off the lights; to attend to watering them moderately, during winter in mild weather in the morning after sunrise, and in summer in the evening. Twice a year, in spring and in autumn, each plant should be examined, and such changes made in the soil, size of the pot, head of the plant, roots, &c. as the experience of the gardener, the appearance of the plant, or the object desired by cultivating it may dictate. At the same time, this is not to be considered as a substitute for daily looking over these plants, and performing whatever operations may be necessary for their welfare. The routine culture of weeding, staking, picking off decayed flowers, leaves, &c., need not be insisted on; and the culture of particular species or even tribes cannot here be entered into.

5660. *Green-house*. The plants of this department, Sweet observes, only require protection from frost in winter. The more air they have given them when not frosty, the more healthy they will be. On a fine morning, the sooner air is admitted the better; but it is best to shut up pretty early in the afternoon, particularly if it appears likely to be a cold night. No fire is required, except frost is expected in the night, or the house should be damp with continued wet weather; then a little fire is requisite to dry the house, as plants are more liable to be injured by damp than by cold. The plants should be looked over most days to see if any require water, which must only be given when quite dry, in the winter season: from nine to twelve o'clock in the morning is the best time for watering them; for, if watered in the afternoon, they are apt to be chilled at night, which makes their leaves look yellow and unhealthy. When the surface of the mould is green with moss, &c., the top should be taken off, and the surface moved with a flat stick, but not deep enough to disturb the roots; if a little fresh mould is wanting on any of them, it should be added. Always be careful to put the same kind of soil they are already grown in; for a different kind put on injures plants more than some cultivators are aware of.

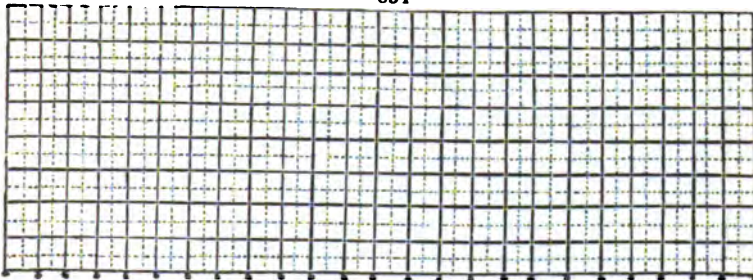
5661. *When the weather begins to get warm in spring*, some air should be left all night, to harden the plants before they are set out; a little must be left at first, and continue to increase it every night till they have full air, if the weather will allow of it. The time of setting them out in the open air depends entirely on the weather. Sometimes they may be put out with safety by the middle of May, in other seasons not till the latter end; but they had better stay in a little too long than be put out too soon. A calm cloudy weather is the best time for setting them out, when as sheltered a situation as possible should be chosen for them. The best time for shifting them in fresh pots is early in spring; some shift them before they are set out, and let them make fresh roots while in the green-house, which is a very good plan, particularly for young or tender plants. If any plants are too tall, and want cutting back, it should be done early in spring, as soon as they begin to grow, then they have time to recover themselves, and make good bushy plants by autumn.

5662. *Cuttings* require to be put in at various seasons, and in different situations. From Christmas to May may be considered the best time for cuttings in general; but some will require to be put in at various seasons throughout the year, according to the state of the shoots. The best time for watering green-house plants in summer is as late as possible in the afternoon, then they have all the night to refresh them. If watered in the morning of a warm day, they will dry again almost immediately. Plants should not remain out too long in autumn, as they are liable to get too much wet, and the worms get in the pots. The middle of September should be the latest, but give them full air as long as the weather will permit. (*Bot. Cultivator*, p. 131.)

5663. *Stove*. The management of stove plants, according to the same author, whose experience and success are exceeded by none in the cultivation of exotics, depends a great deal on the kind of house in which they are grown; but there is little difficulty in growing them well, if the house can be kept up to a proper heat, and a sufficient quantity of air can be given when required. Close glazing is to be preferred; either the lights should be leaded, or the laps stopped with putty, so that a sufficient quantity of air may be always given, and the house kept to a more regular heat. When the laps of the glass are left open, a great deal of air is admitted, which is often injurious, particularly on a cold windy night. The thermometer should never be allowed to be below 60° of Fahrenheit's scale; if it gets above 70° on a fine day, a little air may be given, which should be taken away early, and the house shut up warm; it then requires less fire to keep up the heat through the night. If the house is heated in the common way by fires, and the plants are plunged in tan, care must be taken not to give these too much bottom heat, as it will injure their roots, or too much water in winter, as it is apt to rot them. Particular caution is necessary for watering in winter, not to wet the tan, as it makes the worms very troublesome; they often destroy young plants by throwing the mould out of the pots; but a better way is the one now very generally adopted, viz., to do without plunging in tan. Some hot dung or tan may be still kept in the pit to throw up a little warmth, on which should be put a good thickness of sand or gravel for the pots to stand on, and the plants will thrive much better than when plunged in tan: it is also coming nearer to nature, which should be always studied in the cultivation of plants, both in soil and situation. In tropical countries it is the sun that heats the earth in which the plants grow, not the earth that heats the air; and the heat must be kept up in the stoves accordingly. If the houses are heated by steam, no tan is required. The plants may be

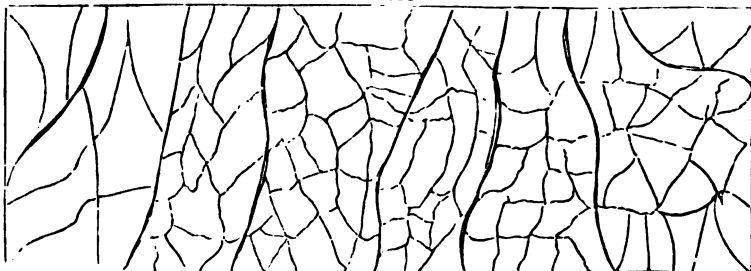
shorn or mown, for that both deprives the sides of the plants of a considerable portion of light and air, and the eye of variety of form, and light and shade; it will have a much better effect if somewhat irregular, and if here and there a distinguished individual appear above the rest as a standard.

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5656. In arranging by method, or botanically, either the Linnæan or Jusselean classification may be adopted; the latter is unquestionably preferable, as exhibiting a more perfect relationship; and it may be considered as represented by the same lines as those delineating the mode of grouping by colours. (Ag. 835.) Where the Linnæan method is adopted, the classes may either be grouped in irregular roundish

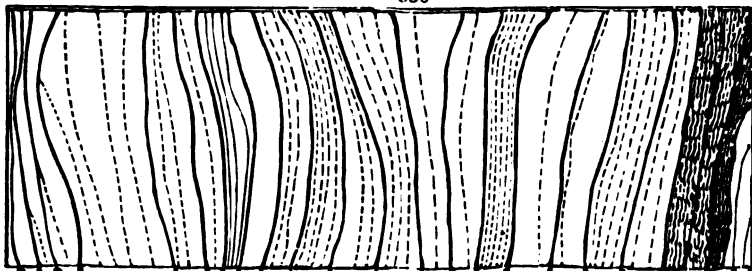
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Thalamifl. sect. 1. | Thalam. sect. 2. | Thalamifl. sect. 3. | Calycifl. | Corollifl. | Monoch. & Phanero.

masses, or, as the tallest trees and lowest herbs are often placed in the same class, it will answer better to dispose each class and its orders in irregular strips (Ag. 836.) Monándria, Diándria, Triándria, Tetrándria, Pentándria, &c.), from the lowest to the highest part of the stage, by which the dwarf plants of each class may be placed in front, and the taller farthest back.

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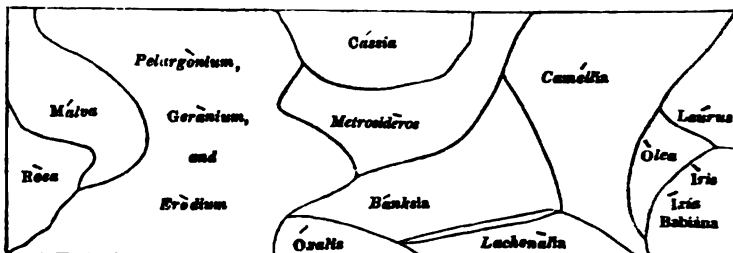


M. D. T. Tet. Pentándria. Hex. H. O. En. D. Dod. Icos. Poly. Didi. Tet. Mo. Dia. Polyd. Sn. Gy. Mo. Di. Po. Cry.

5657. The botanic arrangements, it has been already observed, are only adapted for extensive collections and capacious hot-houses; on a smaller scale the mingled method, or that by grouping, will be most advantageously adopted. In the case of green-houses attached to living-rooms, and where there are reserve-houses to keep up a supply, only such plants as are in bloom should be introduced, and there the method by grouping the colours may be adopted with great effect. But whatever be the size of the house, or even the extent of a bed, or shelf, or any part of them, never let the plants be placed there in the present indiscriminate mode. In this, no regard is paid to any thing but height: or if any farther object is taken into consideration, it is to mix the kinds as much as possible, with a view, as is alleged, to produce variety. But the effect of this mixture, whether on a large or small scale, instead of variety, is sameness or monotony, which lessens interest, and finally produces indifference in the spectator. It is true, there is as great a degree of sameness in the mingled mode; but then it is the sameness of a formal and avowed regularity; whereas, the sameness resulting from the common mode of mixture, is the sameness of affectation,—a sameness resulting from an abortive attempt at something not attained. The one mode may be compared to the geometrical manner of laying out grounds, and the other to the mode by clumps and belts: both are alike artificial; but the former is avowedly so, and therefore has attained its end, while the latter affects to be an imitation of nature, and therefore disappoints. A safe rule for every gardener to adopt, whether in setting pots of plants on a shelf or a stage, however small either may be, and however limited the collection, is, to keep each genus together, placing the tallest plants farthest from the eye. Sometimes this will form a thin, straggling group from the front of the shelf or stage to the

back (*Ag. 827*. *Pelargonium*, *Geranium*, and *Erdium*), and at other times, a sub-orbicular group in the front (*O'alls*), middle (*O'les*), or back parts (*Cassia*). This is a very simple rule, easily recollected and

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set on stages, or any way that is most convenient. Some of them may be planted out in the house, where they will grow in greater perfection, and flower and ripen fruit better than when confined in pots.

5664. *To have plants look well*, they should be always kept clean and free from insects: if infested with any species of aphid, the house should be smoked with tobacco, which instantly destroys them. The red spiders are likewise a great pest to cultivators, but are also easily destroyed. One pound of sulphur vivum, mixed up in a pail of quicklime, and the flues brushed all over with it as a common whitewash, will destroy any quantity of them, and make the house look light and clean. The mealy bug is also troublesome if left to increase on the plants; but as soon as they appear, they should be brushed off as well as the scaly insects; for, if left to increase, they will disfigure the plants, and be very difficult to get rid of. In fine weather, the plants should be often sprinkled over with water from an engine, and the house shut up warm afterwards, which is a great means of keeping them clean and making them grow luxuriantly. Air should be given in the morning as early as possible, in fine weather, as it sweetens the house, and makes the plants healthy. It should also be taken away early in the afternoon, and the house shut up warm, that they may not be chilled by the night air.

5665. *In potting plants*, care should be taken to drain the pots well with broken potsherds or rough bits of turf; for nothing injures them more than letting them get sodden with too much wet. The best time to shift them in fresh pots is the spring, but some will require to be shifted again in autumn, to have them thrive well. The free-growing kinds cannot be well overpotted, if there be plenty of room for them in the houses: they will thrive and flower better for being in large pots. Others that are more tender should be kept in as small pots as possible, that they may not get sodden, and lose their roots. (*Bot. Cultivator*, p. 1.)

5666. *The reserve hot-houses of the ornamental garden* may be divided into those for forcing hardy flowering plants and shrubs, and those for propagating exotics by seeds, cuttings, or otherwise.

5667. *Herbaceous plants and flowering shrubs* are generally forced in pits or low houses; and, as soon as the flower-buds begin to expand, removed to the green-house or drawing-room, there to prolong the flowering season. The shrubs should be previously established in the pots, by being planted and plunged in the open reserve-garden a year beforehand: the autumn before forcing, they should be thrown early into a state of rest, by covering them with canvass frames, to exclude rain and sun, but so as to admit cold and air. This operation should be commenced in July; and the first course of pots may be removed to the pit in November or earlier. Herbaceous plants of most sorts, especially of the fibrous-rooted kinds, may be taken up with balls, and planted in pots early in the autumn preceding the winter in which they are to be forced. Fusiform-rooted sorts earlier, as they do not rise so easily with balls; and the bulbous sorts, the bulbs being out of ground, may be planted in the end of autumn, plunged in the open ground, and covered with rotten tan or ashes, and taken up as wanted. It is of some consequence to remark, that the flowers should be pinched off both the shrubs and herbaceous plants, the summer preceding the forcing season, in order to communicate additional strength, and aid in throwing them more early into a state of rest. The bottom heat may either be from tan or dung, or a vault heated by flues or steam; but the former we consider as most to be depended on. The temperature of the air of the house may at first setting in the plants be kept at 50° or 55°; and in a fortnight, raised 10° higher. After that, it may be kept up to 65° or higher, admitting air during sunshine. The temperature of the pit should be kept as high as that of the air. Successional supplies should be kept for the first fortnight in a cooler house, or in the coolest part of the pit; or the temperature, at their admission, may be somewhat lowered. The other points of routine culture need not be entered into.

5668. *The propagation house* requires to be kept at a much more moderate temperature, both as to the atmosphere and the bottom heat, than the forcing-pit or the principal stove. It need seldom exceed 80° in winter, and 65° in summer. Abundance of air must be given at certain seasons when damp and mouldiness begin to appear; and shading and watering, so as to produce a moist atmosphere, must be attended to in the summer season.

CHAP. VIII.

Floricultural Catalogue. — Herbaceous Plants.

5669. *A floricultural catalogue*, as copious as that which we have given of culinary plants and fruits, would greatly exceed our limits. Plants grown for ornament are so numerous, that we cannot particularise separately the culture of each individual species; but, with the exception of some of the more choice sorts, as the florists' flowers, &c., must collect them in groups, and detail a mode of culture applicable to the whole group. We shall first commence with herbaceous flowers, and these we shall arrange as florists' or select flowers, border flowers, and herbaceous plants for particular purposes.

SECT. I. *Florists' or Select Flowers.*

5670. *Florists' flowers* are so called as being "flowers" by way of eminence, and because the principal sorts of them for a long time almost exclusively engaged the attention of the flower-gardener. The Dutch, in this, as in most other departments of gardening, were the first to bring it into notice, and more particularly by the great excellence to which they attained in the culture of florists' bulbs. In the culture of that tribe, they still excel; but the fibrous-rooted flowers, as the carnation, auricula, &c., and the tuberous-rooted kinds, as the georgina, pæony, &c., are brought to a higher degree of perfection in Britain than any where else. Ornamental flowers, like culinary vegetables which have been long and highly cultivated, acquire a magnitude, succulence, and conformation of parts which render them widely different from what they are in their natural state. This takes place both in double flowers, that is, when the petals of the corolla are increased in number, or by the transformation of other parts of the flower into petals; and also in single flowers, or those in which the petals do not exceed the common number. A flower so changed by cultivation can no more be compared to the blossom of the same species in its wild state, than a headed cabbage or a broccoli can be compared to the wild cabbage of our sea-shores. Hence have been formed, by the

common consent of florists, what are called canons of criticism, by which to estimate the properties of new varieties of established sorts of florists' flowers. To the hyacinth, tulip, auricula, and a few other sorts, particular canons are adapted; but the merits of a number of other select flowers, double and single, are only to be judged of by general rules, such as fulness of floral leaves, roundness of outline, brilliancy and distinctness of colour, &c. Under each species we shall give the established criterion, or canon, as far as generally agreed on. We shall take the plants of this section in the order of bulbous, tuberous, ramose, and fibrous-rooted flowers.

SUBSECT. 1. Hyacinth. — *Hyacinthus orientalis* L. (*Bot. Mag.* 937.); *Hexandria Monogynia* L. and *Aphodizeæ* B. P. *Jacinte*, Fr.; *Hyacinthe*, Ger.; *Jacint*, Dutch; *Giacinto*, Ital.; and *Jacinto*, Span. (*fig.* 838.)

5671. *The hyacinth* is a native of the Levant, and abundant about Aleppo and Bagdad, where it flowers in February; here it flowers in March and April. The bulb is tunicated, the leaves broad and green, from the centre of which arises a scape with a spike of flowers, pointing in all directions, by which it is known at first sight from *Hyacinthus non scriptus* L., *Scilla non scripta* W., in which the flowers turn all to one side, and the scape is drooping. It was cultivated by Gerard in 1596; but had, doubtless, long before been improved by the Dutch, who have added greatly to the strength and beauty of the plant, and produced almost innumerable varieties. The hyacinth, whether considered as a florist's flower, and planted in beds (see *fig.* 839.) as hereafter directed, or as a border flower in patches, or in rows, is one of the very finest which exist. It is not only most brilliant, beautiful, and varied, in point of colour, but it is almost as fragrant as the carnation. With all these excellent qualities, it is of the easiest culture; at least when good bulbs are procured, and the object is to obtain a bloom for only one year.



5672. *Varieties.* Gerard mentions the single and double blue, the purple, and the white. Parkinson, in 1629, enumerates eight sorts. Miller says, the Haarlem gardeners distinguish near 2000 sorts, and generally publish catalogues of them from year to year. At present, the taste for this flower being considerably abated, the Dutch and English catalogues contain only a few hundred names. These names are quite arbitrary, being given by the grower after himself or some public character; and therefore they are here omitted. They are arranged as double blues, whites, reds, and yellows, and single sorts of the same colours; the blues and reds are the most numerous; the yellow, those of which there is least variety. Only single hyacinths were at first cultivated; but about the beginning of the last century attention was paid to double flowers by Peter Voerhelin, whose first double flower was named *Mary*, and is now lost; but his third flower, *the King of Great Britain*, which is now looked upon as the oldest double hyacinth, was greatly preferred to all the flowers known, and the price of it was then above 1000 florins, or 100*l.* sterling. Up to the middle of last century, the greatest attention was paid at Haarlem to raising new sorts of double flowers; and as much as 200*l.* has been known to be given for a root; but, since that period, the taste for this and other bulbous flowers has considerably declined, and at present there are few sorts for which more than 10*l.* are asked; the general price being from one to ten shillings a bulb for the finer sorts, and what are called the common mixtures are sold at from 2*l.* to 3*l.* a hundred. A variety degenerates, under bad treatment, in two or three years; but in Holland some have been preserved nearly a century.

5673. *Criterion of a fine double hyacinth* (*fig.* 838. a): "The stem should be strong, tall, and erect, supporting numerous large bells, each suspended by a short and strong peduncle, or foot-stalk, in a horizontal position, so that the whole may have a compact pyramidal form, with the crown or uppermost flower perfectly erect. The flowers should be large, and perfectly double, i. e. well filled with broad bold petals, appearing to the eye rather convex than flat or hollow; they should occupy about one half the length of the stem. The colours should be clear and bright, whether plain, red, white, or blue, or variously intermixed and diversified in the eye; the latter, it must be confessed, gives additional lustre and elegance to this beautiful flower. Strong bright colours are, in general, preferred to such as are pale."

5674. *Propagation.* By seed for new varieties; and by offsets for continuing approved sorts.

5675. *By seed.* The seed should be sown from such sorts as have strong and straight stems, and a regular well-formed pyramid of bells, not perfectly single, but rather semidouble. It should not be sown in beds, but in boxes perfectly filled with *s. p.* Sow in the latter end of October, or beginning of March,

about half an inch below the surface of the soil, in a deep box, filled with good second garden mould mixed with sand. It will never require to be watered, and the boxes should be paid to it then to keep it free from weeds and frost, till it has remained in the ground two years; it must then, on the approach of winter, have an additional stratum of the compost placed upon it, about half an inch thick; and as the third year in the month of July, the roots may be taken up, dried, and treated in the same manner as large bulbs or offsets: some of the roots will flower the fourth year, one half of them will of the fifth, but by the sixth year every healthy root will exhibit its bloom, and then the hopes and expectations of the cultivator will be realized or disappointed. He may think himself fortunate, if one half of the plants that first appeared, are in existence at this period; and if he can at last find one flower in five hundred deserving a name or place in a curious collection, he may rest perfectly content, and be assured that he has fared as well as could reasonably be expected, and better than many who have bestowed equal attention to the subject. (*Madduck.*)

5676. *By offsets.* These may be planted in the beginning of October, or soon after they have been separated from the parent bulbs. Plant them in an open part of the garden, in rows about two inches deep, upon a bed raised six or eight inches above the common level, consisting of a sandy soil, pulverised, eighteen inches deep; the surface of the bed should be made rather convex or rounding, so as to throw off heavy rains; no farther attention is necessary, except to stir the surface of the bed occasionally, keep it free from weeds, and preserve it from very severe frost. The proper time to take them up is the summer for large roots. Offsets, if preserved in health, will bloom weakly the second year; but by the third tolerably strong, and may afterwards be placed on the best bed.

5677. *Choice of full-grown roots.* "Such roots as have attained the age of four or five years, bloom stronger in this country than any other; afterwards they generally decline, either by dividing into offsets, or diminishing in size and strength; but in Holland, owing to the nature of the soil, climate, situation, &c., the same bulb has been known to produce blossoms twelve or thirteen times, nor is it ever known to die merely with age."

5678. *Soil and site.* The bed on which they are to be planted should be situated on rather a dry and airy part of the garden; a southern aspect is to be preferred, sheltered on the north and east. When the situation is determined on, the dimensions of the bed should be marked out, and the soil entirely taken away to the depth of at least two feet; the earth in the bottom must then be dug up and pulverised, one spit or nine inches deeper, if land, and the space above filled up with a compost consisting of one-third coarse sea or river sand; one third fresh sound earth; one fourth rotten cow-dung, at least two years old; and earth of decayed leaves for the remainder. These ingredients are to be well mixed and incorporated, and about a fortnight previous to planting the bed should be filled up with the compost to about four inches above the level of the path on the south or front side, and ten inches on the north side, so as to form a regular slope or inclination towards the sun. The compost used at Haarlem is said to be rotten cow-dung, rotten leaves, and fine sand. The leaves of elm, lime, and birch are preferred to those of oak, chestnut, walnut, beech, plane, &c., which do not rot so quickly. The cow-dung is collected in winter from cattle, stall-fed upon dry food, without any mixture of straw or other litter. The leaves, when decayed and fit for use, are thus mixed with the other materials. — "First, they place a layer of sand, then one of dung, and then one of rotten leaves, each being eight or ten inches thick. These layers are repeated till the heap is six or seven feet high, a layer of dung being uppermost, sprinkled over with a little sand. The sun is kept upon the pile for six months or more, it is mixed, and thrown up afresh, in which state it remains some weeks to settle before it is carried into the flower-beds. This compost is generally in good use about six or seven years; but the Dutch avoid setting hyacinths in it two years successively; in the alternate years they plant tulips, jonquils, narcissuses, crocuses, irises, &c., in the same beds; nor do they venture to set hyacinths in the compost the first year, when the fresh manure might be injurious to them." (*Herbert, in Hort. Trans.*, vol. iv. p. 163.)

5679. *Planting.* This should take place in the middle of October to the middle of November; if it is sown earlier, the plants will appear above ground in the middle of winter; or if it is deferred later, the roots will be weakened by their natural tendency to vegetate. On planting the roots, the surface of the bed should be covered with a little fresh sandy earth, about one

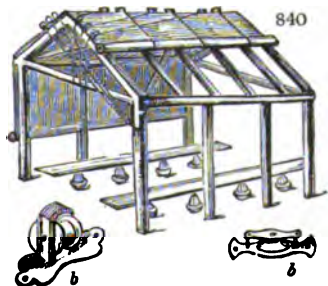
inch thick, raised perfectly smooth and even, and have the exact situation for every bulb marked upon it (fig. 839), re-

839

R	B	W	R	B	W	R	B	W	R
W	R	B	W	R	B	W	R	B	W
R	B	W	R	B	W	R	B	W	R
W	R	B	W	R	B	W	R	B	W
R	B	W	R	B	W	R	B	W	R
W	R	B	W	R	B	W	R	B	W

gularly mingling the colours of red, blue, and white; the colours being classed with the latter. The width of the surface of the bed may be four feet, and six rows may be placed across it at eight inches asunder, the two outside rows being each four inches from the sides of the bed; consequently the space between the centre of each bulb will be about nine inches and a quarter. On planting hyacinths, a little clean sand should be placed underneath, and likewise upon the roots, to prevent the earth adhering too closely to them; the whole are then to be covered with sound fresh sandy earth, from three to four inches deep, according to the size of the bulb; when this is completed, the bed will be about eight inches above the level of the walk on the south or front side, and about fourteen inches on the north; it will look neater, and have a better effect, if it is supported on each side with a strong frame of thick boards or brickwork.

6580. Culture. "In order to preserve the bed from very heavy rains or severe frosts, it should be hooped over, and mats or canvases should be placed at hand ready to cover the bed on such emergencies; but it will not be necessary to defend it from moderate rains or slight frosts: for too frequent and long covering will deprive the roots of the due action and influence of the air, which ought to be avoided as much as possible: it were even better to run the hazard of incurring a slight injury by the omission of covering on some occasions, than overall to be to the certain detriment of the plants. If frost is permitted to penetrate so far into the soil as to reach the bulbs, especially about the time that the plants begin to appear above ground, it will produce a singular effect, by causing some of them to shoot forth or discharge their stems and blossoms; but if the roots become entirely frozen through, they are in danger of being destroyed. The earlier sorts will begin to open and show colour about the beginning of April; it will be proper to screen such from the too powerful effects of the sun, which, if not prevented, would bleach and tarnish their colours, particularly the reds and deep blues; but if they are properly defended from it, their colours will be preserved, and they will, in some measure, be kept back, so as to be in full bloom with the later sorts, especially if the roots of the early sorts have been planted about an inch deeper than the rest: it is a very desirable object to have a uniform bloom. It will be necessary to support the stems as they advance in height; for this purpose, small sticks or wires, painted green, should be forced into the ground, immediately behind the bulbs, either in an erect position or leaning a little backwards, to which the stems are to be rather loosely tied with small pieces of green worsted, as soon as they begin to bend, or are in danger of breaking with the weight of the corolla or bells: this operation must be repeated as they advance in height, for it is impossible to do it at one time so as to answer the purpose. When the greater part of the bed appears in colour, a covering or awning should be erected over it and the path in front; the awning should consist of a strong frame of wood, ten feet high in the centre, and seven feet at the sides, covered with Irish or Scotch sheetings, or flanne duck, which will effectually keep out rain, and admit a great degree of light; it should come down close to the bed on the north side, in order to preserve it from cold winds, which are prejudicial to the bloom. The covering (fig. 840.) should be



so constructed, by means of lines (a) and pulleys (b), as to be easily and expeditiously rolled up, or let down, as occasion requires, to afford the plants the full benefit of light and air, as all favourable circumstances that tend to ripen, when the air is mild, and light clouds intervene, so as to blunt the sun's rays. This sometimes, and indeed, often, happens to be the case

from seven to nine o'clock in the morning, and from four to six in the evening, at which times the sun has also less power than in the middle of the day. A bed of hyacinths never requires to be watered at any period; the rains that happen after planting are generally more than sufficient both for the roots and the bloom; and after the bloom is over, they are rather prejudicial than otherwise, except when very moderate. Although covering in the manner described presents and exhibits the bloom to the greatest advantage, yet it evidently has a tendency to weaken and injure the bulbs, and ought not, therefore, to be continued more than two or three weeks at most; but as soon as the general bloom declines, the beds should be immediately exposed to the open air, and the mats and hoops should be replaced, as before, to keep off heavy rains."

5681. Taking up the bulbs. "It is the practice, in Holland, to take up the bulbs about three weeks or a month after bloom, in the following manner:—As soon as the plants begin to put on a yellowish decayed appearance, they take up the roots and cut off the stem and foliage close to, or within half an inch of, the bulb, but leave the fibres, &c., attached to it; they then place the bulbs again on the same bed sideways, with their points towards the north, and cover them about half an inch deep, with dry earth or sand, in the form of a ridge, and leave them, over each; in this state they remain about three weeks longer, and dry or ripen gradually; during which, as much air is admitted as possible, but the bed is preserved from heavy rains, and too hot a sun; at the expiration of the season, the bulbs are taken up, and their fibres, which are become nearly dry, gently rubbed off; they are then placed in a dry room for a few days, and are afterwards cleaned from any soil that adheres to them, their loose skins taken off, if necessary, and the bulbs may be easily separated. When this dressing is finished, the bulbs are wrapped up in separate pieces of paper, or buried in dry straw, where they remain till the return of the season for planting. Another, and less troublesome mode of treatment after bloom, though perhaps more hazardous, is to keep the bed airy, and rather dry, till the stems and foliage appear nearly dried up or consumed; this will seldom happen in the case in less than two months; the bulbs are then to be taken up, cleaned from the fibres, soil, &c., and preserved in sand or paper, as before directed."

5682. Herbert says, "The bulbs should be placed in an airy store-room, and not suffered to touch each other; a movable stage of open lattice-work, furnished with drawers, may be used with attention should be paid to the ventilation. A French florist, Baudry, is said (*Colch. Hort. Mem.*, vol. iv, p. 76.) to have lost annually a number of his hyacinth-bulbs through dampness, until he adopted the expedient of placing them in the store-room with the leaves of the plants upwards. Drawers of lattice-work would effect the same object."

5683. Diseases. "Hyacinths are subject to various diseases, arising from different causes: that distemper commonly known by the appellation of the rind, and is of all others the most dangerous and most difficult to cure; in short, the only effectual remedy is to cut out the diseased part, till no brownness, yellowness, or other symptom of distemper, remains. The sound part will survive the operation, and will continue to grow as the outside tunic of the bulb, without any hurt; but it will, in such case, only be able to produce offsets, and will never recover itself so as to flower again; as soon as the operation is performed, the wounded part should be exposed to the sun, till it becomes dry, to prevent mouldiness, and it will be best to replant it in some dry situation soon after." The Dutch doctor observes, "as much violence happens in this disease: the cause of which appears to be a fungus, the spawn of which is nurtured in the cow-dung. The only remedy is the removal of the distempered bulb, and the compost that was in contact with it."

5684. Duration of bulbs. "The hyacinth delights in a sandy soil and saline atmosphere; of consequence, it succeeds best on the sea-coast, or in situations very near to the sea. In more inland parts, it is not generally so found necessary to have a constant reinforcement of fresh imported bulbs, in order to make good or supply the deficiencies arising from the loss, or impaired health and strength of many of those that have bloomed on the best bed the preceding spring. Those who are well acquainted with the hyacinth, always allow about one bulb in twelve to fail, notwithstanding no visible blight or decay is discernible at the time of planting; such generally have a *corps de reserve*. In narrow deep pots, which, at the commencement of bloom, they plunge or sink into the bed, wherever a vacancy, or weak sickly plant makes its appearance; by which means the uniformity and regularity of the bed is preserved, without any visible defect or alteration." Herbert says, "My own experience enables me to say, that the nurseryman in the neighbourhood of London may produce hyacinth-bulbs equal, if not superior, to those imported from Holland; though he is attended with greater loss from disease, owing to his not being able to procure the dung of cattle fed upon hard food, and free from straw." (*Hort. Trans.*, vol. iv, p. 168.)

5685. Potting the hyacinth. "Plant the roots in narrow deep pots, filled with sandy loam, in October; plunge them in and cover them with old bark-leaves or sand; they will soon throw down roots, and a part may then, say in November, be planted in bottom heat, which will come into bloom by Christmas, and successional supplies can be taken from the store planted in October, and a bloom thus kept up till they flower in the open air. The best sorts to force are the single blues and reds."

5686. Blowing hyacinths in water-glasses. Blue or dark coloured glasses are more favourable to the progress of the roots than light ones, light being injurious to all sorts. The bulbs to be blown in the glasses should be planted in October, in earth, in which they push their fibres more regularly, and taken up as wanted, washed from the earth, and placed in the blowing-glass; the glasses may be kept in a warm room or stove. The water should be soft, and the glass so full, that it may rise a fourth of an inch on the bulb. As often as it becomes field, it should be renewed."

5687. Restoring bulbs blown in water to their original vigour. As soon as they have done flowering, remove them carefully from the glasses with all their leaves and roots, and plant them carefully in hyacinth soil. When the leaves are completely withered, take up the bulbs, and preserve them dry till the latter end of October, when they are to be planted in beds in the usual manner. (*See Gard. Mag.*, vol. ii. p. 411; vol. iii. p. 162; and vol. v. p. 426.)

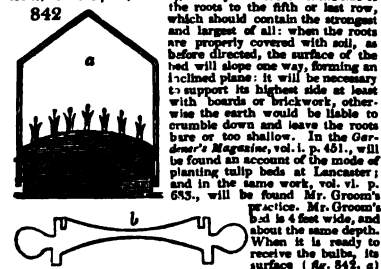
stems, with large well-formed cups, clear in the bottom, and save seed from these in preference to the finest of the variegated or broken sorts, as the seed of such sorts produces nothing but poor weak breeders of no value. "It should remain growing on the stem till the pericarpium becomes of a brownish colour, and begins to open. It is then sufficiently ripe, and should be cut off, with six or eight inches of the stem, and treated afterwards, in all respects, agreeably to the directions given for the management of hyacinths. Some of the seedlings will bloom by the fourth, or fifth, and some, if not all, by the seventh year."

5694. *By effects.* These should be planted, soon after they are separated from the parent bulb, in beds of fresh steady loam, with a little rotten cow-dung placed from seven to twelve inches below the surface, in a dry airy situation, from two to four inches deep, according to the size of the roots. The beds should be raised six or eight inches above the alleys, formed rather convex on the surface, and may be provided with hoops and mats, to be used to guard them, as occasion may require, from heavy rains and severe frosts.

5695. *Choice of soil and bulbs.* Select such as have not lost the brown skin, are not mouldy or soft at the root end, and are full, solid, and rather pointed at the other. Just before planting, strip off the brown skin, so as to leave the root perfectly bare and white, performing the operation with great care, to avoid bruising or wounding the root, especially at the lower end, where the fibres are formed, which is, at the season of planting, extremely dangerous.

5696. *Soil and situation.* "The situation for the best bed should be in an open airy part of the garden: when that is found upon, the ground should be cleared up, as level as is intended dimensions, and the soil taken out twenty inches deep; the bottom is then to be filled up with sound fresh earth, ten inches thick, upon which is to be placed a stratum of two-year-old rotten cow-dung of the above description, about one half of each, well mixed together, twelve inches thick; and again, upon this is to be placed another stratum of the same kind of earth, as thick as the bottom; this is only to be two inches thick at the sides, and three inches at the middle, which will give it a small degree of convexity; this is to be performed about the 20th of October, i. e. a week or two before the snow, to give the soil time to settle, and to be about two inches higher than the circumference paths: but if heavy rains intervene between this preparation of the bed, and the time of planting, it will be proper to keep the surface covered with straw, to prevent the temperature of the earth, as it would be rendered too compact and adhesive, by a redundancy of moisture, for the fibres to pass freely through it, which would be to avoid it. The best recommends a fresh, rich, loamy soil, of rather a sandy nature, which should be dug twelve months at least before it is used, and a small portion of well-rotted dung must be added. (T. v. on the Carnation, *Article*, Table, &c.)"

5697. *Planting.* The most proper time is from the end of October to the 10th of November. On the day made choice of for planting, raise the surface of the bed smooth and even, still preserving its convexity, and mark the distance between every root upon it. The proper distance between each row is seven inches from centre to centre; and if the rows are seven inches asunder, the roots will form space of nine inches upon all parts of the bed. A bed consisting of seven rows makes the noblest appearance, when it is of sufficient length, with a path round it about two and a half or three feet wide; but where the number of roots is small, five rows may suffice, and the path, in that case, may either extend quite round the bed, or only on one side, at pleasure. If, therefore, the bed consists of seven rows, it should consequently be fifty inches wide, which will allow a space of four inches between the middle rows and the sides of the bed; but if the bed contains only five rows, it will only require to be three feet wide, to give the rows similar distances. Having sprinkled a little clean sand upon the roots as they are laid, place them with great exactness, and add some very sandy earth, so as to completely envelope each root in a little cone of it; then cover the whole very carefully with strong, sound, fresh loam, about four inches thick at the middle of the bed, gradually decreasing as it approaches the sides, where it should be about three inches thick; thus will the convexity of the surface be increased in a proper degree, and the roots will be covered with soil, to a depth proportionate to their size and strength; the largest and strongest having been placed in the centre rows, and the smaller and weaker on those of the outside. No tulip-root, whatever may be its size or strength, should be planted more than four inches deep from the upper side of the root; nor should any blooming root be planted less than two and a half or three inches deep, however small it may be. The soil made use of for covering the bulbs should be frequently turned over, and thoroughly exposed to the sun and air, some time before it is made use of, that it may be rendered warm and free from the acrid quality that most soils are subject to, when taken considerably below the surface. But if the bed is only to contain five rows, with a path in the front, and none behind, then it will be proper to plant the roots in the middle of the bed, in the front, next the path, and so gradually to increase in the size of the roots to the fifth or last row, which should contain the strongest and largest of all: when the roots are properly covered with soil, as before directed, the surface of the bed will depend upon the incline of the place; if it will be necessary to support its highest side at least with boards or brickwork, otherwise the earth would be liable to crumble down and leave the roots bare or too shallow. In the *Gardener's Magazine*, vol. i. p. 451, will be found an account of the manner of planting tulip beds at Lancaster; and in the same work, vol. vi. p. 583, will be seen Mr. Groom's practice. Mr. Groom's bed is 4 feet wide, and of the same depth.

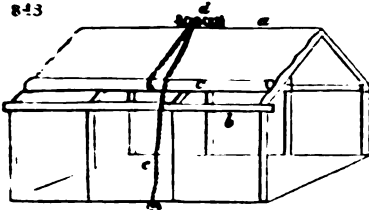


is brought to an accurate curve by means of a thin piece of board, called a strike, &c. "When the surface is thus regulated, it is ready to receive the roots; their places are marked with the greatest ease by means of the strike. Seven rows are planted lengthwise of the bed, at the distance of six inches from each other, and from the sides. Of course the strike is divided into eight spaces. At the marks between the spaces, small staples, one about two inches above the other, are driven into the flat side of the strike; these or any other, may be of wire, or dibble, which, when the strike is put down across, mark the places of the bulbs. The distances between the cross rows, viz., six inches, being marked on the sides, regulate the lesser width of the strike. From this description, it may easily be conceived, with what accuracy and expedition the planting is done. The roots, being deposited in their places, are now covered with the proper compost; and the surface is smoothed off with the back of the strike, which, for this purpose, is formed with a curve and shoulders which take in the whole width of the bed and side boards; against which last the shoulders slide while the strike is moved toward to take off the redundant covering. This operation leaves the surface regularly rounded from side to side, six inches higher in the middle than at the sides." (*Gard. Mag.*, vol. vi. p. 683.)

5698. *Future culture and management.* "When the operation of planting is concluded, the bed may be hooped over, and taken care of, in the manner directed for hyacinths, i. e. so as to preserve it from very heavy rains, and from the sun, but either one or the other, in moderation, will be of more service than injury to it. By the end of February every plant in health will be visible above ground; some tall early sorts will be two or three inches high, others one inch, and the latter will be making their appearance; indeed, a very few remarkably late sorts may be a week longer before they appear, but not more. If, on examination, any distemper or canker is discernable on the foliage, about this time, either above or below the surface, below the surface of the soil, it should be carefully cut out with a sharp knife, and the wounded part left exposed to the sun and air, which will prevent healing; if the surface of the bed appears to be of too close and solid a consistency, it should be carefully stirred up, about two inches deep, which will admit the air to pass freely, and prove fresh, and very beneficial. By the end of April, some of the plants will probably be grown so tall as to require the hoops to be raised a little, to secure the blossom from injury: attention to this part must be attended, for the blossom is very tender, and likely to be bruised or broken, as shown by a very slight blow, or rub against the hoops. As soon as any of the earlier sorts begin to show colour, they should be shaded from the sun; for when the sun is too strong, above, it will cause the colours to run and intermix, in such a manner as to destroy the elegance and beauty of the flower: some sorts are more particularly liable to this effect than others, and will be spoiled in five minutes. When the petals of some of the blossoms have begun to open, a frame, or awning, should be erected over the bed and paths, nearly similar to that for hyacinths (fig. 840.); that is to say, the sides of the frame should be raised as much as is possible; this must be thrown off, or rolled up, at every favourable opportunity, as directed for hyacinths, except that it should be done rather earlier in the morning, and later in the evening, because the sun has acquired a greater degree of power at this season of the year than earlier. If these frequent exposures to the light and air be omitted, the colours of the flowers will be faint and weak, and the grandeur of effect will be lost, or considerably lessened. The cloth covering should come down on each side, within about three feet of the ground, to allow a free circulation of air, except in windy weather; for when the sides are high, the flowers must be most carefully preserved, by a continuation of the covering quite down to the ground, on the windy side; a line of mats sewed together, and their upper edge nailed to the ground on that side, may answer the purpose, if the mats are not of sufficient length. Tulips never require to be artificially watered, in the hottest and driest seasons, at any period from planting to taking up the roots; nevertheless, moderate rains may always be admitted before, and in very small quantity after the bloom is over; but early in the spring, they are absolutely necessary, in order to procure a strong bloom. When the awning is erected, the hoops should be carefully taken away, the sides and end of the bed should be neatly boarded up, and the paths lowered two or three inches, to bring the flowers nearer to the eye: a slight frame, about two feet high, should surround the bed, to prevent the garments of spectators from rubbing against, or breaking off, the flowers; lines of small twine, painted green, and corresponding with the rows of flowers, should pass from one head of the bed to the other, fastened to the end pieces of the frame, and stretched tight; so that the stems of the flowers are to be loosely tied with short pieces of green twine, which will preserve a pleasing regularity of appearance, without stiffness and formality. The flowers will last a considerably longer time in bloom than most other flowers, without sustaining any considerable injury: it may be continued three weeks with great safety. If any root should perish, or fail to produce bloom, the defect may be supplied good by transplanting, with the transplant, from a reserve-bed, or the lower end of the stems of flowers, taken from the reserve-beds, may be immersed in phials, filled with water, and fastened to the bed, so as not to appear. The roots will continue in bloom several days, without requiring to be changed, and will make a tolerable appearance. About a week or ten days after full bloom, when the petals are nearly decayed, the awning should be taken down, together with the frame, boards, &c., that surround the bed; and the mats and hoops may be replaced as before, to throw off excess of rain, as occasion may require; and as the leaves and petioles of any root, the seed-vessel of such should be immediately broken off close to the stem; for, if suffered to remain on the plant, it will protract the period of its maturity, and weaken the stems considerably. The bed may remain in this state about a fortnight longer, by which time the grass, or foliage, will become of a yellowish-brown, and two or three inches of the top of the stem will wither, dry up, and become purplish. It is at this time the critical period to take up the roots, because, if done earlier, they will be weak and spongy, and if deferred later, their juices will become gross; this will be manifest from the succeeding blight, by too great a redundancy of colour, and water in the petals, and the flowers being what is generally termed foul."

5698. *Shamrock awnings for tulip and hyacinth beds of various kinds, have been devised by several gardeners. One, by Mr. Ford (fig. 563), consists of a few uprights and rafters, and*

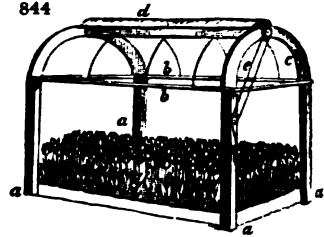
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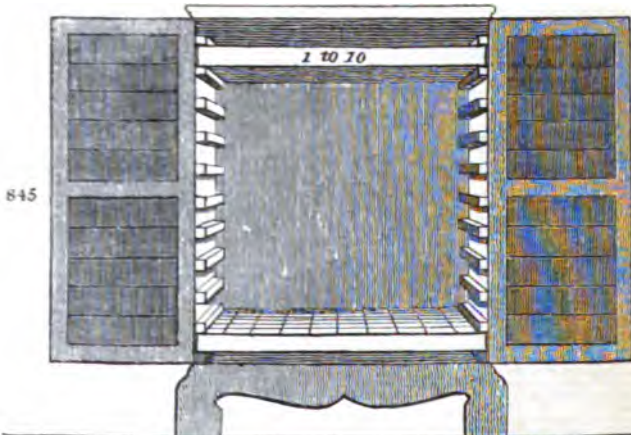
a piece of canvas, which is fixed at *a*, and extends to *b*. A spring roller, *c*, is fixed to the edge of the canvas; a cord is attached to the roller under the canvas, and brought round the roller, and over the canvas to a pulley at *d*, so that by drawing the cord *e*, the canvas is rolled up by the roller *c*. By the use of a similar cord on the other side, running in a distinct pulley at *d*, either side of the awning may be pulled partly or wholly up, as circumstances may dictate. (*Gard. Mag.*, vol. iii. p. 415.) Another very neat, and at the same time economical plan, by the same author, consists of four posts, (fig. 544) *a, a, a, a*, which rest on the ground, and are joined at the top by a frame, *b*, and at each end by a semicircular wire-rope board, *c*. The roller to which the canvas is fixed, *d*, works into these two boards by means of a pulley and line at *e*.

The principle on which this awning is let down or rolled up, is that of the common roller window blind; the difference being, that here two blinds are let down, or rolled up, at the same time. (*Ibid.*, vol. iii. p. 415.)

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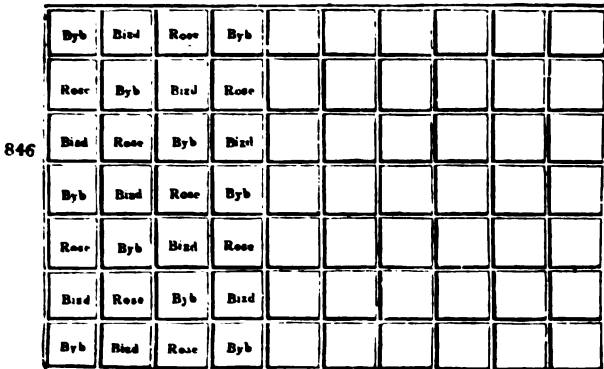


5700. *Taking up the roots. Dig them up carefully, and place them under cover, in a dry, airy, shaded situation. Here they may remain untouched till August or September following. Then it is proper to take off their loose skins, since, at such offsets as are easily separated; observing not to leave the roots too bare, because the action of the air upon such will have a tendency to weaken and injure them, by drying up part of their juices; the last brown skin, which is so intimately connected with the root, should remain on it till the time of planting.* Mr. Groom keeps his bulbs in drawers (fig. 545), which fit in to a frame or case (fig. 546). The size



is three feet eleven inches high, two feet eight inches wide, and one foot nine inches and a half from front to back, with slides for ten drawers. The doors are three feet two inches high,

with wirework for the panels, and also for the back, which by thus admitting a free circulation of air, assists materially in drying the roots. Each of the ten drawers (fig. 546) is



feet seven inches long, one foot eight inches wide, and two inches and a quarter deep; the length is divided into ten cells, the width into seven; each cell being two inches and three quarters by two inches and a half, and two inches deep. Now,

as there are ten rows in each drawer, and ten drawers, the case will of course contain one hundred rows, each row having seven roots; and if the tulip bed when planted contain seven roots across, the drawers will correspond with the bed. The

reason of having seven rows is, that the centre root may be the tallest, and the bed sloped off to each side. In arranging a tulip bed, begin with a byblossom, then take a bisarre, and

next a rose (as marked in fig. 845.); beginning with the first row of the top drawer; thus:—

DRAWN THE FIRST.

1st Row.

1. Byblossom, viz. Parrot.
2. Bisarre - Holmes's Wm. Pitt.
3. Rose - Claudiana.
4. Byblossom - Violet Alexander.
5. Bisarre - Charbonnier noir.
6. Rose - Catalani.
7. Byblossom - Gléda alburn.

2d Row.

1. Bisarre, viz. - Vulcan.
2. Rose - Camrose de Craiz.
3. Byblossom - Impatiens forum.
4. Bisarre - Catalpaque.
5. Rose - Bacchus.
6. Byblossom - Grand monarque.
7. Bisarre - Empereur de Russie.

3d Row.

1. Rose, viz. - Carles blanche.
2. Byblossom - Reine de Ebeba.
3. Bisarre - Polyphemus.
4. Rose - Rose de Vergennes.
5. Byblossom - Louis Seize.
6. Bisarre - Empereur d'Autriche.
7. Rose -

And so on till the bed is complete, by which means the greatest possible mixture of the three classes of colours may be obtained. The same, or a similar case, will answer for named ranunculuses and anemones; but if one is made on purpose for the two latter flowers, the bottom of the drawers should be, of course, canvas strained tight, instead of wood. (*Gard. Mag.*, vol. ii. p. 309.)

5701. *Dianthus*. The tulip is hardier, and less liable to disease and injury from weather, than most sorts of flowers; it is sometimes attacked by grubs and wireworms at the root

early spring, and then the best mode is to remove the plant and a portion of the soil, replacing the former with the same or other-beds. In France, tulip bulbs are sometimes attacked by a fungus, *Scierium Tuliparum* Schrad., for which there is no remedy but transplanting into fresh soil.

5702. *Forcing the tulip in pots or water-glasses*. The early dwarf sorts are well adapted for this purpose, especially the Duc Van Thol. They may be secured as in forcing the hyacinth; and the bulbs may be afterwards recovered in the same manner.

SUBJECT. 3. *Ranunculus*. — *Ranunculus asiaticus* L. (*Mill. Ic. 2. t. 216.*); *Polyand. Polyg. L.* and *Ranunculaceæ J. Renoume, Fr.*; *Ranunkel, Ger.*; *Hanevoet, Dutch*; *Ranuncolo, Ital.*; and *Ranunculo, Span.* (*Ag. 847.*)

5703. The *ranunculus* from a fasciculus of small tubers sends up several bipartite leaves, and an erect branched stem with a terminating flower variously coloured. It is a native of the Levant, and was cultivated by Gerard in 1596. Though rather a tender plant, innumerable and highly beautiful double-flowered varieties have been raised from seed, chiefly by the English florists, from the middle to the latter end of last century.

5704. *Varieties*. Only double ranunculuses are held in esteem: of them, Parkinson, in 1659, enumerates eight; and Ray, in 1686, enumerates seven. In 1764, *divides ranunculos into Turkey and Persian*; of the former he enumerates eighteen sorts, and of the latter a hundred. What he calls the *Turkey ranunculus* is only a variety or sub-species with a very dark flower, which Mr. Ray also considered as a species, and named it *R. sanguinea*. Maddock, in 1792, had upwards of eight hundred sorts. "There are more varieties of ranunculuses," Maddock observes, "than of any other flower;" but as their names are arbitrary, it would be of little use to enumerate them here. A variety will last from twenty to twenty-five years. The best modern catalogue is that of Joseph Tyso and son, of Wallingford.

5705. *Criteria of a fine double ranunculus*. (*Ag. 847. a*) "The stem should be strong, straight, and from eight to twelve inches high, supporting a large well-formed blossom, or

room, from the time of gathering till the time of sowing, and finds it germinate in a month after being committed to the soil. (*Gard. Mag.*, vol. iv. p. 481.) Mr. Tyso impregnated double flowers with the farina of single ones, and by that means, produced a variegated offspring. Double ranunculuses cannot, he says, produce seed, because they contain no anthers, but must have the stigma in the centre of the flower, and be fecundated with the farina from the anthers of such flowers as produce them, which are either single or semi-double. He is confident that if florists were to adopt this method of fecundation, half the old flowers would be thrown into mixtures. (*Ibid.*, vol. vi. p. 549.) Mr. James Reid, highly approving of Mr. Tyso's system, says it may be followed up farther than Mr. Tyso recommends, by fecundating with the anthers, which are sometimes found on double flowers. (*Ibid.*, vol. vi. p. 561, 565, 567.)

5706. *Time of sowing*. According to Maddock, January is the proper time to sow the seed; and in order to prepare it, it must be separated from the stalks to which it is connected, in the following manner, viz.: in the first place, it should be taken out of the bag, and spread thin upon a sheet of paper or tannin, &c., and placed before a moderate fire, till it is just warm, and no more; the seed will then easily scrape off, by means of a penknife; but great care must be taken to avoid scraping it off in lumps, or suffering any pieces of the stalk, dried petals of the flower, or other extraneous matter, to be mixed with it, which would create a mouldiness when sown, of very destructive consequence: when the seed is scraped in a proper manner, it will have much of the appearance of clean coarse bran. It is a little brown or purple speck in the centre of each cuticle, which is the kernel. When the seed is thus prepared, it should be sown in a shallow frame, provided with sashes; the soil should have been previously taken out, three feet deep, and spread thin upon the ground, till it has been perfectly frozen throughout, in order to destroy any vermin it may have contained, more particularly the common earthworms. When the pit is filled up again with the frozen lumps of earth, it should remain till the whole mass has thawed, and subsided to its pristine bulk, or nearly so; its surface should then be made perfectly smooth and even, and the seed sown upon it with the utmost regularity, in such quantity as nearly to cover it; the glasses should be placed over it immediately, and the frame kept closely covered with them, for two or three days, till the seed begins to swell and soften; a little light earth should then be sifted upon it, through a fine sieve, but not sufficient to cover it; this should be repeated once or twice a-week, till the greater part of the seed disappears. It is proper to remark in this place, that such seeds as happen to be covered deeper than the thickness of a half-crown piece will never vegetate, and must, of course, inevitably perish.

5707. Tyso, one of the most successful cultivators of ranunculuses, sows at all seasons from the 1st of August to the 1st of March. He prefers the middle of October, and the latter end of January. (*Gard. Mag.*, vol. ix. p. 67.) To other words, he sows in boxes eighteen inches by eleven inches and four inches deep, filling them full of loamy earth, and pressing the surface level. He sows the seeds about an eighth of an inch apart, covers them as thinly as possible, and waters with care when the boxes are afterwards placed under glass without heat. The plants usually make their appearance in about a month; air is given day and night, except in severe frosts, when the sashes are covered up with straw mats; with such protection the young plants will endure the severest seasons. Mr. Tyso cleans the surface of the boxes from green moss in February, and top dresses them; he puts the boxes into the open ground up to the edge the second week in May, and waters them daily until the grass begins to wither. The boxes are then suffered to become quite dry; and in the middle of July the roots are taken up and preserved in bags until February, when they are replanted with the general stock. In the following June they flower in great profusion. (*Gard. Mag.*, vol. vi. p. 549.)

5710. *Waterings*, of Paisley, sows about the beginning or middle of March, in boxes, which he puts into a bed of half-spent tanner's bark, covered with a frame, and lights. During the first year the plants require to be kept in a regular state as to moisture, and to be shaded from the sun. When the leaves wither, the roots are carefully taken up and kept in a dry place till the ensuing February, when they are again planted one inch deep in fine soil, and many of them flower in the July following. (*Gard. Mag.*, vol. iii. p. 310.)



corolla, at least two inches in diameter, consisting of numerous petals, the largest at the base, and gradually diminishing in size as they approach the centre of the flower, which should be well filled up with them. The blossom should be of a hemispherical form; its component petals should be imbricated in such a manner as neither to be too close and compact, nor too widely separated; but have rather more of a perpendicular than horizontal direction, to display their colours with better effect. The petals should be broad, and have perfectly entire well-rounded edges; their colours should be dark, clear, rich, or brilliant, either consisting of one colour throughout, or be otherwise variously diversified, on an ash, white, sulphur, or fire-coloured ground, or regularly striped, spotted, or mottled in an elegant manner.

5706. *Propagation*. By seed, for new varieties, and by offset-tubers, or dividing the tubers, for continuing approved sorts.

5707. *By seed*. The seed of the ranunculus, Maddock observes, in no instance ever produces two flowers alike, or the same as the original. It should be saved from such semi-double flowers as have tall strong stems, a considerable number of large well-formed petals, and rich good colours, chiefly preferring the darker, but not to the exclusion of the lighter coloured, when their properties answer the foregoing description. "The seed should remain on the plant till it has lost its verdure, and becomes brown and dry; it may then be cut off, and spread abroad upon paper in the seed-room, exposed to the sun, that every degree of humidity may be excluded from it; in which state it should be put into a bag, and preserved in a warm dry place." Most authors recommend ranunculuses seed to be kept dry; but Mr. F. Smith keeps his seed in a damp

5711. It is necessary to keep the seed moderately moist, by gentle waterings with soft water; that has been exposed to the sun till it is a little warmer; the rose of the watering-pot should be hemispherical, and perforated with a great number of very small holes, that the water when applied may be water in a very distinct and regular manner. About the time that the plants begin to make their appearance, it is proper to stir the surface of the earth with a pin, or silver bodkin, just sufficiently to admit air, and give liberty to the roots to pass easily through; this operation should be very carefully performed, to prevent breaking off the fibres, or raising and moving any of the plants out of the earth, because the heat and sun which would inevitably destroy them. When the sun shines very hot, it is necessary to admit some fresh air under the glasses, and shade the frame with mats; but it should be close shut up with the glasses when the air is cold, and always at night.

5712. After the plants are all up, and the two interior leaves appear, more air must be given; by having harden or lattice-work substituted for the glasses; waterings must be regularly continued, in the manner before described, when the long continuance of dry weather renders it necessary; but fine warm showers of rain are always preferable, when they happen in due time. This kind of management is to be continued till the roots are matured, and fit to take up, which is known by the foliage becoming perfectly brown, dry, and nearly consumed.

5713. The expedient and easiest method of taking up these small roots is to pare off the earth, three inches deep, with a trowel or shovel, having previously carefully picked off the dried leaves, and any other extraneous matter that may be found upon it. The earth and roots, thus collected, are to be thrown into a fine linen wire sieve, that will not permit the smallest roots to pass through it; the sieve is then to be worked in a large vessel or tub, newly filled with water; the earthy part will sink, in consequence, be dissolved and washed away, and the roots will remain in the sieve, where, by a little management, they may be easily separated, and the water, which is now very warm, thrown away. The upper rim of the sieve must, at all times, be held above the surface of the water, otherwise some of the smallest roots will be lost, as they are frequently found floating on the surface, till they are so much decayed that they sink. The roots are to be dried and preserved, and are to be planted at the latter end of October, or beginning of November; the greater part, or such as have two or more leaves, will live through the following summer. In William's nursery half his seed in autumn, and the other half in January, in the open air. He prefers the autumnal sowing, if the winter prove mild.

5714. By effects. Unlike the effects of the hyacinth and tulip, those of the ranunculus generally attain perfection in the season of their formation on the parent plant, and are therefore fit to be planted as full-grown tubers at the same time as the others are removed. Smaller ones, which are unfit to bloom the following year, may be planted in a bed prepared as to be directed for the full-sized roots.

5715. By dividing the tubers. — In minutely examining the crown of a ranunculus root, several small protuberances will be found; from each of which a shoot will arise, and the root may therefore be divided by a sharp knife into as many parts as there are protuberances; and thus the danger of losing any rare variety is much diminished. These sections will not bloom till the second year. (Hist. Trans., vol. iv. p. 380.)

5716. Choice of soil and position. Select such a place as is warm and full in every part, and have plenty and prominent buds.

5717. Soil and situation. According to Madox, a fresh, strong, rich, lumpy soil is preferable to all others. Messrs. Reynolds and Cowdung. The Rev. W. Williamson (Hist. Trans., vol. iv. p. 375), uses a stiff clayey loam, with a fourth part of rotten dung. The soil should be open, but not too loose, to violent winds or currents of air. "The bed should be dug from eighteen inches to two feet deep, and not raised more than four inches above the level of the walks, to preserve the moisture more effectually; at about five inches below the surface should be placed a stratum of two-year-old rotten cow-dung, mixed with earth, six or eight inches thick; but the earth above this stratum, where the roots are to be planted, should be perfectly free from dung, which would prove injurious, rather than of benefit, if too near them. The fibres will draw sufficient nourishment from it at the depth above mentioned; but if the dung was placed deeper it would not receive so much advantage from the action of the air, which is an object of consequence."

5718. Planting. "This may be done either before or after winter: if the soil and situation is remarkably cold and wet, it will be better to defer planting till the middle or end of January or beginning of February, as the weather may favour; but, in other situations, the latter end of October or beginning of November is to be preferred, as the roots will have more time to vegetate and form themselves, and will in consequence bloom rather stronger, though only a few days earlier than those later planted. A bed, composed of the variety called the scarlet-turbaned ranunculus, will produce a most brilliant effect; if planted at the same time as the tulip-bed, they will bloom together; they are harder than any other ranunculuses, but very, in other respects, be treated in the same manner. The surface of the bed should be raked perfectly even and flat, and the roots planted in rows, at the distance of about five inches from each other. It is better to plant them deeper than usual, making nearly two inches deep, than to make holes for the reception of the roots: there should be a little lime coarse sand sprinkled into the trench, and the roots should be placed with their claws downwards, at the same depth as the sand, according to their size: when the trench has received its roots, it should be carefully filled up level with the same earth that was taken out, so as to cover the root exactly one inch and a half deep, which is the only true depth to give a good bloom; it is pointed out by nature in a singular manner; for when these roots have been planted too shallow or too deep, in either case, a second root is formed at the greater depth, by which the plant is weakened to such a degree that it seldom survives a repetition of it. Williamson plants in spring, but never after the 10th of February; and he frequently plants the roots in the same place for several years successively." (Hist. Trans., vol. iv. p. 378.)

5719. Future culture and management. Ranunculus roots

will remain several days in the ground after planting, when they begin to vegetate; during this period, they become very much swelled, by imbibing the moisture of the soil, and are, in this state, extremely susceptible of injury from frost, much more so than when vegetation has begun to take place. As soon as the bed is planted, a sufficient quantity of barley or oat straw should be placed near it, ready for a covering: in case of frost, it may perhaps be necessary, during a very severe winter, to cover the bed with straw ten or fifteen inches deep, and the straw should be taken off at all favourable times: for the effects of covering too much or too long are as destructive as the reverse, especially when the roots have begun to vegetate, because they are then more liable to become mouldy than in any other period, than which nothing can be more prejudicial. Early in the spring, when the plants make their appearance above ground, so as to render the roots easily accessible, the surface of the earth between each row should be broken or beaten, so as to make it firm and compact; and if the soil is compressed with the fingers, quite close to the plants, it will keep out cold drying winds, and prove beneficial. It is advisable to make choice of a fine dry day, soon after rain, when the ground is still moist, to perform the above operation: when it is finished, a little long straw should be placed between each row to preserve the surface of the soil cool and even, and the foliage of the plants is sufficiently grown and expanded, to afford it shade without further assistance.

5720. Water. A April shower, or a moderate rain in May, are essentially necessary to the growth and vigour of the plant; if these fall, soft water must be administered in sufficient quantity between the rows, by means of a common watering-pot, with a long handle, and a hose, to take care not to wash the plants into holes; for it is better to avoid watering the plants themselves, as it may chill them too much, and stagnate their juices. The consequences of omitting to water when necessary are these: the plants will not rise so high, nor will the buds of the strongest will be small, and the weaker plants will not bloom at all; the grass, or foliage, will put on a sickly appearance, and the vegetation, from want of water, will be retarded. The plants, when they are first put into the ground, are small and lean. But such kind of waterings, however necessary, are by no means so salutary to these, or any other flowers, as the showers of rain, natural showers, which are not easily dispensed, nor are the plants naturally disposed to grow when the atmosphere is dry, because their pores and fibres are contracted, and they are, as it were, in the expectation of the weather. The plants, when they are first put into the ground, are in all respects, so much inferior to nature, it is better therefore to wait a day or two, in hopes of a change of weather, than to water too hastily in vain. Although the rains may appear to suffice for the moment by the contrast; for a change should fortunately take place, they will receive infinitely more benefit from it than when both themselves and the soil are already saturated, and the plants are over-watered.

5721. Shading. The weather in May is sometimes very cold and hot; the plants ought to be shaded at such times by means of lath-ropes and mats, or some better contrivance, than will admit light and air freely, and which may be removed, as that for hyacinths, may answer best, if expense and trouble were not to be considered: it will, however, be absolutely necessary to shade them, in some measure, during the period of bloom, otherwise they will continue but a very short time, especially the dark rich-coloured sorts; for, in proportion as their colours approach to black, is the injury they will receive from the rays of the sun, if continued to shine on them in full force; some of the very darkest cannot stand it one hour before being entirely spoiled. The light-coloured sorts will bear the sun's rays much better, reflecting them in proportion as they approach to white; green is the only colour that will stand, and absorbs the rays of light in equal proportion, and is more predominant in the vegetable kingdom than any other. After the flowering is over, watering is no longer necessary, but shading, in the middle of hot days, is still very beneficial, and it tends to prolong their vegetation, and the size and substance of the roots are thereby increased.

5722. Taking up the roots. By the end of June, or soon after, the greater part of the plants will appear brown and dry: operation has then ceased, and it is the exact time to take up the roots, because if they are suffered to remain in the ground all rainy weather months, they will begin to shoot afresh, and thereby sustain considerable injury. When the roots are taken up, their stems, &c. should be cut off close, and they should be placed in a shady airy room, or situation, to dry gradually; but before this is perfectly accomplished, it will be necessary to clean and separate them, because, when quite dried, they become very hard and brittle, and there is great danger of breaking off their claws: some may be separated into many convenient parts, although they are so closely connected, as, on a superficial observation, to have the appearance of only one large part. Nothing more remains to be done, till the return of the planting season, except to stow the roots in a dry room, or place, for the sake of convenience, in a dry room, in which state it is possible to keep them out of ground for two or three years without any drying, although they formerly used to wither and injure them: there have been instances known of the ranunculus roots surviving till the fifth or sixth year; they were, however, rendered extremely weak, nor could any but very strong tubers retain their vigour for so long a period; and Williamson takes up the roots immediately after the end of the foliage begins to change.

5723. Storing. The ranunculus may be stored, has been stored in its greatest state, and in brilliant colours, in the neighbourhood of Berlin, tubers which have been kept three or four months, or even a year after the season of planting is over, and are nearly excited, but have been buried only the usual time out of the soil, are planted in pots, and show the beginning of August. In autumn these pots are placed on a slight hotbed, and are protected through the winter by a frame. By taking them into a forcing-house at different times, a flower is kept up from October till February. (Gard. Mag., vol. i. p. 186.)

5724. The flowering of the ranunculus is retarded by Mr. Groom in the following manner: — The tubers, when they are usual, but the surface is kept as low as the path in order to retain moisture; the roots are dibbled in about the usual depth, and the ground immediately about the roots is well watered with urine-water, not only because the ranunculus is a moisture, but to destroy the worms, which are otherwise apt

to draw the roots from their places. Afterwards the bed is kept well watered with clear cow-dung water, until the foliage makes its appearance. The beds are then kept shaded, from nine in the morning till five or six in the evening, till the bloom is over. For a bloom in September or October, plant

about the middle of July. For a bloom throughout the season, commence in February, and plant every fortnight or three weeks; in September plant to a frame, and the roots will have a bloom about January or February. (*Gard. Mag.*, vol. v. p. 238.)

SUBJECT. 4. *Anemone*. — *Anemone* L.; *Polyándria Polygýnia* L. and *Ranunculáceæ* J. *Anémone*, Fr.; *Windblume*, Ger; *Klaproos*, Dutch; and *Anemone*, Ital. and Span.

5726. There are two species of *anemone* cultivated as florists' flowers, under the common name of *anemone*: the *A. coronária* L., or poppy-anemone (*Bot. Mag.* 841.) (*fig.* 848. a), a native of the Levant, and introduced in 1596; and the *A. horténsis*, the star or broad-leaved anemone (b), a native of Italy, and introduced from Holland in 1597. The anemone has been cultivated from as early a period as the tulip, and many fine double varieties produced both by the Dutch and British. The single and semi-double flowers are nearly in as high estimation as the double ones.

5726. *Varieties*. These are numerous, but few of them are named. Parkinson, in 1629, enumerates thirty sorts of single narrow-leaved anemones, and nearly as many double and single of the broad-leaved sort. Misses's catalogue for 1830 contains seventy-five sorts. The florists of the present day do not, in general, give names to the varieties of this flower which they cultivate.

848



5727. *Criteria of a fine double anemone.* (*fig.* 849.) "The stem should be strong, elastic, and erect, not less than nine inches high. The blossom, or corolla, should be at least two inches and a half in diameter, consisting of an exterior row of

849



large, substantial, well-rounded petals, or guard leaves, at first horizontally extended, and then turning a little upwards, so as to form a broad shallow cup, the interior part of which should contain a great number of long small petals, imbricating each other, and rather reverting from the centre of the blossom; there are a great number of small slender stamens, intermixed with these petals, but they are short, and not easily discernible. The colour should be clear and distinct when diversified in the same flower, or brilliant and striking if it consists only of one colour, as blue, crimson, or scarlet, &c., in which case the bottom of the broad exterior petals is generally white; but the beauty and contrast is considerably increased when both the exterior and interior petals are regularly marked with alternate blue and white, or pink and white, &c. stripes, which in the broad petals should not extend quite to the margin."

5728. *Propagation*. By seed for new varieties, and by dividing the root for continuing approved sorts.

5729. *By seed*. Select single or semi-double flowers, that have strong, tall, and erect stems, large well-formed cups, and petals of very brilliant colours. The seed must be gathered from

time to time as it opens; for, being very downy and light, it will otherwise be blown away by the first breeze of wind, or fall down and be lost: it may be sown at the same time, and be treated in all respects like that of ranunculuses; the seedling will, like those, blow strong the second year. It will be found very difficult to sow anemone-seed in a regular manner: it is united with, and enveloped in a downy substance, that, upon being put together in quantity, adheres in such a manner as to render it necessary to make use of some sand or earth to separate it on sowing; nor will this be effected sufficiently without considerable labour in rubbing it for a long time amongst the earth, as it ought not to adhere together in lumps, which would not allow the young plants space enough to form their roots. There will be found but few double flowers amongst the seedlings, nor can it hardly ever be expected there should, if the seed be entirely saved from single ones; of course, the greater number of broad petals the flower of the seed-bearer possesses, so much greater is the probability of procuring large double flowers from the seed of it."

5730. *By dividing the root*. When the division is properly made, every piece will blow the first year, and is therefore to be treated in the same way as such as are full grown.

5731. *Choice of full-grown roots*. Select fresh plump roots of moderate size; large overgrown roots, which are hollow in the centre and often decayed, are to be avoided, as they never blow strong.

5732. *Soil and situation, and preparation of the bed*. The same as for the ranunculus.

5733. *Planting and future culture*. The distance between the roots may be the same as for the ranunculuses. Attend to place that side of the roots next the soil in which the decayed rudiments of small thread-like fibres will be observed, and cover about two inches deep. "Anemones are harder than ranunculuses, and, consequently, may be always planted in the autumn with safety; the most advisable time is about the middle of October, by which means they will blow a week or two earlier than the tulips; if they are planted ten days or a fortnight after the tulips, they will all bloom together; but a few days earlier or later in the planting will scarcely be perceptible at the time of flowering; it is, however, proper to observe, that such roots as are planted in October will blow stronger, and, when taken up, will be found of a larger size, than those that are planted towards the end of November, especially if the winter proves mild; but if the winter sets in early, and proves severe, late-planted roots will not have time to vegetate before frosty weather takes place; in which case there will be great danger of their perishing, unless they are covered with straw, just sufficiently to keep frost from the roots, as they are then in a state of inactivity, but replete with moisture, which renders them more susceptible of injury from frost, and, at the same time, in much greater danger of mouldiness than after vegetation has commenced. The covering must therefore be taken off and put on, as often, and in such proportion, as the exigency or circumstance of the case requires." Water, and protect from high winds and heavy rains, as directed for ranunculuses.

5734. *Taking up the roots*. "Anemones continue longer after bloom in a state of vegetation than ranunculuses, probably because of their greater degree of succulency; and even at the proper time to take them up, it will sometimes happen, that part of their foliage will not be entirely divested of greenness and moisture; this will often be the case when frequent showers of rain intervene, and are admitted between the times of blowing and the maturity of the roots: when this happens, much skill is required to ascertain the critical period to take up the roots; for if they are suffered to remain in the damp or wet ground a few days too long, they will shoot ahead, and be thereby materially weakened and injured; it is, indeed, better to take them up rather too early, than suffer them to re-vegetate in this manner; but the roots will not be so firm and solid as if done at the exact time. The safest and most effectual method to preserve them from these disagreeable consequences, is to keep off all rains after the bloom is quite over, by means of mats or hoops; the roots will then regularly and gradually mature, and the foliage will, in like manner, become brown and dry, which will point out the true time to take up the roots; and this will usually happen to be about a month after full bloom. The whole subsequent treatment of the roots is the same as for the ranunculuses, with only the following caution, viz., that, as the roots are exceedingly brittle, it is necessary to handle them very gently upon dressing and maturing, and the soil that adheres to them; however, should only small pieces break off, such should not be thrown away, as each will, in the course of a few years, become a blooming root, if it has an eye, without which it is of no value; but that which seldom happens to be the case." (*Missadock*.) Anemones may be forced like the ranunculuses; but, as it generally destroys the roots, the finest sorts should not be devoted to this purpose. The leaves are sometimes attacked by fungi, for which we are not aware that there is any remedy. (*Gard. Mag.*, vol. III. p. 490.)

SUBJECT. 5. Crocus.—*Crocus L.*; *Trifol. Monog. L.* and *Iridæ B. P. Safran, Fr.*; *Safran, Ger.*; *Krokus, or Saffraan bloem, Dutch*; *Zaffirano, Ital.*; and *Azafran, Span.*

5735. *The crocus* is a native of the south of Europe, and one species, *C. vernus*, has been found wild in England. This flower has long been a great ornament to the garden; the spring sorts coming into flower from February to May, and the autumnal species from September to October.

5736. *Varieties.* None of these are double. Of the spring crocus, Parkinson has enumerated twenty-seven varieties; the fundamental colours of which are blue, purple, yellow, and white. Miller recites twelve as leading sorts. Mason's catalogue for 1890 mentions "twenty named sorts," besides the light, dark, and striped purple, cloth of gold, the Scotch crocus, beautifully striped, the white, the large snow small yellow, and several striped sorts. The Dutch are continually producing new varieties, as are some florists in this country, of which Haworth (*Hort. Trans.*, vol. i, p. 192.) may be cited as an instance. Of the autumn crocus, Parkinson has enumerated four, and Ray six varieties. Miller has only four: the sweet-smelling, of a deep blue; the mountain, of a pale blue; the many-flowering, bluish and the small-flowering. Sabine (*Hort. Trans.*, vol. vii.) has given an interesting history of spring crocuses, and a list of no fewer than 93 named species and varieties. The essence of this interesting paper will be found in the *Gardener's Magazine*, vol. v, p. 516., and vol. vii, p. 41. In our *Horæ Britannicæ* twenty distinct species of this genus are enumerated, besides varieties. Four of these flower in autumn.

5737. *Criteria of a good crocus.* Clear or brilliant colours, and each colour distinctly marked and finely pencilled in the striped and variegated sorts.

5738. *Propagation.* By seed, for new varieties; and by offsets, for common purposes. The latter generally flower the first spring after planting, and are treated in all respects as full-grown roots.

5739. *By seed.* The following directions are by Haworth. "The seeds of crocuses are best sown, immediately after being gathered, in light dry earth, in large pots, or pans, or small shallow boxes, with a sufficiency of holes and potsherds at the bottom, for the purpose of draining off with certainty all superfluous moisture, thinly; for almost every seed will vegetate, and cover not more than the top of an inch with soil. The most eligible aspect, or situation, for the seminal boxes, until the autumnal rains set in, is a moderately shady yet unsheltered one: permitting them to receive all the influence of the weather, except such heavy showers as would wash bare the seeds. As soon, however, as the autumnal rains commence, remove the boxes to a warm aspect; and protect them from all excessive rains, frosts, and snows, by the occasional shelter of a garden frame; allowing them, nevertheless, the benefit of the full air at other times, but more especially after the seminal leaf for they have but one, being monocotyledonous plants), eager to commence the career of life, urges its fine scapaceous point above the surface of the earth. This occurs sometimes about the end of the year; but oftener in earliest spring. After this it is quite essential that they should have complete exposure to the air, even in frosty weather; screening them, however, occasionally, like early radishes, with loose straw, from other injurious effects of frost; so as to prevent their being raised out of their infantile state by its baneful effects. In this manner may the young crocuses be treated until the sun acquires sufficient power to dry the earth in their boxes, so as to require daily waterings. It will be then found advantageous to remove them to a cooler, but not sheltered situation, and here they may remain until their leaves die down; giving them, as just hinted, at all times, and in every situation, while their leaves are growing, such discretionary rose-waterings, when the sun is not shining, as they may reasonably appear to require; but never until the earth they grow in becomes dry: not any whatever, after their leaves

begin to look yellow. After this period, it is necessary to defend them from all humidity, except dews and gentle rains, until the end of August, or beginning of September.

5740. *From seeds, sprouts, slugs, and snails.* "It is almost needless to observe, they should constantly be kept as clear as possible. And if the surface of the earth in their boxes is occasionally stirred with the point of a knife, or fine piece of stick, it will never fail to be attended with beneficial effects, and invigorate the bulbs: operating, no doubt, as a sort of hoeing, and like that important practice (as the writer of this paper conceives), proving salubrious to vegetables of every denomination, not only by lightening the soil, but by admitting new currents of atmospheric air towards their roots; and thereby facilitating, and stimulating their absorbent inspiration of oxygen: without a due supply of which all vegetables, as well as animals, eventually become feeble and sick. If, notwithstanding the precaution of thinly sowing the seeds, the plants in any of your seminal boxes should have grown so thickly together as to have incommoded each other, it will be desirable to have such taken up, and replanted immediately farther and farther from each other, and about three quarters of an inch deep. But if they are not too crowded, they will require no shifting this their first autumn; but merely about a quarter of an inch of fresh mould sifted over them, previously stirring and cleaning the surface of the old from moss and weeds; and observing not to bury the young bulbs, not yet so large as lentils, deeper than three quarters of an inch, or an inch at the most. The second season requires exactly the same management as the first. But as soon as their second year's foliage has passed away, the roots should all be taken up, and replanted again the same or following day, into fresh earth, of the same kind as before, about an inch deep, and as much apart, and treated as above. Nor does the third season demand any alteration in their management; sifting over them in autumn half an inch of fresh earth, and in spring following, if the soil should be considered too moist, to most of them will show flowers in June, perhaps, being due to the season before) in the midst of their fourth crop of leaves; fully rewarding with the cheering colours of their new faces all the preceding assiduity and care." (*Hort. Trans.*, vol. i, p. 195.)

5741. *Choice of bulbs.* Observe that the base is not mouldy, nor the bud or summit of the bulb decayed.

5742. *Soil, situation, and culture.* They will grow in any common soil, but prefer a loamy one. October is the best season for planting; the more select varieties are grown in beds like the hyacinth, and the colours mingled in the same manner; the distance from bulb to bulb about three inches. The more ordinary sorts are grown as border-flowers, and form an important part of the early flowers of the front row. They are very hardy, and require no care till the leaves begin to fade, when they should be taken up, and kept in a state of rest for two or three months. Some do not take them up oftener than once in three years, which answers very well for the border sorts. Even those, however, chosen for the flower garden, may as the young bulbs are formed on the tops of the others, they come nearer to the surface every year; till at last, if neglected, they are thrown out and lost. As no bulb is cheaper to purchase, and so easy to cultivate, or increase faster in any soil, than this, it will be the fault of possessors of gardens if they have not abundance of them in their borders, when they will flower from the first week in February, till the last week in April, and from the beginning of September, till the middle of October. (*Gard. Mag.*, vol. vii, p. 47.)

SUBJECT. 6. Narcissus.—*Narcissus L.*; *Hex. Monog. L.* and *Anaryllidæ B. P. Narcisse, Fr.* and *Ger.*; *Narcisse bloem, Dutch*; *Narcisso, Ital.*; and *Narciso, Span.*

5743. *Most of the species of narcissus* are natives of the south of Europe, but one, the *N. Psuedo-Narcissus*, is a native of England, and common in woods in clayey soils. They come into flower in February, March, and April.

5744. *Species and varieties.* The popular division of this genus is into daffodils, white narcissus, jonquills, and polyanthus narcissus.

The Psuedo-Narcissus L. and *Telamonia Haw.*, of which the varieties are the Common Double, with white petals and a golden cup, the Single with yellow petals and a golden cup, three or four concentric cups, Trudescant's daffodil, and other varieties; the *Pseudo-N.* (incorporated with the *N. bulbosus* (N. b. a. bulbosus) with one flower only on the scape; the *Two-coloured* (N. b. bicolor) (Bot. Mag., 1187.), a native of Spain, and a variety of the great Yellow Spanish, the largest flower of the genus; the *Lean daffodil* (N. minor) (Bot. Mag., 5.); the *Rush-leaved* (N. triandrus) (Bot. Mag.,

48.), and some other species and varieties.

The White Narcissi are the Poet's narcissus (N. poeticus); the *Foot-scurf* (N. p. a. angustifolius); and the *Large-flowered* (N. p. a. majalis); the *Leaf-narcissus* (N. monchastus) (Eng. Bot., 1800.); the *Eastern* (N. p. a. orientalis) (Bot. Mag., 948.), and the *Yellowish and Large-flowered* varieties; the *Hoop-petioled narcissus* (N. Bot. Mag., 85.); and the *Paper narcissus* (N. papyraceus), with other varieties.

The Jonquills are the Common (N. Jonquilla) (Bot. Mag., 15.), so named from its rush or jonc-like leaves; the *Double-flowered jonquill*; the *Swart-scemed jonquill* (N. odorum) (Bot. Mag.,

934.); the *Great jonquill* (N. calathinus) (Bot. Mag., 78.); and some minor varieties.

The Polyanthus Narcissi are the Common (N. Tenaxia) (Bot. Mag., 925.); the *Sulphur-coloured, Single and Double*; the *White and Yellow, Single and Double*; and the *Double* (with arbitrary names given by the Dutch, who have highly improved this division of the genus. Some of these sorts are considered species by botanists. A new arrangement of the *Narcissus* has been proposed by Haworth; but it embraces too many local distinctions for our purpose. In scope will be found sketched in the *Gard. Mag.*, vii, 479.; and viii, 49, and 212., and in *Hort. Brit.* p. 594. 1st ed. Supp.

5745. *Criteria of a good narcissus.* Strong erect stems; regularity of form and disposition in the petals and萼片; distinctness and clearness of colour; and in the many-flowered sorts, the peduncles all of the same length, and coming into flower at once.

5746. *Propagation.* By seed for new varieties, but generally by offsets, which, as they seldom flower the first year after separation, should not be planted with the full-grown roots, but in a bed of heavy soil by themselves in the reserve garden. They should not be planted later than the beginning of September.

5747. *By seed.* Miller directs to sow in flat pans, filled with fresh, light, sandy soil, about the beginning of August, soon after the seed is ripe; to place the pans where they will receive only the morning sun till October. Then expose them to the full sun, and protect them from heavy rains and frosts till April, when they will have come up, and must be removed to their first situation. In June, the leaves will have decayed, when some fresh earth is to be sifted over the surface of the pans. Treat them in other respects during the second winter as during the first. The end of a summer after sowing, the roots are to be taken up and planted, at about three

inches' distance every way, in beds raised and rounded to throw off the water. These beds are to be protected in winter by old tan-sacks or bams. After remaining two years in this situation, they are to be taken up and planted in others, dug deep, and with a little rotten cow-dung buried in the bottom for the third to strike into. Here the roots are to be planted at six inches' distance, having earth sifted over them when the leaves decay, and tan or saws in winter. The second season of their growth in this bed, that is, the fifth from sowing, most of the bulbs will come into flower. Such as are esteemed good flowers may be taken up and treated as full-grown bulbs; but those which have not flowered, or of which the flowers are of doubtful excellence, may remain another year. Miller says, none should be rejected till they have flowered two or three times: as it often happens that their first blooming is not near so beautiful as their second and third.

5748. Choice of full-grown bulbs. Select such as are rounded towards the base rather than compressed, with full sound tops, and bottoms free from mouldiness or decayed fibres.

5749. Soil, situation, and planting. An eastern aspect is to be preferred; and, according to Miller, the best soil is fresh, light, basel loam, mixed with a little very rotten cow-dung. The bed in which they are to be planted must be excavated three feet deep, and filled with this compost, and then the roots planted on it about eight inches' distance every way, and covered from six to eight inches, in the manner directed for tulips. The best time for planting is August, or the beginning of September.

5750. Culture. Stirring the soil, weeding, and watering are all that is in general required; but such as wish to produce a very perfect show of flowers, shelter with an arched in the manner recommended for hyacinths. In winter, the beds require the protection of tan or litter, which should be put on in October or November, and removed in February or March. Where the narcissi are cultivated for

commercial purposes, the strength of the bulb is greatly increased by cutting off the flower-stem when the flowers begin to expand. The flower is still valuable, being expanded till in a marketable state by inserting the stalk in water. "Some years ago I gained admittance into the grounds of Daniel Carter, at Fulham, who has long cultivated large quantities of polyanthus narcissus for sale, and was surprised to find all the roots, though very early in the season. His son, however, explained the mystery, by taking me into a large barn, which was filled with the gathered flowers, blowing in pans of water; and he told me that, by doing this, the bulbs continued to produce an abundant crop every year, as new ones imported from Holland. The practice was suggested to him by remarking, that in a bed left for seed one year, very few roots sent up a complete bunch of flowers the following season, and many roots none at all. He therefore now cuts off the stalk close to the ground, as soon as two or three of the flowers are expanded, but is very careful not to injure the leaves." (*Mer. Press.*, vol. i. p. 361.)

5751. Taking up the bulbs. The bulbs should not be taken up oftener than every third year, if they are expected to flower strong and make a great increase. If they remain longer than three years, the offsets will become so numerous as to weaken the bulbs, which will at first flower weakly, and in time cease almost entirely to show flowers. The Dutch take up these roots every year, because their object is to furnish a round plump root, and the way to accomplish this is to take off the offsets annually, to prevent their pressing against and flattening the parent bulb. The bulbs, being dried in the shade, may be laid in an airy situation in the seed left till wanted for planting.

5752. Forcing. These bulbs force well, and either in deep pots of sandy loam, or in water-glases; their previous treatment is the same as we have prescribed for the hyacinth; and they are highly odoriferous and ornamental in apartments.

SUBSECT. 7. Iris.—*Iris* L.; *Trián.* *Monog.* L. and *Irídea* B. P. *L'Iris*, Fr.; *Schwerdtliie*, Ger.; *Liach bloem*, Dutch; *Iride*, Ital.; and *Iris*, Span. (*figs.* 850, 851.)

8753. There are several species of *iris* which are considered florists' flowers.

The Persian Iris (*I. persica*) (*Bot. Mag.*, and our *fig.* 850. a); a very low bulbous-rooted plant, with delicate blue and violet-coloured flowers, greatly esteemed for their beauty and sweet smell, which is so powerful that one plant will scent a whole room. It is a native of Persia, and was cultivated by Parkinson in 1699. The bulbs are generally imported from Holland, and blow in water-glases, or pots of sand with very little earth intermixed, in February and March.

The Snake-head Iris (*I. tuberosa*) (*Bot. Mag.*, 531, and our *fig.* 850. b, and *Gerd. Mag.*, vol. viii. *fig.* 41.) has long narrow four-cornered leaves, and a dark purple flower, which appears in April. It is a native of the Levant,

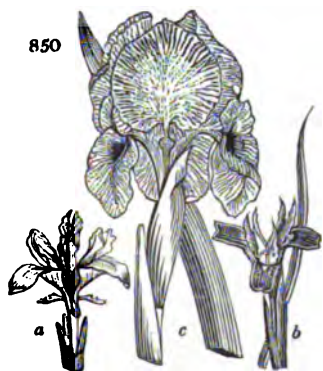
and was cultivated in 1597. It is also a native of England and Ireland. (*Gerd. Mag.*, viii. 225.) The tubers are generally imported from Holland.

The Chalcidonian Iris (*I. ensifolia*) (*Bot. Mag.*, 91, and our *fig.* 850. c) has finely striated leaves, a scape a span high, and the largest and most magnificent corolla of all the species. Its petals are of a delicate texture, almost as broad as a hand, purple or black, striped with white. It flowers in the beginning of June; is a native of the Levant, and was cultivated by Gerard in 1594.

The Bulbous-rooted, or Spanish Iris (*I. Aphium*) (*Bot. Mag.*, 531. e) has channelled leaves, convoluted during their whole length, and

awl-shaped at the tip; the flowers of the wild plant are blue, with emarginate petals, and appear in June; but cultivation has produced a great number of varieties with yellow, white, violet, and variegated flowers. It is a native of the south of Europe, and was cultivated by Gerard in 1596.

The Great bulbous-rooted Iris, the English *Iris* of the Dutch (*I. siphonoides*) (*Bot. Mag.*, 602, and our *fig.* 851. d), is much larger than the other in all its parts, the flower-stalk is near twice the height, and the flowers are more than double the size. It is equally prolific in varieties as *I. Aphium*, of which some botanists considered it as a variety. The tubers of both sorts are annually imported from Holland.



5754. Culture of the first three species. These seldom ripen their seeds in this country, nor are they often propagated here from offsets, annual supplies of bulbs being obtained from Holland, and generally forced like the hyacinth. Justice says (*Brit. Gard. Direct.*, p. 224.) the Dutch florists told him, that they never could obtain any varieties from sowing the seeds of the Persian iris; nor could this author himself, who cultivated the plant, and raised seedlings at Crichton, near Edinburgh, with great care and considerable success. The three sorts are best cultivated under the protection of a frame, where their flowers will be less liable to injury than in the open air, and where their leaves will be stronger and more able to nourish the bulbs and offsets. The Chalcidonian iris, Curtis observes, thrives best in a loamy soil and sunny exposure, with a pure air, but guarded from moisture, and from frosts during winter. The Persian iris thrives best in a light sandy loam and eastern exposure, sheltered from rains and frosts, like the other. The snake-head iris is the hardiest of the three, requires the same soil and exposure as the Persian, but less care during winter. None of these sorts need be taken up oftener than once in three years, when the leaves decay; they should be replanted in a month or six weeks afterwards, at six inches' distance every way, and covered from two to four inches, according to the size

of the bulbous tuber. If the soil in which the bulbous and tuberous sorts of iris is planted be loose and deep, and the plants not taken up every three, or at most four years, they will run down and be lost.

5755. The culture of *Iris tuberosa* is thus given by Mr. Dawson, jun., in the *Gardener's Magazine*. Let it stand two or three years in succession in the same spot; then in July take it up and divide the tubers, planting them as soon as dug up six inches deep, in a compost formed of half friable loam and half leaf mould, or old hotbed dung, rotted to the consistence of soil. Let the situation be a dry bed or border, at the base of a wall, with a southern aspect, and plant the tubers close to the wall, or only a few inches from it. Thus treated, *Iris tuberosa*, in the Botanic Garden at Bury St. Edmunds, every spring exhibits its peculiarly coloured and constructed, and delightfully fragrant flowers, and occasionally also produces seeds; these, if sown the moment they are ripe, produce plants in the fourth year of their age. One observance in the cultivation of this plant should be absolute; never to stir the soil within a foot of it, after the 1st of September; for it will by this time have commenced the emission of roots for the imbibition of the requisite energies for its next year's flowering, although it may not send its foliage above ground to tell you so until even November. This last

SUBJECT 10. *Amaryllis*.—*Amaryllis* L.; *Hex. Monog. L.* and *Amaryllidæ* B. P.

5764. *The amaryllis, lis-narcisse*, Fr.; *narcissocille*, Ger.; and *giglio narciso*, Ital., is a splendid genus, lately subdivided into those of *Nerine*, *Coburgia*, and *Brunsvigia* (see *Bot. Mag.*), of which almost every species may be considered a select flower. Most of the species are frame, green-house, or stove plants, and natives of the Cape of Good Hope, China, or South America. Various hybrids of this family, of great beauty, have been produced by Herbert, Sweet, Gowen, and others. (*Hort. Trans.*, vol. iv. p. 486., &c.)

5765. *Propagation and culture.* New sorts, as in similar cases, are procured by seed; but the most usual mode, as few of these plants have ripened their seeds in this country, is by offsets from the flowering bulbs, removed yearly, or every two years the bulbs are taken out of the ground. The great art in cultivating these, and all other bulbs, is to procure vigorous leaves, as on these depend the quantity of nutritive matter prepared and deposited in the bulb, and consequently its ability to flower the following season. The circumstance of several of these plants, as the Guernsey lily, flowering in the autumn, and producing their leaves afterwards under the disadvantages of a winter's sun, is the reason why they have been hitherto cultivated with so little success in this country, and why we are obliged to import the bulbs annually from other countries.

The observations of Knight on this subject are particularly valuable; they more immediately refer to the Guernsey lily, but they are equally applicable to all exotic bulbs. "Bulbous roots increase in size, and proceed in acquiring powers to produce blossoms, only during the periods in which they have leaves, and in which such leaves are exposed to light; and these organs always operate most efficiently when they are young, and have that they might not injure the bulbs. As soon as the bulbs become dry and hard, some of them begin to show flower, and others continued to do so all the winter and spring, seldom being less than a hundred, sometimes two or three hundred in flower together, when scarcely any other plant was in bloom. As soon as they show for bloom they should be potted, and the sooner the better, as they draw up weak, and do not flower so well, if allowed to remain too long after showing bloom; as soon as potted, they must be placed in the hot-house, giving them but little water at first, but as the pots get filled with roots they will require a greater supply. The sorts that succeed best in turning out are *A. regina*, crocota, *A. reticulata*, *fulgida*, *pallidula*, and *viridis*, and the hybrids that have been produced from them. *A. allica*, *calyptrata*, *salandina*, and *reticulata*, do not like turning out so well, as it is in the nature of nature to continue growing, and the hybrid productions from those parents of the nature of their parents. They only require to be kept dry a considerable time in their pots, to make them flower, except any get sickly, or the mould gets sordid in their pots; they should then be laid by for dry for a considerable time, or they will be apt to rot. By laying the bulbs to dry in this way, a far greater number may be grown than could be by any other means; as, by their being laid to dry on shelves, other plants can be grown in the space that they would occupy if kept in pots. *A. reticulata* and *striatifolia* succeed best in light turfy loam, mixed with sand; and all the other sorts are best grown more freely about one half light turfy loam, rather more than a third of white sand, and the rest turfy peat; the use of the turfy soil is to keep it from binding or getting hard in the pots, which it will do if sifted fine; the fibres of the turfy soil also keep it open, that the roots may pass readily through it; the pots must also be well drained with potsherds, that the moisture may be off readily, as nothing injures bulbs so much as being sordid in the pots; the roots are also very fond of running among the small potsherds. It is a very bad plan that is generally adopted of placing a piece of flat tile or potsherd over the hole at the bottom of the pot for the purpose of keeping the water, the hole gets as firmly closed as if corked up, and the water remains in the pot, sordidening and souring the mould, and very often occasions the plant to rot. The better way is to lay a hollow piece of potsherd about half way over the hole, then to lay another piece or two against it, and to fill up all round with a handful or two of potsherds broken small, according to the size of the pot. Seeds of this genus, as well as most other bulbs, should be sown as soon as ripe, and when the young plants are a few inches high, they must be potted off, either singly or several in one pot; if a hotbed frame be ready to receive them, all the better, as they will grow much faster in frames than in the house; as soon as their pots are filled with roots, shift them into larger ones, giving them three or four shifts in the course of the summer; they will then grow rapidly, and many will flower at twelve months old, particularly any mules from *A. reticulata* or *striatifolia*.

5766. *The Rev. W. Williams* has adopted the same rationale as Knight; and, with the aid of a glass frame, without artificial heat, brought bulbs which had flowered into a state to flower again after two winters. Had he applied artificial heat, he thinks one winter might probably have been sufficient. (*Hort. Trans.*, vol. iii. p. 490.)

5767. *The Hon. and Rev. W. Herbert* has found a similar treatment attended with corresponding success. He says, "the only attention which the Guernsey lily requires here (Spofforth, Yorkshire), is to give it sufficient air while the leaves are growing, that they may be strong and dark-coloured; to protect the leaves from frost in winter, and to keep the light, if under glass, to give a moderate and regular supply of water, and to leave the bulbs nearly dry, from the time the leaves decay, that is, about midsummer, at latest, to the end of August, when the flower-buds should appear. If the bulbs are not left dry early in the summer, the autumnal shoot will be delayed till the season becomes too cold for the proper growth of the flowers or leaves, and the natural course and vigour of the plant will be interrupted after which it will take at least a year to repair the injury it will have received. Whenever the sprouting of the bulb is tardy, it should be assisted by placing it, for a short time, in a warmer situation. If the stems do not expand so as to become, after a few days, trifid, it is a sign that the temperature is rather too low to suit the plant, and the leaves will probably not push freely without more heat. I have obtained seed from the Guernsey lily by procuring the blossoms early in an airy situation." *The soil* Herbert recommends is a good yellow loam, without any manure; but he thinks "they will thrive in any phloesomous compost, which does not make their bulbs. They should be planted partly above ground, for the wet earth round their necks will prevent their flowering or thriving, and will even sometimes destroy them." (*Hort. Trans.*, vol. iv. p. 177.)

The same treatment, with very few exceptions, he adds, suits the whole of the bulbs included under *Amaryllis*, as well as a number of other allied genera, as *Hemantthus*, *Pancratium*, *Agapanthus*, &c. Some species of these genera, as *Amaryllis longifolia* W. and *Crimineo*, *salsicium* Ros., are natives of dry ditches that communicate at certain seasons with the water of

the rivers in Bengal, where they root deeply in the mud. These species, and some others, Herbert found to succeed perfectly when plunged during summer in a pond. "Most of the crinum," he says, "are swamp plants, or grow in river mud, and should be cultivated in our stoves, with a pan of water under them, the bulbs being raised above the earth, and stripped of all dead integuments. *Agapanthus umbellatus* flowers best when so treated; the *Amaryllis longifolia* (which, he says, should be named *Crimineo capense*) will, he has no doubt, "flower as a hardy aquatic, if planted in any pond or river of ten feet water, not liable to freeze at the bottom." (*Hort. Trans.*, vol. iii. p. 185.)

5768. Sweet, one of the most successful cultivators of bulbous-rooted hot-house plants, observes, that the hybrids are in general more hardy, and flower more readily, than the original species. When in Colville's nursery, he raised many hundreds of hybrids, and the following was his method of treatment. The bulbs, having been grown in frames and pits all the summer, were removed to the hot-house in autumn when they had ceased growing. They were then laid on shelves in the house, and, as the leaves and roots began to decay, they were cleared away, and they might not injure the bulbs. As soon as the bulbs became dry and hard, some of them began to show flower, and others continued to do so all the winter and spring, seldom being less than a hundred, sometimes two or three hundred in flower together, when scarcely any other plant was in bloom. As soon as they show for bloom they should be potted, and the sooner the better, as they draw up weak, and do not flower so well, if allowed to remain too long after showing bloom; as soon as potted, they must be placed in the hot-house, giving them but little water at first, but as the pots get filled with roots they will require a greater supply. The sorts that succeed best in turning out are *A. regina*, crocota, *A. reticulata*, *fulgida*, *pallidula*, and *viridis*, and the hybrids that have been produced from them. *A. allica*, *calyptrata*, *salandina*, and *reticulata*, do not like turning out so well, as it is in the nature of nature to continue growing, and the hybrid productions from those parents of the nature of their parents. They only require to be kept dry a considerable time in their pots, to make them flower, except any get sickly, or the mould gets sordid in their pots; they should then be laid by for dry for a considerable time, or they will be apt to rot. By laying the bulbs to dry in this way, a far greater number may be grown than could be by any other means; as, by their being laid to dry on shelves, other plants can be grown in the space that they would occupy if kept in pots. *A. reticulata* and *striatifolia* succeed best in light turfy loam, mixed with sand; and all the other sorts are best grown more freely about one half light turfy loam, rather more than a third of white sand, and the rest turfy peat; the use of the turfy soil is to keep it from binding or getting hard in the pots, which it will do if sifted fine; the fibres of the turfy soil also keep it open, that the roots may pass readily through it; the pots must also be well drained with potsherds, that the moisture may be off readily, as nothing injures bulbs so much as being sordid in the pots; the roots are also very fond of running among the small potsherds. It is a very bad plan that is generally adopted of placing a piece of flat tile or potsherd over the hole at the bottom of the pot for the purpose of keeping the water, the hole gets as firmly closed as if corked up, and the water remains in the pot, sordidening and souring the mould, and very often occasions the plant to rot. The better way is to lay a hollow piece of potsherd about half way over the hole, then to lay another piece or two against it, and to fill up all round with a handful or two of potsherds broken small, according to the size of the pot. Seeds of this genus, as well as most other bulbs, should be sown as soon as ripe, and when the young plants are a few inches high, they must be potted off, either singly or several in one pot; if a hotbed frame be ready to receive them, all the better, as they will grow much faster in frames than in the house; as soon as their pots are filled with roots, shift them into larger ones, giving them three or four shifts in the course of the summer; they will then grow rapidly, and many will flower at twelve months old, particularly any mules from *A. reticulata* or *striatifolia*.

5769. *Crimineo* and *Pancratium*. As the different species of these genera are of the nature of the crinum, and grow in swampy places, it will succeed better to be kept in pots continually, only shifting them occasionally into larger ones, as the others become filled with roots, for the more room the roots have to run, the finer the flowers will be. *Crimineo* and *Pancratium* are very fond of water, and will produce its magnificent and fragrant flowers four times every year. They will all require occasionally to have the mould all shaken from the roots, and the succulent roots to be cut off, or otherwise they will become unmanageable. As they are of stronger and more vigorous growth than *Amaryllis*, they will require rather a stronger soil; some good rich loam mixed with nearly a third of sand, and a little peat to keep it open, is the best soil for the different species, also being careful to have the pots well drained with potsherds; and if any bulb should chance to be getting rotten, or have long roots, it may be dried in the way recommended for *Amaryllis*. In the way recommended for *Amaryllis*, if any plants that are wanted to grow fast, should also be placed in a hotbed frame or pit in summer, and as soon as one pot is filled with roots, it should be shifted into a larger one; by that means they will soon become flowering plants.

5770. *Hemantthus*. Most of the species are green-house plants, and may be treated like *Amaryllis*; but *Hemantthus multiflorus* is a tender stove bulb, which requires a great deal of care to grow and flower it well; the same soil as recommended for *Amaryllis* is suitable to it, and bulbs that are fresh imported should be potted in a hotbed frame, and as soon as they will require a little water until they have made fresh roots; they will then need a frequent supply, but

they will always require a warm situation in the hot-house, and care must be taken not to water them over the leaves, as it very frequently goes into their hearts and rots them; one reason, we believe, of their generally surviving so short a time in most collections, which is the more to be regretted, as they are splendid flowering plants. (*Gard. Mag.*, vol. i. p. 33.)

5771. Some account of the culture of the *Guernsey lily* in the

Island of Guernsey is given by Dr. Macculloch (*Calcd. Mem.*, vol. ii. p. 62); there they grow it in the open air, and protect it with sand during winter; and a number of excellent papers on the culture of *Amaryllides*, and other hot-house bulbs, will be found in the *Gard. Mag.*, vol. i. p. 51.; vol. i. p. 185.; vol. iii. p. 300.; vol. iv. p. 341.; and vol. vii. p. 188. and 189.

SUBJECT. 11. *Iris* and *Gladioli* W.; *Trián. Monog.* L. and *Iridea* B. P.

5772. The *Iris* and *Gladioli* include a number of recently formed genera (see *Hort. Brit.*) of Cape bulbs, which may be flowered in the open air, under frames without bottom heat, or on shelves near the glass in green-houses. The Hon. W. Herbert, who has paid great attention to the culture of bulbs, is "persuaded that the African *Gladioli* will become great favourites with florists, when their beauty in the open border, the facility of their culture, and the endless variety which may be produced from seed by blending the several species, are fully known; nor will they be found to yield in beauty to the tulip and ranunculus." (*Hort. Trans.*, vol. iv. p. 154.)

5773. *Propagation and culture.* They may either be propagated by seed or offset-bulbs; by the former mode, Herbert has produced numerous beautiful varieties. The proper soil for these and similar bulbs is peat with sand; and in a bed of this compost the seeds should be sown in spring, and well watered before and after they come up. "At the beginning of October, or as soon as the leaves wither, the young bulbs should be taken up and dried; they may be replanted at any time, placing them about eight inches under ground, to prevent the frost reaching them. Next year they will generally

flower." The best way of treating *Gladioli* which are to be flowered in pots is, whenever the bulbs are potted, to plunge the pots about eight inches under ground in a bed of peat, and raise them nearer the surface in spring, as soon as the very severe frosts are over; or not to plunge them so deep, and protect them with moss, leaves, rotten tan, &c.

5774. Various other bulbous *Irides*, and also *Oxalis*, *Lachenalia*, *Cyclamen*, &c. may be successfully treated in a similar manner. (Herbert, in *Hort. Trans.*; and *Gard. Mag.*, vol. i. p. 306.; vol. ix. p. 467.)

SUBJECT. 12. *Tuberosae*. — *Poliánthes tuberosa* L. (*Bot. Reg.* 63.); *Hes. Monog.* L. and *Hemerocallideae* B. P. *Tuberosae*, Fr. and Ger.; and *Tuberoso*, Ital.

5775. The *tuberosae* is a native of India, whence it was first brought to Europe about 1524, and to England in 1629. It is generally cultivated in frames or in the green-house, but in warm situations will flower in the open air. The tubers of this plant are annually imported from the warm provinces of North America and Italy, and sometimes from Germany (*Gard. Mag.*, vol. ix. p. 409.); but, like those of the *Guernsey lily*, might, by proper treatment, as Salisbury has proved, be produced in this country equally fit for flowering. There is a double variety, which is in most esteem, but both are equally fragrant.

5776. *General treatment.* The bulbs are planted in pots of sandy loam in May, and begin to grow in June in a hot-bed or hot-house till the flower-buds begin to appear. The plants are then removed to the green-house or the open air, or to hails or churches, as in Italy, where the cooler temperature procures a prolonged bloom. At Drogenbra, flowering bulbs of the *tuberosae* are planted in the pleasure-grounds. A pit four feet deep is filled up three feet with well-decomposed manure, and on this is placed one foot of turfy loam with a small proportion of sand. The plants, having been forwarded to the height of six or eight inches in frames, are then turned out of the pots into these clumps, where they attain the height of from four feet to six feet, and diffuse their delicious fragrance to a great distance on every side. (*Gard. Mag.*, vol. ix. p. 561.)

5777. *Culture to produce flowering roots.* The following is the process followed by Salisbury, by which he produced, for many years, in the open air at Chapel Alerton, flowering bulbs equal to those imported. The situation he preferred was a dry warm border; in this he made an excavation two or three feet deep, and of any convenient length and width; about the middle of April, he filled this pit with fresh stable dung, and covered it with light sandy earth; then, on the bed so formed, the small lateral roots or those from foreign bulbs, or from those which had flowered in this country the preceding year, and been preserved through the winter in sand, were planted at five inches' distance every way, the upper part of the tuber being just covered with earth. The bed was protected from nightly frosts and heavy rains, little or no water was given, but

when the leaves were an inch long, a little fresh compost was added to the surface. In June and July, when the leaves were in full vigour, it was watered copiously after warm days; but in autumn and the beginning of winter, it was carefully protected from heavy rains. In the beginning of December, the decayed leaves being removed, the bed was thatched over a foot thick with dry straw, sloping it well to throw off the wet; or covered with a frame and litter. In February the roots were taken up, preserving their fibres, and packed in dry sand in a cellar where the cold could not penetrate till April, when their fibres being shortened in proportion to their decay, and all the offsets except one or two on each bulb being removed, they were replanted as before. A few strong roots flowered in this second year. In the succeeding winter the bed was thatched as before, and in February the roots were taken up for forcing, or any of the purposes for which *tuberosae*-roots are grown. By this process bulbs were produced equal, if not superior, to those imported; and therefore the author thinks their culture might become an object to the commercial gardener, especially in the southern counties near the sea, and in the vicinity of London. The great object, he says, is to obtain "a sufficient degree of heat in summer, to bring their leaves out to their full magnitude, that of the roots following of course. The theory," he would recommend to the intelligent gardener to adopt in its general management is, to keep the roots growing as vigorously as possible from May to October, but in a state of complete rest and drought for the remainder of the year." (*Hort. Trans.*, vol. i. p. 55.)

SUBJECT. 13. *Pæony*. — *Pæonia* L.; *Polyán. Digyn.* L. and *Ranunculaceae* J. *Pivoine*, Fr.; *Päonie*, Ger.; and *Peonia*, Ital.

5778. *Pæonies* are of two kinds; the herbaceous, *P. officinalis*, and other species; and the suffrutescent, *P. Moutan*. The first is a native of Switzerland and other parts of Europe, and also of Asia, and the second has been imported from China and Japan, and was introduced into England in 1789. The flowers of both are very splendid, and the plants well deserve a place in every garden.

5779. *The species and varieties of herbaceous pæonies*, as given in the *Hort. Brit.*, amount to nearly forty in number, all of which, together with many sub-varieties, are purchasable in the nurseries.

5780. *Propagation and culture of the herbaceous pæonies.* By seed, from the single and semidouble sorts for new species, and by dividing the roots for ordinary purposes. Miller directs to sow the seeds which ripen in September, immediately afterwards in light fresh earth, covering them half an inch. They will come up the first year, and may remain in the seed-bed two years before they are transplanted, sowing a little rich earth over them when the leaves decay at the end of the growing season. Having made two years' growth in the seed-

bed, they are to be transplanted in September into other well-prepared beds of light fresh earth, and placed six inches asunder every way, and three inches deep. Here they are to remain till they flower, which is generally the fourth or fifth summer after sowing. Full-grown roots are readily propagated by parting, taking care to preserve a bud on the crown of each offset. The plants are very hardy; they will grow in almost any soil and situation, and even under the shade of trees, where, Miller says, they continue long and in beauty. They are chiefly adapted for flower-borders, and form a splendid ornament both to the parterre and shrubbery.

5781. *The varieties of P. Moutan*, enumerated by Sabine (*Hort. Trans.*, vol. vi.), are the following:—

1. <i>P. M. Bâton</i> , papaveracea,	4. <i>P. M. rosea</i> , semisimplex,	7. <i>P. M. cinnra plena</i> ,
2. <i>P. M. Bâton</i> ,	5. <i>P. M. rosea plena</i> ,	8. <i>P. M. cinnra plena</i> ,
3. <i>P. M. Hûmel</i> ,	6. <i>P. M. Rawesi</i> ,	9. <i>P. M. Annellet</i> ;

and the Earl of Mountnorris has since raised the *P. Moutan* variegata, figured in Sweet's *Brit. Flow. Garden*, 2 ser. 236.

5782. *Propagation of the shrubby pæonies.* The common mode is by division, or by layers, but they may be also grafted on the roots of the herbaceous pæonies, or struck from cuttings prepared in a particular manner. The grafting is done any time from the beginning of September to the middle of March. Select some good and healthy roots of any other hardy herbaceous kind, and take off cuttings of *P. papaveracea*, or of any of the tree kinds which it is wished to increase; then slit the tuber from the crown downwards about two inches from the apex like a wedge, insert it into the slit of the tuber, and fit the bark on one side as exactly as possible; then bind them well together with good bass, over which put one turn of brass wire, to prevent the parts from separating, and the soil is decayed. Put the bits pots deep enough to allow the mould to cover the top of the tuber, set them into a cold frame or pit, keep them close, rather dry, and defended from the sun for the first month, and from frost during winter. When they have

perfected one season's growth, plant them out, or treat them like established plants. (*Gard. Mag.*, vol. iii. p. 293.)

In laying, some advise twisting the layers.

5783. *Culture of the shrubby pæonies.* In general the protection of a frame is required; for though the plants will stand the winter in sheltered situations without any covering, yet as they produce their leaves and flowers early in the season, these when exposed to the spring frosts are liable to be injured. Mr. Curtis of Glaxwood Nursery, who cultivates the *P. Moutan* to a great extent, recommends an open airy situation and no protection whatever; and the plants, under this mode of management, are not forced forward so as to come into bloom before the season is settled. The best soil is a rich sandy loam. As the growth of these plants is also slow, they require very little pruning, and indeed not much care in any way. There are pæonies in Ireland, and also in other parts of the country, which have attained a very large size. (See *Gard. Mag.*, vol. i. p. 154., and vol. viii. p. 473.)

5784. *The shrubby species may also be propagated by cuttings.* "In February select any of the stems of the *Pæonia Moutan*, or all may be used; and at the distance of half an inch from the centre of each bud, both above and below it, cut out entirely round the stem a small ring of the bark, rather more than the thickness of an inch wide, in the manner of common thieving, as practised on fruit trees. The stem so cut will occupy one inch of the stem, where the direct continuation of its bark is obstructed, both above and below, by the rings which have been cut out of it. The stems so prepared are then to be laid horizontally about three inches beneath the soil, leaving only the leading bud at the end of each branch above the surface. In six months every bud will have made a vigorous shoot, and the general will have two radical stems at its base. In August remove the soil from

above the layers, and having raised the newly made roots, carefully separate each young shoot from the main layer, by passing a small knife from one ring to the other, cutting out about one third part of the old stem. The young plants should then be immediately potted, to remain till they are required for planting out in their final situations. After thus gathering the first crop of young plants the old layer should be again covered with good soil, and left as before; and in the following summer a second and greater crop of plants will be produced than in the first season; and, what is more remarkable, they will issue from various parts of the stem, there no trace of a bud was previously indicated." (*Memor. & Botanic Garden*, part v. No. 241., quoted in the *Gardener's Magazine*, vol. vi. p. 102.)

SUBJECT. 14. *Georgina*. — *Georgina variabilis* W. and *G. coccinea* W. (*Dahlia pinnata* Cav. Ic. i. t. 80. and 266.); *Polyg. Super. L.* and *Corymbifera J.*

5785. *The Georgina* grows wild in Mexico, in sandy meadows, and was sent to Madrid in 1788, and thence to England in the same year; but the plants being lost, seeds were reintroduced by Lady Holland in 1804, and from these and some plants imported from France during the peace of 1814, the present extensive stock has originated. Independently of the great beauty and diversity of the flowers, they are in perfection at a season, when, till they came into notice, our gardens had but little ornament. The name *Dahlia* is improperly given to the genus, because, as Mr. Sweet has shown (*Gard. Mag.*, vol. v. p. 163.), it had been previously applied to another by Plumberg.

5786. *The varieties* are exceedingly numerous.

The leading varieties of the fertile-rayed *G. variabilis* are the purple, rose, pale, white, sulphur, yellow, tawny, copper, brick-red, dark red, rose-crimson, &c. The half an inch from the centre of each bud, both above and below it, cut out entirely round the stem a small ring of the bark, rather more than the thickness of an inch wide, in the manner of common thieving, as practised on fruit trees. The stem so cut will occupy one inch of the stem, where the direct continuation of its bark is obstructed, both above and below, by the rings which have been cut out of it. The stems so prepared are then to be laid horizontally about three inches beneath the soil, leaving only the leading bud at the end of each branch above the surface. In six months every bud will have made a vigorous shoot, and the general will have two radical stems at its base. In August remove the soil from

georgina, which were most in request in 1822, will be found in the *Gard. Mag.*, iii. 180.

Annemone-flowered georgina. This division of the family has the flowers with their centres composed of narrow radiated lobes, like the small petals in the centre of the double anemone.

They were first brought into notice by Mr. Drummond of the Botanic Garden, Cork, about 1822, and it is supposed that he originated them by ascending the variety known as *transitiflora*, with a common double *georgina*. (*Gard. Mag.*, vi. 77.)

Double-flowered georgina. There are some varieties of this flower which have the centre very double and filled up in the manner of a double ranunculus. This division is supposed to have been originated by some of the Parisian nurserymen. One of the finest varieties is the *Aurora*. (*Gard. Mag.*, vi. 78.)

Globe-flowered georgina have small globular flowers, very double, and showy, with various greenish colour, though they are deficient in that breadth and splendour, which characterizes the anemone-flowered division.

Varieties of any of these divisions may be increased to any extent. In the spring of 1831, Mr. Lord, florist and seedsmen, Bury St. Edmunds, sowed seeds of Douglas's *G. spectabilis*, which is a shaded rose colour. From this seed plants arose, which, on their blooming in the September and October following, displayed respectively the following colours: striped red dark crimson dark lilac, rose, light crimson, shaded crimson, light scarlet, purple, crimson, bright crimson, salmon, and dark red, besides one of a very dark colour, something like *G. pallis*, and another of the same colour as *G. methiblis*. From the scarlet turban *georgina* Mr. Lord has raised different shades of scarlet, crimson, and lilac, and one plant with blossoms of a red colour. From *G. coccinea* aspræ he has raised plants with crimson, purple, and scarlet, orange, and yellow, &c., and dark crimson flowers. Mr. Barrett, of Hardwick (raiser of those superb *georginas*, Barrett's *Sensation*, and Barrett's *king*), has seen a double and yellow flower produced by different plants raised from one head of seeds. (*Gard. Mag.*, viii. 47.)

At almost every nursery several hundred sorts may be procured; but as new sorts are continually coming into fashion, and the old sorts becoming neglected, it would be of little use presenting a list of varieties.

Dwarf georgina. The merit of producing them belongs to Mr. Joseph Wells, gardener to the William Wells, Esq., Redleaf. This excellent gardener succeeded in raising sorts which combined beauty with early and abundant flowering, with blossoms of the most beautiful description. The plants are from 2 to 3 feet in height. A list of 60 of the dwarf

5787. *Criteria of a good georgina*. The flowers should be fully double, always filling the centre; the florets should be entire or nearly so, pointed or rounded, reflexed, and so forming a globular kind, regular in their disposition, each series overlapping the subadjacent wards; they may be either plain or quilled, but never distorted; if, instead of being reflexed, the florets are recurved, the flower will be equally symmetrical. The peduncles ought to be sufficiently strong to keep the plants erect, and consequently well exposed to view, and long enough to show the flowers free of the leaves; if they are a little pendulous in the taller-growing sorts, they will have a more elegant appearance. The plants should flower early and abundantly, and retain its characters until the end of the season. Bright and deep velvety colours are most admired. (*Gard. Mag.*, vol. iii. p. 180.)

5788. *Propagation*. By dividing the roots, and by cuttings for ordinary purposes, and by grafting either on the root, or on the herb, for multiplying rare kinds; and by seed for new varieties and also for increasing the stock of this plant, as the seedlings flower the first year. In dividing the root care must be had to preserve a bud to each section, otherwise, though the tubers will throw out roots, they will not produce leaves.

5789. *By cuttings*. "Take them from the root about in spring, or the tops of the young shoots, as early in summer as may be; in the last case, cut the lower end smoothly off in the middle of a joint, and leave the leaves on the top, except such as would be buried in planting the cutting. Plant in sandy soil, on heat, and cover with a hand-span, and they will strike and produce both flowers and tubers before the autumn. Nash directed to place the roots early in February close together, without potting, in a hothed frame, or in any forcing department containing a moist atmosphere, sprinkling a little loose earth over them. In a short time numerous young shoots will be protruded from the buds on the roots. These shoots may either be slipped off, or, if it is desired to have a second crop of cuttings, they should be cut off, leaving a bud on the bottom of each shoot. The cuttings, being prepared, are to be put into pots of the middle size in light rich sandy loam, and placed in a hothed frame, and shaded, but not watered. In a fortnight they will have struck root, and may be removed to the greenhouse or to any other place where they may be protected as soon in the season as possible: when obtained, select a good tuber of a single sort, taking especial care that it has no eyes; with a sharp knife (for a dull edge would mangle the fleshy

root, make it jagged, and so prevent a complete adhesion), cut off a slice from the upper part of the root, making at the bottom of the part so cut, a ledge whereon to rest the graft; this is recommended because you cannot touch the graft as you do a wood-shoot, and the ledge is useful in keeping the graft fixed in its place while you tie it; next cut the scion sloping, to fit, and cut it so that a joint may be at the bottom of it, to rest on the sloped ledge; a small nail may be effected within the ledge, provided the graft can be well fixed to the tuber, but the work will not then be so neat. It is of advantage, though not absolutely necessary, that a joint should be at the end of the scion, for the scion will certainly grow from the joint, and the lower joint; the stem is formed from the upper joint. I therefore procure the cuttings with the two lower joints as near together as possible. After the graft has been tied, a piece of fine clay, such as is used for common grafting, must be placed round it: then put the root in fine mould, in a pot of such a size as will bury the graft half way in the mould; place the pot on a little heat in the front of a cucumber or melon frame, if you chance to have one in work at the time; I prefer the front for the greater convenience of shading and watering which are required. A striking place may be put over the graft, or not, as you please. In about three weeks the root should be shifted into a larger pot, if it be too soon to plant it in the border, which will probably be the case; for supposing the work was begun in March, the plants cannot go out till the end of May, so that the shifting will be very essential to procure the plants in due time, per season of planting out shall arrive." (*Hort. Trans.*, vol. iv. p. 476.) Nash observes, that for grafting the *georgina*, dry roots should be reserved for the winter in a dry cellar, in close stocks; and that when cuttings of the desired sorts are in readiness, single tubers should be taken from them, and slit from the top, two inches downwards; the scion should then be cut to fit the tuber, and inserted into the hole, and the tuber, binding it well up with good heat. The grafts may then be put in small-sized pots, and placed on heat. (*Gard. Mag.*, vol. vii. p. 38.)

5790. *The following directions are extracted from Sabine's excellent paper on this subject in Hort. Trans.*, vol. iv. p. 426. Collect the seeds in September from the dwarf plants, which are preferred to others, as they are the most delicate double flowers when double varieties are chiefly desired. Perhaps seeds obtained from those particular sorts of the disc which have shewed their form, may have a greater tendency than others to produce plants of the same kind. Sow in March, or earlier, on a heat of 55° or 65°; the young plants to be pricked out, if necessary, in pots, and kept in a moderate temperature, say 50° or 55°, till the end of May, when they should be taken out, where they are to remain, covering each plant at night with an empty pot for some weeks, to avoid injury from spring frosts. If in a compartment by themselves, plant in rows three feet wide, and in two feet between the rows, and in the end of the border, plant in the back rows. In either case they require to be staked. Seedlings thus treated will blow in July, and continue in perfection till the autumn; but the first frost takes the

same effect on the georgina as it does on the potato and kidney-bean. A blow may be prolonged by planting in large pots and removing early in autumn to the greenhouse. Some gardeners succumb to artificial, and some others who do this extensively we may mention Bates, at the neighbourhood of Oxford. The flowers he intends to frondaceous by art, he covers two or three days previously to their expansion, in order to prevent their being frondaceous from other flowers, by heat or the weather. When the flower expands, he takes a camel-hair pencil, and touching with it the poles of the flower of the colour or form desired to be added to the incident or frondaceous parent, he touches with it each flower separately, keeping the whole flower covered with the pause bag for eight or ten days after the last flower has expanded. The frondaceous requires to be performed two or three days according to the weather, as the flowers do not all expand at once. (*Gard. Mag.*, vol. x.) Many cultivators, however, consider such frondaceous unnecessary; a single flower, as we have already seen (sect. 5766.), producing offspring of all the colours and forms peculiar to the species.

5792. *Soil and situation.* Georgina thrives best in rich loam, and a clear open space, neither sheltered by trees or walls. Like the potato, they exhaust the soil considerably, and do not thrive well when repeatedly planted on the same spot.

5793. *Planting full-grown roots.* These may either be planted at the spot where they are to flower, and be protected by covering with litter or by empty pots, as in transplanting seedlings; or, when an early blow is wanted, they may be planted in large pots and forwarded in frames or pits, or in any spare house, where the temperature is equal to that of the green-house, till the middle of May, when they may be planted where they are finally to remain, and will flower in June. Sabine says, "georgina look best in a large mass, unimpaired by other plants; in this plan of growing them, some nicety is required in the due distribution of the sorts, so as to have a proper and good mixture of colours; and particular care is necessary to keep the tallest plants either in the centre or at the back of the

clump, according as it is destined to be viewed, from one side only, or all sides, and to place the whole so that there shall be no unevenness in the general shape of the entire mass, arising from the irregular arrangement of the individual plants, according to their respective heights. The roots should be planted about three feet from each other every way; this distance will keep the stems sufficiently distinct, and yet so united that the whole clump will have the appearance of an unbroken wood or forest of georgina. They look very handsome if planted in the manner of an avenue, in a straight line, on each side of a walk, instead of the usual mode of trying the plants steady to stakes, spread them out like espaliers, while others peg them down to the ground, and so give the appearance of a bed of flowers. Georgina bordered with China asters, especially the German varieties, have a splendid effect.

5794. *General culture.* No particular care is requisite after the plants are neatly tied to stakes (single stakes inserted close to the stem, we consider the most elegant mode), till they have been attacked by the frost; they should then be cut down, and in very dry soil, the roots may be covered with as much straw, old tan, or leaves, as would be necessary to keep the frost from the tubers of a potato-plant left in the soil. If this is done, they will blow well and early next season. But the most general and safest way, especially with the valuable sorts, is to dig up the roots or a portion of the stem attached, and to plant or beat them in pots or boxes among sand or dry mould, and keep them under the stage of a green-house, or in some dry airy place, free from the drip of water, or the access of frost, till the spring. On a large scale, they may be pitted like potatoes, or raised in ridges with sand in cellars, and covered with straw; the object being to keep them sufficiently moist and plump to maintain the living principle, and yet not to rot them, or have them destroyed by frost. Some preserve the most choice sorts in boxes covered with very dry sand, and placed in a room, the temperature of which is never allowed to fall below 40° or 45°.

SUBJECT. 15. Auricula.—*Primula Auricula* L. (*Jac. Aus.* 5. t. 415.); *Pent. Monog.* L. and *Primulaceae* B. P. *Oreille d'ours*, Fr.; *Aurikel*, Ger.; *Beerenoren*, Dutch; *Orecchio d'orso*, Ital.; and *Orgia de oso*, Span. (*Fig.* 853. f. represents the plant in its unimproved state.)

5795. *The auricula* is a native of the mountains of Switzerland, Austria, Syria, and the Caucasus, &c. It was cultivated by Gerard in 1597, under the name of bear's ears, or mountain cowslips. To show what cultivation may perform on this plant, Professor Martyn relates, from Morant's *Colchester* (1768, p. 92), that Henry Stow, a gardener, near that place, a famous grower of auriculas, had some plants with no less than 138 blossoms on one stem. About a hundred years ago, Justice informs us that the passion Revolution, used to re-supply us with the progeny of our own flowers. Justice was the most enthusiastic cultivator of the auricula, and, indeed, of all florists' flowers of his time. After him the Lancashire growers are the next to be distinguished, and more especially Maddock, the well-known author of the *Florist's Directory*, originally from Warrington. The best collections are now to be found among the commercial gardeners near London, and the operative manufacturers and artisans near Manchester, Paisley, and other large towns.

5796. *The varieties* are endless.

The colours of the flower in its wild state are yellow, purple, and variegated. Gerard figures the yellow, purple, red, scarlet, blue-coloured, and bright red, most of which grew in the London gardens in his time. Parkinson, in 1629, enumerates 40 varieties, and says many more were to be found. Res, in 1704, has an

increased number, classed as purple, reds, yellows, and whites. In 1792, the catalogue of J. Maddock contained nearly 500 names, and divided into *ligules*, selfs, or plain one-coloured sorts; double flowers; and plain or self-coloured sorts. The latter only are held in esteem, and few collections contain more than two or

three sorts of the fundamental colours, and as many double flowers. Double varieties are more common. Hogg's catalogue for 1833, contains nearly 300 names arranged as flowers with green edges, grey edges, white edges, plain or self-coloured sorts, and shaded flowers of one colour.

5797. *Criterion of a fine variegated auricula* (*Fig.* 853. a, b, c, d, e).—"The stem should be strong, erect, and elastic, and of a proper height, that the bunch or truss may be above the foliage of the plant. The peduncles, or footstalks, of the flowers



should also be strong and elastic, and of a proportional length to the size and quantity of the pipe, which should not be less than seven in number, that the bunch may be rather round, close, and compact. The component parts of the pipe are the tube (with its stamens and anthers); the eye; and the exterior circle containing the ground-colour, with its edge or margin; these three should be all well proportioned, which will be the case if the diameter of the tube be one part, the eye three, and the whole pipe six, or nearly so. All the admirers of this flower agree that the pipe ought to be round; but this is seldom happens; and we must be content if they are so nearly round as

not to be what is termed starry. The anthers, or summits of the stamens, ought to be large, bold, and fill the tube well, and the tube should terminate rather above the eye; the eye should be very white, smooth, and round, without any cracks, and distinct from the ground or self-colour. The ground-colour should be bold and rich, and equal on every side of the eye, whether it be in one uniform circle, or in bright patches; it should be distinct as the eye, and only broken at the outward part into the edging; a fine black, purple, or bright coffee-colour, contrasted with the eye; a rich blue or bright pink is pleasing, but a glowing scarlet or deep crimson would be most desirable, if well edged with a bright green; but this is seldom to be expected. The green edge, or margin, is the principal cause of the variegated appearance in this flower; and it should be in proportion to the ground-colour, i.e. about one half of each. The darker grounds are generally covered with a white powder, which seems necessary, as well as the white eye, to guard the flowers from the scorching heat of the sun's rays, which would soon destroy them if they were exposed to them in a full sun.

5798. *Propagation.* By rooted slips, or dividing the root for continuing approved sorts, and by seed for obtaining new varieties. The best time for taking off slips, or dividing the roots, is after the plant has done flowering and ripening its seed, if this last is permitted. The operation is therefore generally performed in July and the beginning of August. Emmerton says, the Lancashire growers will not take off or sell a slip before the 5th of August, on which day they begin to execute orders for young plants.

5799. *By seed.* Maddock says, "the surest and best method to obtain fine auriculas from seed is to provide ready to hand strong plants, of capital high-coloured sorts, possessing first-rate properties; these, on the approach of bloom, should be detached from the rest to a remote part of the garden, where exposed to the sun, air, and rain, when the last is in moderation; but if in excess, they should be preserved from it by mats on hoops, or small hand-frames may be placed over them. In dry weather, they must be regularly watered as often as they require it; for much depends on a due attention to this particular point." Emmerton is a warm advocate for raising the auricula from seeds, and says, any one who will follow his directions may be certain of raising very fine sorts. He selects the flowers he intends to breed from, according to the properties he desires in the offspring. Thus, he advises to procure the following sorts, sufficiently well known to the London and Manchester florists, and to plant them in pots; six plants of two sorts in each pot, viz.:-

as the only true method to procure a fine blow of auriculas, such as I had this last spring (1768); which, to the sight of numbers of amateurs, resembled all the blows of auriculas ever seen in Scotland, in England, or in Europe; which was composed of the most capital flowers in England and Holland, and some very rare seedlings of my own raising." The soil he recommends is, one half free (fresh loam, from under an old pasture; one half composed of the following parts, viz. three parts three-year-old cow-dung, and one part sea or river sand, or horse-dung to be sown in the bed; the ingredients not to be mixed together till a few days before being made use of: "for otherwise, when they are mixed for some time, they breed vermin and worms." He adds, "if you use fullers' earth to them, it must be done in the spring dressing; for if used in autumn, it is prejudicial; and even when it is used in spring, it must be well stirred by frequent shirings before being used, and then use no sand." (*Brit. Gard. Direct., art. Auricula.*)

5614. Curtis, in a note to the last edition of Maddock's work, says, "We have seen the strongest auriculas produced from the following ingredients: two thirds of the rotten dung from old hotbeds reduced to fine mould; one third containing equal parts of coarse sand and peat or bog earth, such as is used in the culture of heaths, mixed well together by shirings or sowing, and suffered to be well aired by frequent shirings during the frosts of winter." (*Floria's Direct., p. 161.*)

5615. Henderson, of Dalrym, uses two parts of very rotten dung from old hotbeds, one part of peat-moss, one quarter of river sand, and one whole, and expounding it for a winter. (*Calcd. Hort. Soc. Mem., vol. ii. p. 530.*)

5616. The compost in most general use among auricula-growers is of fresh loam, perfectly clean, new fibres for new fibres, four parts of each, adding one tenth of the mixture of sea or river sand. Some use leaf-mould instead of cow-dung. The whole incorporated and prepared for one summer and one winter in the usual manner.

5617. Manner of growing. The common sorts are grown in beds or in mingled borders; but all the fine flowers in pots. Maddock recommends pots of six inches and a half (interior diameter at top) four inches deep; the interior bottom diameter four inches, for full-grown flowering plants; and smaller sizes for seedlings and newly separated offsets. Repotting used in the autumn, eight inches deep, eight inches and a half diameter at the top, and four inches and a half at the bottom, outside measure.

5618. Time of potting and transplanting full-grown plants. The most advisable time to pot auriculas, according to Maddock, is, immediately or soon after bloom, and this should be repeated annually (notwithstanding the opinion of some who say the plants bloom better the second year after potting) for this obvious reason, that it preserves the health and constitution of the plants, by affording them a fresh supply of nutriment; and at the same time the cultivator has an opportunity of re-arranging their fibres, if grown very long, or of cutting off the lower part of the main root, if too long, or the end of it is decayed; thereby forcing the plants, as it were, into a state of action, and causing a continued circulation of their juices, during the summer, in the formation of new fibres, and the necessary sustenance and support; whereas, if this operation of potting is not performed till the second year, the soil must have lost a considerable part of its nutritious quality, which will produce a proportionate decline in the strength of the plants; and it is deferred till the autumn, there will not be time for a sufficient reproduction of the fibres before winter sets in, the effects of which will be a faint-colored and weak bloom the ensuing spring. The only objection of any importance, against spring potting, is that some sorts will in consequence be more inclined to blow in the following autumn, and thereby deprive the plant of its capacity to bloom well the ensuing spring; this, however, occurs but in few instances.

5619. In potting or transplanting auriculas, the plants should be carefully turned out of the former pot, and the earth shaken from its fibres; the soil should be examined if found too long, and numerous, together with the lower end of the main root, and the fibres attached to that part, if it appears too long, or somewhat decayed; the plant is to be, at the same time, carefully examined, and wherever any unsoundness appears, it must be entirely eradicated by means of a sharp penknife; let the extent of it be ever so great, till no appearance of decay remains; particularly in that part of the main root where it enters the surface of the earth, or, as the sailors phrase it, betwixt wind and water, which, being alternately wet and dry, is more subject to decay than any other part, and for the same reason is the most difficult to heal: the wounded part should be immediately exposed to the sun, and when the surface of the wound is perfectly dry, a cement should be applied consisting of beef's tallow and pitch, about one half of each, warmed and softened in the sun, or by a fire, to make it adhere more firmly on application: this will become close and hard when cold, it will resist moisture, and is the best application yet discovered, to prevent the entrance of water, and to keep the lower leaves of the plant, next the surface of the earth, become yellow, or dried up, it is proper to strip them off, in a direction downwards. On replanting, a pot suitable to the size of the plant is to be selected, and it is to have a hollow oryster shell placed with its convex side upwards, over the hole at the bottom, and then to be about three parts filled with compost, higher in the middle than at the sides: the plant is next to be placed therein, with its fibres regularly distributed all round, so as nearly or quite to reach the sides of the pot, which is afterwards to be filled up with the compost, adding a new stratum of earth to the firm and compact plant, on the surface: the bottom of the pot should then be gently struck two or three times against the table, which is supposed to be made use of for the sake of convenience in the operation, in order to render the soil more firm and compact; this will cause it to sink or subside about half an inch below the top of the pot, which will prevent the loss of water when it is administered.

5620. Henderson strongly recommends attention to the putting plants of broken tiles at the bottom of the pots, to secure a good drainage, many potted plants being destroyed by the retention of water about their roots. (*Supp., p. 170.*)

5620. The true depth to plant an auricula is within about half an inch of the bottom of its lowest or outside leaves; as they grow and new viable fibres proceed from that part, so they should immediately meet with earth to strike into, or otherwise they will perish; it will likewise encourage the offsets, if

there be any, so struts must come down they would do if not in contact with the soil. (*Floria's Direct., p. 162.*)

5621. On the flowering of auriculas. Maddock, in other words, has the following note:—"Notwithstanding the author has so particularly recommended the annual fresh potting of auriculas, yet he long leaves to differ in opinion from him, as far as relates to those plants which are intended to bloom strong the following spring, the mode of potting advised being to shake the whole of the earth from amongst the fibres of the plants, in order to encourage the growth of new fibres, and this severe operation being performed in the spring, when the plants ought to be making their most luxuriant growth, will have evil consequences. The case is clearly this: the plants are intended to bloom strong the following spring, and in the spring, during this rapid growth, the operation gives an unnatural shock to vegetation; the consequence is, the plant must remain dormant until fresh fibres are formed sufficient to draw nourishment for supporting the growth necessary to form a strong-blooming plant. Having given our opinion against it, we subjoin the following recommendation: select those plants intended for strong blooms the following spring from the younger ones, turn them out with their balls of such earth, and, if the fibres are healthy, return the balls into a set of pots one size larger than they were in, and fill them up with good soil to fill; we have no objection to remove a such earth as can be done without disturbing the mass of soil; in this state turn them as usual, and when their which have become strong on this plan are ready to flower, pot them in the same manner as the former ones. We long leave also to state, that it sometimes happens that the outer-shell placed at the bottom of the pot, by sitting too close, confines the water in it, which is inevitable to some extent, and it is therefore of great particular care to be taken for the effectual drainage of a superabundance of wet, by putting two or three pieces of broken pot over the surface of the bottom."

5622. Henderson recommends the first week in August, because "if you put your plants at this early period of the summer into pots, in which they are to remain till they flower again next spring, the space of nearly twelve months will be the time of the summer, and the plants will be growing before that time, particularly as they require so much water during the last months of June and July; this must tend, beyond all doubt, to create a more nutritious constitution in so small a body of earth, as is in the pots; by which means they will be less able to throw out strong fibres, or to produce your strong blooms in the spring. Early potting is attended with another evil consequence, to wit, the plants being cramped into a small quantity of earth, accompanied with daily waterings, forces them prematurely into a state of active vegetation, and causes them to flower too in the autumn; a circumstance which is very disagreeable to viewers with regard to the appearance of the plants, and will also have acquired more strength and better root, by being suffered to adhere to the parent plant till the beginning of August, and will occasion you less trouble in your next spring, than the former. From the beginning of August till the beginning of November is a period quite long enough for the plants to strike fresh fibres, and to get well established in the pots, before winter; and, with the return of spring, you may expect vigorous growth of the plants in all the pots. The customary mode is, to shake the mould completely from the roots every second year; but, in doing this, you must be guided by the state and condition of your plants. The less time it is to remain very frequently until the third year, reducing the bulk of earth only, trimming the fibres, and examining the crown or main root. Transplanting should be done in a cloudy day and a moist atmosphere."

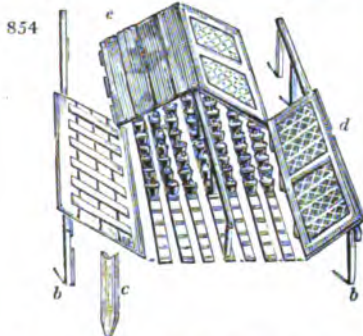
5623. Justice pots suckers, and transplant old plants, in August. Henderson, of Dalrym, says, "The shifting must be always, with me, about the third week of May, and the plants should be shifted in the same manner. At the end of the old plants, and cut the end of the stump up to the fresh young roots, if it has grown too long. (I am now speaking of those plants which have been in the largest-sized pots for two years.) After dressing the wounds with pen-ink, to prevent gangrene, the plants are repotted in the second size of pots. Next May they are shifted, with the ball roots, less the largest size, or two-year-olds; so that from the first potting of the young plants in small pots, to a complete shifting, ten years elapse; the plants having been one year in small pots, one in the second size, and two in the largest, or third size. A little river-sand is put round the stems at all the shiftings; and if any wounds are made by taking off the suckers, they are dressed with mastich. At all times the stems are cleared of sprouts above ground as they appear, but suckers from under the soil are allowed to grow in order to raise young plants." (*Calcd. Hort. Soc. Mem., vol. iii. p. 530.*)

5624. Removal and potting of offsets. When often they are found or more fibres than the main plant, or when the main plant directs to remove them by means of a piece of hard wood, or by the use of the fingers, to be separated from the old plant with safety, and replanted round the sides of a small pot, with the same compost. All the offsets which are ready to occupy pots separately, if a small hand-glass be placed over each pot containing these newly planted offsets, it will cause their fibres to grow more rapidly; but it should not be less continued, as it would have a tendency to draw and weaken the plant. (*Floria's Direct., p. 130.*)

5625. General culture. Maddock keeps his auriculas during one part of the winter in what he calls a summer repository (Ag. 854), and the other in a winter repository.

5626. Summer repository. "The following is recommended as a proper plan for the summer repository, viz. in the first place, a room should be built of brick or stone, and covered with where it is intended to be erected, about five or six inches thick; or a platform of plain square tiles, closely fitted to each other, on the surface of the ground, to preserve the pots from the earthworm, which, when the weather is warm, will come upon them, would perforate, and alter the constance of the soil, in such a manner as to prove very injurious: upon this foundation rows of bricks (Ag. 854) are to be placed in straight rows about two or three inches asunder, and the space between the circulation of air under and between the pots when placed upon them; an object of great importance, especially in warm weather, when the air is most inclined to stagnate, and hence

impregnated with noxious effluvia. The plants, by the above plan, will be raised from nine to twelve inches above the level of the ashes or platform. There should be two rows of substantial stakes, three feet long, and five inches by three wide, one row of which should be placed on each side about three or four inches' distance from the two outside rows of pots (b); these stakes (c) should be driven twenty inches into the ground, with their narrow sides towards the pots, and have notches cut in their tops, to receive the edges of the shutters they are intended to support. By way of illustration, suppose the whole length of the platform to be twelve yards, and the width three feet, it will contain seven rows, and each row about seventy pots; a sufficient number to constitute a moderate collection for a private gentleman. Three shutters (f), made with



feather-edged inch-deal boards, each four yards long, and two feet six inches wide, will reach the whole length on one side: three of the notched stakes will be sufficient to support one of these shutters; of course, fifteen stakes at proper distances will completely answer the purposes on one side: the notches are to be cut in the form of a V, two inches deep and three inches wide at the top, which will give room for the shutters to move backwards and forwards, without difficulty or danger of slipping out. Both sides are thus to be provided with stakes and shutters, the upper edge of the latter should meet over the centre of the platform (e), when the plants require to be covered with them, in the form of the ridge or roof of a house, well fitted and sloping equally on both sides, so as to throw off rain, without even admitting it to drip through upon the plants in any part. It is necessary that a rail, or row of stakes, of a proper height and strength, should proceed from the ground between the two middle rows of pots, to support the shutters when closed or closing, especially as it is usually more convenient to begin to cover or uncover on one side first, and finish on the other; without a support of this kind, in such case, the shutters must fall down upon the plants: a similar exterior rail, or row of stakes, is necessary on each side, to support the shutters when open, with the same degree of slope, in a contrary direction than when closed; by which means the plants will have a free communication with the air, whether covered or open: nor are they entirely deprived of light, when the shutters are closed, because the lower edge of the shutters is as high or higher than the top of the plants at all times. The peculiar advantage arising from this plan is, that when the plants require to be shut up from excess of rain, they are at the same time the advantage of a continual supply and free circulation of fresh air, which passes amongst their leaves in all directions; whereas those who are obliged to shut up their plants in a close frame, to exclude excess of rain from them, oftentimes shut them up in a wet state, as soon as it is judged they have had a sufficiency: this is a very dangerous, though not unusual practice, and often produces a mildew, which is attended with the most destructive consequences. The importance of a properly constructed repository, and suitable treatment of the plants, for the summer season, will sufficiently apologise for any prolixity in the description: it cannot, indeed, be too strongly impressed on the mind of the cultivator of this delicate flower that his success more particularly depends on the health and vigour of his plants towards the end of summer, than at any other period of the year. The plants, after being placed in the summer repository, are to be kept moderately moist; if the rains that happen are not sufficient, they must be occasionally watered with soft water, by a small pot with a round curved spout, taking care not to let any water fall into the heart or amongst the interior leaves of the plant, as it could not speedily dry up in that part, and, of course, would endanger a decay; any water lodging in the heart of the plants in spring, when the blossoms begin to make their appearance, cannot fail to injure them considerably. The plants are to remain in the summer situation till September or October, as the weather may be more or less favourable, or until the heat of the sun has considerably decreased."

8517. *Ray's* removes his auriculas which have blown in spring from the show-still at a north-east aspect, to avoid the scorching rays of the summer sun. He then sets them upon thin boards or thin slates, lying on a bed of coal-ashes. (*Treatise*, &c., 115.)

8525. *Juster* sets his plants in a full northern exposure, and without covering, to the 20th of October. Whichever of these plans be adopted, the plants must be kept clear of weeds, the soil gently stirred, and it set hard or mossy, water supplied in dry weather, and the leaves, as they become yellow, drawn off close to the stem.

8535. *Winter repository.* In the end of September or beginning of October, *Juster* removes his auriculas to the winter repository, "which is to be constructed in a manner exactly similar to that for the summer season, with only one exception,

viz. that the south side of it should consist of frames of glass (fig. 604, d), instead of the wooden shutters; these are to act in the same manner, but will admit of light when the plants are of necessity shut up from adverse weather, which so frequently occurs during winter, the admission of light at such times is indispensably necessary to the wellbeing of the plants, especially when the long continuance of rain, or severe frost, renders it requisite to keep them covered, sometimes perhaps for a day or two, with little or no intermission. In the first favourable weather that occurs in February, it is necessary to divest the plants of their decayed exterior leaves; and by the middle of that month, the operation of setting up, as it is termed, should commence; that is to say, the superficial earth of the pots should be carefully taken away, about an inch deep, and fresh compost with the addition of a little loam, to give it more tenacity, should be substituted in its stead: this will contribute greatly to the strength of the plants, and the vigour of their bloom: at the same time it will afford a favourable opportunity to separate such offsets as shall appear possessed of sufficient fibre, to be taken off at this early season with safety: these offsets, when properly planted in small pots, should be placed in a frame, in some warm sheltered situation, till the roots are established. The auricula is by no means a tender plant, yet it will be proper to cover the repository with mats, in case of severe frost; for although it probably would not destroy the plants, unless it happened in an extreme degree; it would, however, injure them, and perhaps speedily destroy them, particularly early in the spring, when the stem begins to rise; it would certainly, at that period, destroy or render the pipes or corollas abortive. If any plant is possessed of more than one or two principal stems, it is advisable to pinch off the pipes the smallest and weakest, in order to render the blossoms of the remaining one larger and more vigorous than they would be if this was omitted to be done in due time. It is a curious fact, that those sorts which are naturally possessed of a fine green on the edge, or margin, of the flowers are often known to lose that property, when the stem proceeds from the very heart or centre of the plant; whereas those stems that proceed from the side produce larger pipes, possessing their true natural colours in much greater perfection: these last are called the winter stems, because they are usually forwarder, and produce their flowers rather earlier in the season than those which proceed from the centre of the plant. When the pipes become rugged, and begin to expand, they must be preserved from rain: nor should they remain any longer in a situation exposed to cold winds; on the contrary, such plants ought to be selected from the rest, and removed to a calm shady corner, where they should have small hand-glasses suspended over them in such a manner as to preserve the bloom from rain, &c. and yet admit a free circulation of air, both to the plant and to the blossom, it being equally necessary for the one as for the other."

8530. *Hogg* puts his auriculas into frames in October; the frames are placed on a bed of ashes, and are raised on bricks to admit a free current of air under them; but when the frost sets in, about Christmas, the bricks are removed, and the frames rest on the ground. In all dry and temperate weather the plants are exposed to the air, very little water is given, and the plants are kept free from decayed leaves, and the surface of the pots from mouldiness. From the second week of February, and during March, the plants are allowed the benefit of general rains for an hour or two; they are top-dressed, such as require it are shifted, and suckers are taken off where they are large; and while as possible rain is given during day; on the shut close at night, to prevent the opening blossoms being nipped by the frost.

8531. *The Lancashire growers* have no frames or lights, but make use of weather-boarding, with hinges, fixed against some wall or fence, in a south aspect, to defend them against the rain and snow, resting, when shut close, upon a board nine inches high; but this is never done except in very severe weather: the pots are plunged up to the rim in sawdust or coal-ashes. (*Hogg*.)

8532. *Juster* places his auriculas in what he calls a bunker or shed, on the 10th of October. This bunker is a shed, boarded ends, front and cover, placed against a wall with a north-eastern exposure. He gives water sparingly, but as much as possible; by the end of February he top-dresses the plants, and if they are weak he adds the proportion of one sixth of fuller's earth to the compost.

8533. *Blowing-stage.* (fig. 855.) This, according to Maddock, should have a northern aspect, that the sun may not



shine on the flowers; it should consist of four rows of shelves, in the form of steps, but must not exceed five; the front, or lowest shelf, should be two feet five inches from the ground, the second about three inches higher than the first, and the rest in the same proportion; these shelves should be six inches wide, strong, and well supported, otherwise the weight of the pots will cause them to bend or give way. If the stage consists of four rows of shelves, its depth should be eight, ought to be about two feet eight inches; the north or front elevation of the stage should not be less than seven feet, gradually sloping to about five feet six inches on the south side; the roof should consist of frames of glass. The most common mode made use of on the south side of the winter repository will answer extremely well for this purpose; but as they will not be wide enough to form the roof completely, without addition, a single row of feather-edged boards may be placed on the lower part of the slope, and the lower edge of the frames of glass may rest upon them; these boards will answer another good pur-

pass, by preventing the sun, which at this season of the year has obtained a considerable degree of altitude, from shining on the first and second rows of plants, during the middle of the day, when it has most power; although the plants of the back row will, in consequence, have rather less light, yet it is not so materially injurious as the former. The posts supporting the roof of the stage, on the south side, may be so constructed, and placed at such distances from each other, as that the wooden shutters, made use of on the north side of the winter repository, may fit between them, and form a regular shed, as low or lower than the higher shelf; the remaining space to the ground may be left open in mild calm weather, or may be easily closed up, by a line of mats sewed together, when it is otherwise. The east and west ends of the stage should be entirely boarded up from top to bottom, and the front left open, unless in unfavourable weather, and at night; at these times, it may be defended by frames of canvas covered with canvas; these should be about six feet wide, suspended from the front edge of the roof by hinges; they will serve both to defend the bloom, when let down, and also by each having two small iron rods, about five feet six inches long, connected with their lowest edges by staples, that will allow them to move in any direction, and support them when up, will defend the path in front from rain, take off the glare of light when the sun shines, and at the same time defend the spectators from its heat. The inside of the back and ends of the stage, and the shelves likewise, should be painted black, or some very dark colour, by way of contrast to the white eyes, &c. of the flowers; and if a large looking-glass be placed at each end of the stage, the effect produced will be very pleasing, by apparently lengthening the stage each way as far as the eye can reach.

5834. *As auriculas and hycinthids generally blow earlier at the same time, the beauty and elegance of the scene is considerably increased by having a stage of the former, and a bed of the latter, under the same awning, with an intermediate path, about six feet wide; in such case, if the cloth covering of the hycinthids is fine enough to admit a sufficiency of light, it may be continued over the auricula-stage, instead of the glass and boards, and will answer all purposes tolerably well with little trouble; or otherwise, the edge of the cloth covering, for the bed and path, may be nailed to the upper or front edge of the glass frames, over the auriculas, in such manner as effectually to prevent rain dripping through in the winter. A row of fine polyanthus, in pots, may likewise be introduced in front of the hycinthids, as they likewise blow at the same time; it will add to the variety, and form altogether a more elegant assemblage of beautiful fragrant flowers than any other season of the year can afford. The tallest blowing auriculas should stand on the last or most distant shelf, and the shortest in front; those stems which are weak and bend should be supported with small wires, fixed in the earth behind them, so as not to be easily discerned. If any of the stems and blossoms of those in the back row incline forward too much towards the light, they may be easily rectified to an erect position, by turning the pots for a few hours in the morning; but the glass roof will render very little of this trouble necessary: the pots must be regularly watered, two or three times every week, during the bloom. No person can depend on a complete stage of auriculas, who is not provided in autumn or early in the spring with twice as many blowing plants as his stage will contain, because some will eventually prove defective, and fall in one respect or other; and a succession of proper plants in bloom will be required to replace such as, being earlier than the rest or of shorter duration, are no longer eligible to remain on the stage, and ought, in consequence, to be taken away, and more suitable ones brought on in their stead.*

5835. *When the bloom is declined, the plants are to be removed into their summer repository, where they will soon recover their former strength and vigour, which, notwithstanding the utmost care and precaution, will have been, in some degree, impaired by standing two or three weeks under the stage.*

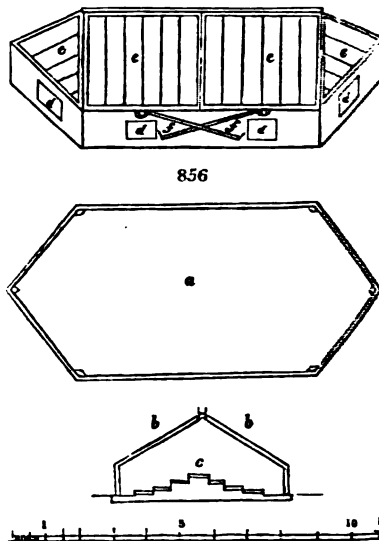
5836. *Hogg keeps the lights over his auriculas in an April night and day, and in consequence, they remain unimpaired. Air admits by raising the sashes behind; he covers up close at night, "this being the very crisis of time that requires your most particular care." He thins out the pipe or blossoms, leaving not more than thirteen, nor fewer than seven on a truss or umbel. In thinning, "they should be taken out two or three at a time, and it requires some taste, nicety, and art, to perform this operation well, that the blossoms which are left on may grow in a regular equidistant form, so that any common spectator might suppose that no such thinning of the pipe had*

taken place, but that they had grown evenly in that form, and with that number, from the first." Towards the end of the month the flowers are removed to the stage facing the east.

5837. *The Lancashire growers, "in blossoming time, set their large show plants under hand-glasses, in an east aspect, to receive the morning sun only. The plants are, perhaps, not so early in bloom as those wintered in frames, but then their stems are not drawn, and they are able to support the trusses firmly; the mildew and rot do not take them so readily as when in closer situations."*

5838. *Justice blows his flowers in the benches, or shade, exposed to the full north; "he gives them all the air he can, but excludes the sun, sheltering them from winds, and warm them well twice a week (first. Gard. Direct, art. Auricula.)"*

5839. *Hinderson, of Deale, blows his flowers in a frame (Ag. 536), which, he says, "answers all the purpose of frame,*



hand-glass, and stage, used by the English florists; at least I make it do so. I have only to erect a screen of matting or poles in front, during the flowering season. The plan of it (c) is a long hexagon, which has a span roof (b), and a low stage elevated on all sides (c). In the elevation are eight ventilators (d), eight hinged sashes (e), and as many iron rods on staples for holding them up. The whole seems a simple, economical, and sufficiently neat structure.

5840. *Cornfield, of Northampton, covers his auricula stage with frames made of light thin deal, in the manner of cucumber lights. These have some fine cambric, or calico, stretched tight, and nailed on the frames, which are oiled with clear linseed oil, once over. These frames admit nearly as much light as glass, will repel the wet, and completely prevent the sun's rays from injuring the blooms or plants. Mr. Cornfield considers this the most economical kind of covering ever invented. (Gard. Mag., vol. vi. p. 426.)*

SUBJECT. 16. *Primula*, or *Primrose Family*. — *Primula* L.; *Pentand. Monog.* L. and *Primulaceæ* B. P.

5841. *The primrose family, grown as florists' flowers, consists of the polyanthus, primrose, cowslip, and oxlip.*

5842. *The polyanthus is the Primula vulgaris var. Polyanthus L. Primula, French, German, and Italian. In its wild state, it is a common mountain plant, growing on sunny open pebbles; but, by cultivation, it throws up a scape, bearing an umbel of numerous flowers, brown, purple, red, and yellow. Linnaeus asserts, that the peduncles in the common wild primroses spring from the base of the leaves, which, as he is not concealed among the leaves, has not been observed. Curtis, however, found it in a few plants, and also that wild primroses, introduced into Dr. Buxton's garden, at Miss Hill, near Greenwich, produced flowers both with and without a scape, and became, colour excepted, perfect polyanthus. Some botanists consider that the polyanthus, primrose, cowslip, and oxlip are one species; and Rev. W. Herbert thinks it as probable, as to have done the same as to *Primula auricula*, *helvetica*, *nivalis*, and *viscaria*. (Hort. Trans., vol. iv. p. 19.) It is sufficient for our purpose to observe, that the polyanthus is a very permanent variety, which does not readily return to the primrose, and that it is in high repute as a select and border flower, appearing in March and April, when there are few others to decorate the flower-beds.*

5843. *Varieties.* These are as numerous as the varieties of auricula; and, as in that plant, single flowers are most esteemed.

5844. *Criteria of a fine polyanthus.* "Its properties are, in most respects, similar to those of a fine auricula; viz., the stem,

peduncles, or footstalks, and formation of the branch or truss; therefore, a definition of its pipe, or petals (Ag. 537, &c.), only necessary to be considered in this place. The tube of the corolla above the calyx should be short, well filled with the anthers or summits of the stamens, and terminate tufted, rather above the eye. The eye should be round, of a bright clear yellow, and distinct from the ground colour; the proportion as in the auricula throughout the flower. The ground colour is most admired when shaded with a light and dark rich crimson, resembling velvet, with one mark or stripe in the centre of each division of the limb, bold and distinct, from the edging down to the eye, where it should terminate in a fine point. The pipe should be large, quite flat, and as round as may be, consistent with their peculiar beautiful figure, which is circular, excepting those small indentures between each division of the limb, which divide it into five or six heart-like segments. The edging should resemble a bright gold lace, bold, clear, and distinct, and so nearly of the same colour as the eye and stripes as scarcely to be distinguished; in short, the polyanthus should possess a graceful elegance of form, a richness of colouring, and symmetry of parts, not to be found united in any other flower." (Madwick.)

5845. *Propagation.* By dividing the root, or by slips, for ornamental purposes; and by seed, for obtaining new varieties.

5846. *By seed.* The plants from which seed is to be sown are to be separated from the stems, and treated in the same

manner as seed-bearing auriculas. When ripe, it should be cut off with part of the stem, and so preserved till the sowing season, which, as well as the mode of procedure, are, according to Maddock, the same as for the auricula. Emmerton says, flowers intended for seed should be selected on the same principle as he directs for the auricula; and he recommends Pearson's Alexander and Nicholson's Tantarara as excellent flowers to breed from. Knight's mode of fecundation may be adopted.

5847. *Justice* says he "has had great success in raising polyanthus and primrose from seed." He gathered the seed generally about the 25th of June, and sowed it ten days afterwards in boxes, placed in the open air, under a wall or hedge with a north aspect. In July, he directs to "prepare a nursery-bed of the same earth in which they were sown, and plant them carefully out, taking up as much earth about their roots as you can, so as not to disturb their young fibres, planting them twelve inches asunder, and shading them from all sun until they have struck new roots; keep them clear from weeds, and give them gentle waterings, and let this nursery-bed be made in such a situation as to have the morning sun only. Some of them will show their flowers the same autumn, and many of them in the spring following. Select the best, and plant them in a bed by themselves in a shady moist situation. In November, top-dress the plants, which will greatly strengthen them for the succeeding spring. They require to be transplanted every two years." (*Bell. Gard. Direct.*, p. 318.)

5848. *Soil.* Maddock and Emmerton recommend the same compost as for auriculas, but with more loam. *Justice* uses the following:—"To a well rotted cow-dung or leaf-mould of trees, take half a load of fine white sand, and two loads of fine hazely loam, taken from a pasture some months before, and which has had the sword rotted amongst the earth: mix all well together."

5849. *Hogg* says, "The primrose and polyanthus require a much greater portion of sandy loam than the auricula, a very small quantity of rotten dung, and a little leaf-mould or peat earth, mixed with them; in this they are found to grow extremely well."

5850. *Manner of growing.* Maddock says, they may be grown in the same-sized pots as the auricula, and be treated in the same manner; but they are more impatient of heat than all, and drought, and partial to shade and moisture, they may, with equal propriety, be planted on cool and shady beds or borders. This is the general practice of almost all the growers of this flower.

5851. *General culture.* The polyanthus is very hardy, and seldom perishes in the coldest and wettest seasons; but, during the heats of summer, it is frequently destroyed by snails and slugs, and by a small red spider. "This insect," Maddock observes, "seldom attacks such plants as are in a state of vigour, or when the weather is cold and wet; it generally commences its depredations in the early part of summer, and continues them as the heat and dryness of the weather favour its existence: the juices also of the plants being then more viscous and saccharine, afford it more suitable nourishment than at any other season. Such plants as appear infested should be immediately selected from the rest, taken out of the earth, and soaked for two or three hours in a strong infusion of tobacco-water, and be replanted in fresh soil or compost, and removed to another situation remote from the former. If the whole bed or border of polyanthus is overrun with this insect, it is best to take up all the plants, serve them in the same manner, and plant them elsewhere. The bed or border whence the plants have been taken, should be immediately dug up or trenched, and suffered to remain fallow till the following season, or be occupied with some crop not liable to the same calamity." (*Prior's Directory*, p. 326.)

5852. *The Primrose* (*P. vulgaris* L. (*Eng. Bot.* 4.)) *Primrose*, Fr.; *Schafblow Primula*, Ger.; and *Primavera*, Ital.) (*Ag.* 857.) has a perennial root, appearing as it bifts at the end, with a singular smell like that of the anise. It is a native of most parts of Europe, in woods, coppices, and sheltered lanes, particularly in a clayey soil. The flowers of the wild plant are almost always of a bristly colour, but sometimes of a purple hue; they appear in March and April.

5853. *Varieties.* The double varieties produced by culture are in most esteem, of which there are—

Single.—Common yellow; white; red, or crimson; red, with enlarged and partially coloured calyx; oxlip primrose, that is, a primrose bearing its flowers on a common footstalk like the oxlip.

Double.—Yellow; white; daisy; lilac; crimson; carmine, or very dark crimson.

5854. *The Cowslip* (*P. veris* L. (*Eng. Bot.* 5.) *Primel*, Fr. and *Schiesoldstone*, Ger.) (*Ag.* 858.) is distinguished from the primrose, by smelling more strongly of anise, by shorter leaves, and by an umbel with a leafy involucre. It is a native plant, and found in moist pastures, in open situations, flowering in May.

5855. *Varieties.* Both double and single varieties are in esteem; but the plant has not been so much cultivated as the primrose. Gibbs, nurseryman, Brentford, raised, in 1814, a great many very beautiful varieties from seed, differing in colour, magnitude of the umbel, and in some being double, and in the hose-in-hose form. "He raised them from the seed of plants, originally derived from the wild cowslip, which had



spoiled into varieties, and by frequent reproduction attained their present excellence. The changes that have taken place are in the magnitude of the trusses, and the size and colour of the flowers; the selection appearing to have been from the darker hues, though some paler flowers were in the collection. However great the variation was in the points alluded to, yet none of the specimens appeared to have lost the general character and appearance of cowslip, not running either into the oxlip or the primrose; but some of them had become what florists term hose-in-hose, which appears to be the conversion, more or less, of the calyx, into the appearance of the corolla. The most notable natural variety of the cowslip is the old variety (noticed in *Gard. Mag.* vii. 125. 847.) which has its corolla so multiplied as to form a full flower like that of a double rose.

5856. *The Oxlip* (*P. elatior* L. (*Eng. Bot.* 518.) *Bavillon*, Fr. and *Gartenprimrose*) (*Ag.* 859.) is distinguished from the primrose by its many-flowered scape; and from the cowslip, by the flat border of the corolla. It is found in woods, thickets, hedges, and sometimes in pastures; but is by no means so common as the primrose and cowslip. It flowers in April and May. Sir J. E. Smith is inclined to think that the oxlip is a hybrid production from a primrose, impregnated by a cowslip; its habit, the contraction towards the middle of the leaf, and the umbellate flower-stalk, indicating the father; whilst in the corolla, its form, colour, and scent, it most resembles the mother. (*Eng. Bot.*, 515.)



5857. *Varieties.* There are a few; but the plant has not been much cultivated with a view to that object.

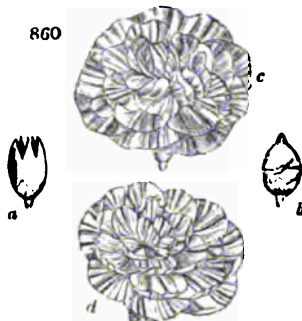
5858. *The propagation and culture* of these three species are the same as for the polyanthus.

SUBJECT. 17. Carnation.—*Dianthus Caryophyllus* L. (*Bot. Mag.* 39.). *Decand.* *Trigynia* L. and *Caryophyllæa* J. *L'aillet des Fleuristes*, Fr.; *Gartennelke*, Ger.; *Angellier*, or *Karnoffel*, Dutch; *Garofano ortense*, Ital.; and *Encarnacion*, or *Clavel*, Span. (*Ag.* 860.)

5859. *The carnation* is little known in its wild state, though it has been found in England on rocks and walls. It was not known to the ancients in its cultivated state; but has been a favourite flower in Europe for an indefinite length of time. It is generally supposed to have been introduced from Germany or Italy, in which countries it is more cultivated than in England; Gerard, in 1597, received it from Poland. "Of all the flowers that adorn the garden," Hogg observes, "whether they charm the eye by their beauty, or regale the sense of smelling by their fragrance, the carnation may be justly said to hold the first rank. The stateliness of its growth, the brilliancy and diversity of its colours, and the sweetness of its perfume, never fail to attract our regard and admiration. The tulip, though styled the queen of the garden, cannot boast of more admirers; they may with propriety be considered the two master-

pieces of nature ; and, though rival beauties, may be said to share the sovereignty of the garden equally between them. Yet it must be admitted, that the carnation, independent of its fragrance, has this advantage over its rival, that it continues longer in bloom ; and that, when planted in pots, it can be removed to decorate the green-house, the conservatory, or the drawing-room." The carnation and picotee, he adds, in 1833, still continue to adorn the flower-gardens of our nobility and gentry, for this reason, that, after the attraction of the metropolis has ceased, and they have retired to the country in the beginning of July, the ladies find these flowers ready to greet them with the most inviting fragrance during the greater part of July and August. (*Supplement*, &c., p. 127.)

5660. *Professional gardeners*. Mr. Hogg alleges, are not very good cultivators of carnations. "It is not every gardener that

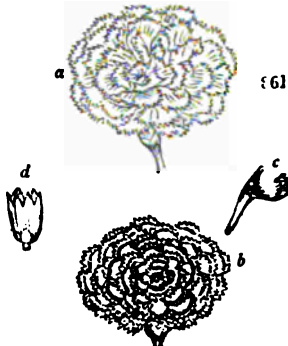


knows how to grow a carnation, however lightly he may treat it, and however confident he may feel of doing it. If he neglects to prepare proper compost, his plants will not thrive ; if he does not pay requisite attention to them before, and during, their flowering, the bloom will not be worth looking at ; and if he does not understand how to propagate them, they will all very soon perish. Gardeners unaccustomed to flowers are, in general, bad propagators. Few of them have any right notion of piping ; and though nothing is more simple, they never set about it, as if they wished to succeed. They are, likewise, great bunglers in laying : there is not one in ten whose assistance I would claim upon the most pressing occasion, and leave the operation to them, uncontrolled and unlooked after ; whereas, I could trust implicitly to any amateer cobbler, tailor, weaver, or barber who had had the least practice with their own flowers, to do this laying in the most satisfactory manner. This I know from experience, that very few of them, unless fond of the flower itself, seem to take any care of them, or treat them right, or bloom them well." (*Supplement*, &c., p. 130.) The London Horticultural Society, in the time when Mr. Baboe was secretary (and virtually director) were at some pains and expense to form a collection of carnations and picotees, both English and foreign ; but they had not a man in the garden who knew how to treat them, and they all perished in a year or two. (*Supplement*, p. 131.)

5851. *Varieties*. Fairbairn (in 1695) has forty-nine sorts, which he divides into carnations, or "the greatest sorts in leaf and flower," and gillyflowers, or such as are smaller in both respects. One Tugger, in Westminster, was the most remarkable man at that time for the culture of these flowers. Ros (in 1708) has 360 good sorts of carnation ; a number scarcely exceeded by the catalogue of most English florists. The varieties of this flower are now arranged in three classes : flakes, bizzars, and picotees. *Flakes* have two colours only, and their stripes large, going quite through the petals ; *Bizzars* (*Fr. piquette*), pricked or spotted) have a white ground, spotted or pounced with scarlet, red, purple, or other colours. Of each class there are numerous varieties, arranged under the further subdivisions of scarlet, flake, pink flake, purple flake, yellow flake, &c., scarlet bizzar, crimson bizzar, &c., and purple picotee, yellow picotee, &c. Hogg gives a catalogue of nearly 350 sorts so arranged, named after great personages, all of which were in his possession at the time he published his *Treatise on the Carnation*, in 1828. Only double varieties are in esteem. As an oddity may be made of the double double carnation *Léopold*, with scabell flowers. There is also a variety called the tree carnation, with suffrutescent stems, which may be trained against a wall, trellis, or stake, to the height of five or six feet, and will live as many years, flowering every year. (*See Register in Gard. Mag.*, vol. viii. p. 428.)

5852. *Criteria of a fine double carnation* (Fig. 860. c and d). "The stem should be strong, tall, and straight ; not less than thirty or more than forty-five inches high ; the footstalks supporting the flowers, should be strong, elastic, and of a proportionate length. The flower, or corolla, should be at least three inches in diameter, consisting of a great number of large, well-formed petals ; but neither so many as to give it too full and crowded an appearance, nor so few as to make it appear too thin and empty. The petals should be long, broad, and substantial, particularly those of the lower or outer circle, commonly called the guard-leaves ; these should rise perpendicularly, about half an inch above the calyx, and then turn off gradually, in a horizontal direction, supporting the interior petals, and altogether forming a convex, and nearly hemispherical corolla. The interior petals should rather decrease in size, as they approach the centre of the flower, which should be well filled with them. The petals should be thickly disposed alike on every side, imbricating each other in such a manner as that both their respective and united beauties may captivate the eye at the same time ; they should be nearly flat, however a small degree of concavity, or inflection, at the lamina, or broad end, is allowable ; but their edges should be perfectly entire, that is to say, free from notch, fringe, or indenture.

The calyx (860. a, b ; 861. d) should be at least one inch in length, terminating with broad points, sufficiently strong to hold the narrow bases of the petals, in a close and circular way. Whatever colours the flower may be possessed of, they should be perfectly distinct, and disposed in long regular stripes, broadest at the edge of the lamina, and gradually becoming narrower as they approach the centre, or claw of the petal, where terminating in a fine point. Each petal should have a due proportion of white, i. e. one half, or nearly so, which should be perfectly clear, and free from spots. Bizzars, or such as contain two colours upon a white ground, are esteemed rather preferable to flakes, which have but one, especially when their colours are remarkably rich, and very regularly distributed. Scarlet, purple, and pink, are the three colours most peculiar to the carnation ; the first two are seldom to be met with in the same flower, but the last two are very frequently. When the scarlet predominates, and is united with a pale colour, or, as it sometimes happens, with a very deep purple spot on a white ground, it constitutes a scarlet bizzar, which there are many shades and varieties, some richer and others paler in their colours, as is the case with all the rest. Pink bizzars are so called when the pink abounds ; purple bizzars, when the purple abounds ; crimson bizzars consist of a deep purple and rich pink. When the pink flake is very high in colour, it is distinguished by the appellation of rose flake ; but rose flake are so nearly in the medium betwixt pink and scarlet, that it can scarcely be defined to which class they belong. In addition to the foregoing varieties, there is a sort held in great esteem by cultivators, called *picotee* (Fig. 861. e) ; many of which are very beautiful, and, being harder than the other sorts, are in considerable request. The colours are principally yellow, and white spotted ; their properties are the same as the other kinds, except that the edges of the petals are serrated or jagged, and the colour is disposed in spots, where the other are striped. It is propagated in the same manner as the others."



5853. *Propagation*. By layers and pipings for continuing improved sorts, and by seed for procuring new varieties.

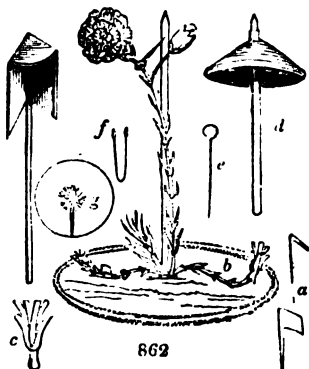
5854. *By layers*. The time for performing this operation is when the plants are in full bloom ; some defer it till the flowers are on the decline ; but in that case the new plants are not so well rooted as those layered earlier, and consequently less able to stand the winter. Laying, by the wounds it inflicts, considerably impairs the bloom, and generally kills the parent plant. The practical part of the operation has nothing extraordinary in it ; a sufficient quantity of peeps (Fig. 862. a) and of compost being provided, the pot containing the plant to be layered is placed on a table, and the layers prepared by cutting off the lower leaves (b) ; the earth is then stirred, and the pot filled up with "light rich mould, not of too fine a grain." (*ibid.*) The incision is made by entering a quarter of an inch below the joint, and passing the knife up through the centre of it ; it is then to be pegged down, and buried not more than half an inch deep. "It is advisable," Haddocks says, "to peg down the layers in a dry state, being then less brittle, and consequently not so liable to break off as when they are wet and succulent ; therefore, as soon as the layers are downed, the pot should be placed full in the sun for half an hour, in order to render them more flaccid and pliant than they otherwise would be. When the layers are properly rooted, which will be the case with most sorts in about three weeks or a month after laying, provided due care be taken to keep them regularly moist, and to shade them from the heat of the meridian sun, they are then to be cut off from the old plant, with about half an inch of the stalk which connects them with it, and be immediately planted in small pots, three or four plants in each, placed round the sides. The pots are to be placed under an arch of hoops, where they can be covered with mats, in case of excessive rain, till the severity of the weather renders it necessary to remove them into their winter repository, which is to be constructed in the same manner, and have the same care as that described for auriculars." (*Flower's Dictionary*, 156.)

5855. *Hogg* commences laying when the flowers are sufficiently expanded to show which are in colour, or true to their kind ; and which not ; this he holds to be about the 15th of July, and he continues laying from that time to the 31st of August. The plants receive a good watering the day previous to laying, because they can receive it only for some time after

through the fine rose of the water-pot, on account of preserving the earth on the layed shoots. In performing the operation, he cuts off the soil at extreme end of the tongue, or tube, immediately below the joint, because, "if left on, it is apt to decay," and prevent the protrusion of that granular matter from which the fibres proceed. Under favourable circumstances they will be fit to take off in seven or eight weeks, and may then be planted two or three in a small pot (No. 45.), three inches in diameter, by four inches deep. The pots are to be set on tiles, slates, or boards, there to remain till the middle or end of October, when they are to be removed to their winter quarters. (Trevelter, &c., p. 56.)

5856. *By pipings.* This mode of propagating the carnation is very precarious. Maddock says, "Five thousand plants were pipped one season, of which not more than one hundred perished; whereas more than two thousand were lost of the same number the year following, with but very little variation in the management; nevertheless, some sorts succeeded much better by piping than laying, and make healthier plants; it requires attention and experience to distinguish such sorts from the rest." Piping, however, is often a necessary resource where the shoots are too short for laying, or where, in laying, shoots are broken by accident. "Piping," Hogg observes, "succeeds worst in very hot summers, and best in those which are rather moist and cloudy. Early piping, before the carnations come into flower, succeeds best, and pipings cut immediately below the second joint, where the bark is loose and most compact plants." (Supp. &c., p. 153.)

5857. *In pipping the first thing is to provide a slight hotbed, and cover it with fine light earth.* When their fibres are laid very regular and even. The cuttings intended to be pipped are to have two complete joints, that is to say, they are to be cut off horizontally close under the second joint: the extremities or points of the stems are likewise to be shortened, in laying, which will leave the whole length of the piping from one inch and a half to two inches, according to its strength (fig. 862. c.); as soon as thus prepared, it may be thrown into



a basin of soft water for a few minutes, to plump it up. The earth on the bed where the pipings are to be placed should be moderately moistened, and rendered rather compact than otherwise: then take a small hand-glass, and with it make an impression neatly on the surface of the soil, in order to know where to stick in the pipings, so as to lose no room, or endanger their being disturbed when the glass is placed over them. The pipings are then to be taken out of the basin singly, and forced into the earth, in their wet state, with a steady hand; but not more than half an inch deep. When a sufficient number for the glass are thus placed regularly, at equal distances from each other, and rather more than an inch within the mark described by the glass, on every side, they are to be very gently watered, in order that the earth may adhere more closely to them, and thereby keep out the air: after this watering, they are to be covered with a box that is to be removed, till their leaves become perfectly dry, after which the glass is to be placed over them carefully, on the same mark that was made by it upon the surface of the soil before the pipings were placed there. The bottom edges of the glass are to be forced a little into the earth, to prevent the admission of too much air, which so far finishes the operation. What further remains to be done is, to attend diligently to their management, with respect to sun and air, &c. Some gardeners assert that cutting the points off the leaves is injurious, and others, that it is at least unnecessary; so that this point does not seem to be determined on. The only application of the pot may be removed, as a stimulus to the leaves, and cause them to return the sap to the stem, causing it to form a callous, and throw out roots. (Clark, who has written very accurate directions for piping; in Hogg's Supplement, pp. 133 to 140, differs from Maddock, as to watering after the pipings are planted. Saturate the earth with water before inserting the pipings; but after they are put in, he does not add one drop more, as some recommend, and as they say, to settle the earth to the pipings; because it must be evident, that any water put to them after they are in, will, as it sinks, unsettle the earth from the bottom of the pipings, and thus have exactly the contrary effect to settling the earth to them." (Hogg's Supplement, p. 134.)

5858. *The soil in which pipings are planted ought to be kept regularly moist, till they have formed their fibres; but too much moisture is as prejudicial as too little, and whenever they are watered, the glasses are never to be replaced over them till their leaves are perfectly dry. The pipings should have a little of the morning dew, but not be shaded from it, as when the heat recovers considerably, this will be easily effected by placing mats upon a slight frame of hoops or laths erected over the bed,*

about two feet above it. Hogg prefers hanting and Scotch gauze to the common garden mat, because they admit a faint glimmering of light. (Supplement, &c., p. 124.)

5859. *The glasses over pipings should be occasionally taken off to send in fresh air:* if this material point is neglected, the consequences will be a green mossy appearance on the surface of the earth, and an universal mouldiness amongst the plants, which will destroy them. It requires more skill to keep when and how long the pipings should be exposed to the air, while forming root, than for almost any other part of the management; on this single point, in great measure, depends the good or ill success of the whole undertaking. It is almost impossible, and is, in fact, impossible to lay down any rules that will not be liable, as circumstances may vary, to mislead the inexperienced in the art of piping; much must depend on the discernment and prudence of the cultivator; there is no great danger to be apprehended from taking off the glasses for a few minutes, or half an hour, when it is cloudy, and the air rather warm and moist; but if no opportunity of this kind occur in due time, it should be done early in the morning: and rather than to omit doing it entirely, it will be better to take the glasses off, if it is only for five minutes, turning them upside down on the path, in order to air them, and replacing them again over the plants; even this will be of great service, though not equal to a more effectual airing at favourable times, which, indeed, becomes more frequently necessary in proportion to the length of time the pipings have been upon the bed; but when the glass is cut, it strikes fibre, they will soon spinde up and become extremely weak, if not carefully attended to, viz. agreeably to the following directions, &c. When their fibres are formed, and the additional verdure and growth of the plants will demonstrate, the glasses should be placed over them very lightly, in order that more air may be admitted; and when they become tolerably well rooted, the glasses being no longer necessary, they may be taken away; but it seldom happens that all the plants, under the same glass, strike root together; some are generally a few days or a week forwarder than the rest, as will be apparent by their superior growth and verdure; and these ought to be carefully taken up and planted in small pots, for winter preservation, or they may be planted round the sides of large carnation-pots, filled with the compost, where they will soon make rapid progress; the remaining plants which are not sufficiently rooted for removal, must be continued under the glasses, as before directed, till they become so.

5870. *Care of pipings as to run or degenerated flowers.* It is necessary to be very careful to mark such pipings as are taken off before it can be ascertained whether the original plant is in true colour, or run (or degenerated); because it very seldom happens that the pipings or layers, taken off from a plant, produce any other than run or plain-coloured blossoms; in consequence of which they are not worth the trouble of propagation: the pipings ought therefore to be so marked as that it may be accurately known from what parent plant they were taken, in order that if any of the originals should prove foul in colour, or run, the increase of such may be distinguished from the rest, and destroyed. The layers and pipings which are not sufficiently rooted for removal, must be continued under the glasses, as before directed, till they become so.

5871. *Some people are very careless of the third joint, but it is better to do it at the second; because, in the first instance, the third joint being more hard and woody, the pipings do not strike root so soon, or form afterwards such handsome plants, when they are pipped at the second joint, from the extremity of the shoot. (Fib. Direct., p. 302.)* Clark says, pipings should have two or three joints, and generally speaking, the second joint would be the proper one, if the glass is in a good position, and the joint is not green and succulent, neither too hard, but white, soft, and swelling. (Hogg's Supp., p. 137.)

5872. *Hogg considers that piping the carnation should commence sooner than laying, before the shoots get too hard and woody; he begins about the first of July; but sometimes, he has found the "grass" quite ready by the 21st of June. (Supp., p. 132.)* Plants raised from pipings, he considers as scander, and therefore likely to encounter the rigour of a sharp winter, than layers; but still, as laying is the surest mode, he only makes pipings of such shoots as appear crowded, or too short or too high up the stalk to be laid easily. He plants them on a bed of dung of blood warmth, in a compost of one third maiden earth, one third leaf-mould, one third rotten horse-dung, and one sixth sand, sifted, that is, the cuttings, when stuck in, may enter easily and without injury. The piping should be cut with a sharp pen or budding-knife, at the second or third joint, according to the condition of the shoot; but the shorter the better. The cut must take place horizontally, close below the joint, and the sheath, or part that comes from the joint, be carefully removed and peeled off. When the pipings are cut, the surface of the bed made flat and level, and gently watered through a fine rose, they may be stuck in three quarters of an inch deep, in rows no more than two inches apart, and the glasses, pressing them closely down. The best glasses for piping are those made of the common window-glass, eight inches square and six inches deep, with the top cut off, so as to be enough to admit a common cork. The less air the glasses contain, the sooner will the cuttings strike root. The striking-glasses in common use, which are down for the purpose, too much contain such a thick body of glass as to prevent the sun's rays, and scorch the pipings. They require shading only when the sun is out, and then with a net or old mat, to admit the glimmering of his rays. If the weather is too hot, dry, and hot, they will require to be watered occasionally with a fine rose, early in a morning, over the glasses, which, for one fortnight at least, need not be removed if they are doing well. After, you may take off the glasses, or remove the cork, from time to time, as you see occasion, for half an hour or so in a morning, to give fresh air, and dry the glasses; and if any of the pipings appear mildewed or rotten, pull them up. At the end of six or seven weeks they will be sufficiently rooted to be transplanted into small pots or a prepared bed, over which it would be advisable to place a frame and lights for a week or ten days, till they take root again. There they may be allowed to remain till the middle or end of September. In taking them up, you find any not rooted, but sound, and their ends hard and callous, do not let them remain upon the same spot, but remove them to another bed, with a little temporary shade, and water them with glasses as before; this will not fail to start them and hasten their rising." (Trevelter, &c., p. 52, and Supp., p. 125.)

5873. By seed. Carnation-seed is rather difficult to raise or ripen in this country, owing to the moisture and cold of the autumnal months. It is generally procured from Vienna and different towns of Switzerland; and if put in vials and well corked, will keep for years. To raise it in this country, Maddock gives the following directions:—"Those flowers which have but few petals, or, as it is more commonly expressed, are thin of leaf, generally produce most seed, and therefore are most to be depended on for a supply; but they should be possessed of the best properties in other respects, viz. their seeds should be large, broad, substantial, and perfectly entire at the edge, and their colours rich and regularly distributed, and in due proportion, throughout the whole blossom. The plants should be selected from the root, and their pots should stand upon a stage, defended against earwigs, in an open part of the garden, in which situation they should remain during bloom, and until the seed is perfectly matured; their blossoms should be defended from rain, by having glass, paper, or tin covers (*fig. 862. d*), suspended over them, in such a manner as to admit a free circulation of air; the pots should neither be kept very wet nor very dry; nor will it be proper to cut and mutilate the plants, either for their layers or pipings, till the seed becomes ripe, because it would certainly weaken them, and consequently injure, if not destroy, their seed. When the seed is over-ripe, the petals become withered and dry, they should be carefully drawn out of the pot or calyx, being apt to retain a degree of moisture at their base, endangering a mouldiness and decay in that part, which will destroy the seed. There is another method of treatment adopted successfully in ripening the seed, which is, when the bloom is over, and the petals begin to decay, they are to be extracted as above, taking particular care to leave the two styles, which support the seeds, perfectly unharmed. The garden, or future pericarpium: the calyx (*fig. 860. e*) is then to be shortened to about one half of its original length, and an aperture made on one side of the remainder, down to the base of the pericarpium, so that no wind or rain can enter there; but in doing this, great care is necessary not to wound or injure the pericarpium, or seed-vessel itself; because it might prove destructive to the seed. After this is done, the pots or covers may remain or be taken away at pleasure; but in the latter case it is advisable to loosen the upper part of the stems from the sticks, that the open end of the calyx may incline a little downwards, and more effectually preserve it in a dry state; the stems should not be suffered to hang so loose as to be in danger of breaking off with every puff of wind. The seed ripens from the end of August to the beginning of October: the pericarpium becomes brown, dry, and hard, and the seed, when ripe, is of a black or very dark brown colour; those who are not sufficiently attentive to the ripening of their seed, are apt to gather it too soon, and consequently it is imperfectly matured, of which the greatest part proves small, pale-coloured, and unproductive. When gathered, it should remain in the pericarpium, in a dry room, till the beginning or middle of May; it is then to be sown in pots filled with the compost, and a little fine mould sifted upon it, barely sufficient to cover the seed: at this season of the year artificial heat is not required, the pots should therefore be placed in an airy part of the garden, be shaded from the heat of the sun, and kept moderately moist, but never very wet. As soon as the young plants appear with six leaves, and become about three inches high, they should be planted out on a bed of good rich garden-mould, at about ten or twelve inches apart, and be defended from excess of rain and severe frosts, by mats on hoops, placed over the bed in the usual manner; they will in general blow the following summer. Some persons have advanced an opinion, that the seed of run plants produces as great a proportion of variegated flowers as any other; but the validity of this assertion has not yet been sufficiently demonstrated by experiment." (*Maddock*.)

5874. Hogg's directions differ in nothing of importance from those of Maddock. He says it often happens, that out of 300 blooming plants you will not be able to get even two pots of perfect seed. More was saved in the dry summer of 1818 than in any seven previous years. Seedling require two years to bloom, and the chance of getting a good new flower he reckons as 1 to 100. If a florist raises six new carnations in his lifetime, he is to be considered fortunate. Seed out of the same pot, he says, is reported to produce flowers of all the different varieties, flakes, bizzars, &c. Emmerton experienced that seed from a scarlet flake will produce a scarlet bizzar, and a rose or pink flake.

5875. Soil. The compost Maddock recommends is as follows:—"one half rotten horse-dung, one year old, or that has been used as a hotbed for cucumbers, melons, &c.; one third fresh sound loamy earth; one sixth coarse sea or river sand. These ingredients are to be mixed together in autumn, laid in a heap about two feet thick, in an open exposure, and turned three or four times during winter; or, otherwise, the dung alone, after being used as a hotbed, may be thrown together in a heap, in a conical form, in order to rot more perfectly; and, as its surface freezes in winter, it should be pared off, and laid on one side, till the whole mass has been thoroughly frozen through, and then be repeated as often as the season permits, and it will be completely fit for use the following spring: the earth and sand may be added to it in March, when wanted to fresh pot the plants for bloom: the whole compost then be well mixed and incorporated together, and passed through a coarse screen or sieve, to reduce its parts and take out stones, or any other extraneous substance which it may contain. In some places, where the soil is more pure, experience has pointed out the propriety of using less dung and more loam; the proportions of which, for such situations, may be reversed, viz. one half loamy earth and one third dung, when the weather is cold, and the preparation of the compost, in other respects, is to be exactly the same in all situations." (*Florist's Direct.*)

5876. Hogg says, "Take three barrows of loam, one and a half ditto of garden-mould, ten ditto of horse-dung, and one ditto of coarse sand; let these be mixed and thrown together in a heap or ridge, and turned two or three times in the winter, particularly in frosty weather, that it may be well incorporated. On a very dry towards the end of November, I take a barrow of fresh lime, which, as soon as it is slaked, I strew over it while hot in turning the heap; this accelerates the rotting of the fibrous particles in the dung, softens the soil, and destroys the grubs, worms, and slugs. Lime is too well known as a manure to say any thing farther in its praise here. If there has been much rain during the winter, so that the warmth of the compost is reduced, and the salts washed from it, I take about seven pounds

of damaged salt and add them to it, either dissolved in water or strewed over with the hand. This, from an experience of three years, I have found to be attended with the most beneficial effect upon the future health and vigour of the plants. During very heavy rains, many florists cover their compost with tarpauling or double mats, to prevent the nutritious particles from being washed out; this is also an excellent precaution. If any objection be started that the quantity of dung is too great in proportion to that of the loam, I answer, that such an objection might be well founded, if the compost were to be used immediately on its being mixed together; but as it has to lie six months before it is used, I am decidedly of opinion, that the quantity is not more than is necessary to insure the most luxuriant growth and a generous bloom." For flowers that are apt to sport in colour, such as Humphrey's Duke of Clarence, Plummer's Lord Mansfield, &c., he lowers the compost, and uses "three barrows of sound staple loam, two ditto old rotten dung, one ditto horse-dung, a half ditto sand, a half ditto lime rubbish, or old plaster: to be prepared, and well incorporated, as before. He also uses the same compost for yellow pinks." (*Tweelin, &c. p. 45.*)

5877. Cornfield, one of the first carnation growers in England, prepares his carnation compost as follows:—"For his strong and light-coloured bizzars, he mixes two parts of rich, strong, yellowish-brown peat, with one part of fine, white, clean, stable-dung. This he also uses for his crimson bizzars and strong-coloured pinks. For his scarlet rose or purple flakes, he uses the same peat, but with a smaller quantity of loam and dung." (*Gard. Mag. vol. iv. p. 221.*)

5878. Justice says, "One article with respect to the soil for carnations you must certainly observe; never to use for it the mould which has been hyacinth raised, or any other of the same kind, being a sure poison to the carnations, and vice versa." (*Brit. Gard. p. 427.*)

5879. Manner of growing. The commoner sorts are planted in beds or borders, but the select kinds always in pots.

5880. Pots and potting. Maddock was pots for flowering plants, "at least twelve inches wide at the top, six inches at the bottom, and ten inches deep in the centre; the soil in the centre of the bottom of about an inch in diameter; also three or four smaller holes round the sides of the pot, close to the bottom, to prevent the possibility of water lodging or remaining in that part. His pots are of twelve or thirteen to the cast, being smaller than those recommended by Maddock."

5881. The operation of potting, according to Maddock, "should be performed about the middle of March, if the weather is not extremely unfavourable; but it should not, on any account, be deferred later than the end of that month. The pot is, in the first place, to be half filled, exactly to the same height, with its hollow side downwards, placed over the hole in the centre of the bottom; this compost is to be higher at the sides than in the centre of the pot, and the plants intended for it are supposed to have been raised in the same manner, containing four plants each, are to be carefully turned out of their pots, with all the earth adhering to them, in a hall; and after rubbing off about half an inch of the surface of the old mould, the plants are to be placed in the new compost, and cutting off the decayed points of their leaves, the ball is to be carefully placed in the centre of the pot, and the space between it and the sides filled up with the prepared compost. It is very necessary to be attentive in placing the plants, that they be neither planted deeper nor shallower than they were before; the compost should therefore be high enough to replace the old earth that was rubbed off on potting, exactly to the same height as before, i. e. a half an inch higher than the ball of old earth and fibres; and the whole surface of the earth in the pot, when the operation is finished, should be nearly level or flat; but by no means lower at the centre than at the sides. The compost would thereby be kept too dry; nor should the compost come nearer than within an inch of the top or rim of the pot, after it has been gently shaken, or struck against the ground, in order to settle it, or in consequence of the rain falling on it when the operation of laying comes to be performed, which requires some additional mould on the surface, for the layers to strike into." Hogg considers the first week in April as the safest and best time to pot carnations, and he performs the operation in the same manner as Maddock. Cornfield commences potting layers about the middle of March; and, if the weather permits, finishes about the end. (*Gard. Mag. vol. iv. p. 221.*)

5882. General culture. When the plants are potted off for bloom, the pots should be placed in an open airy part of the garden, under an arch of trellis, that in case of cold drying winds, heavy rains, or frosty nights, mats may be thrown over, to preserve them from the effects of such unfavourable weather: in this situation they are to remain, always open to the air, except in cases above mentioned, when they are to be kept regularly watered with soft water from a fine-rostrated watering-pot.

5883. When their flower-stems are grown eight or ten inches high, it will be necessary to support them, by means of a stake driven into the earth in the centre of the pot, to which the stems are to be loosely tied with small pieces of bast mat: these sticks should be as high as the hoops will admit, in order that the pots may remain under them as close as possible; but when the stems are grown too high for this situation, the pots are to be removed to the stage, and to remain there till the time of bloom; the small sticks should be replaced with these more extensive ones, for the operation is to be repeated about four feet or four feet six inches long, regularly tapering a little from the bottom to the top, and be painted green; they should be substantial and straight, and their lower ends should be pointed, and driven into the centre of the pot, sufficiently deep and firm, not so to be shaken loose by the wind. As the stems continue to advance in height, the tying, as above, must also be continued at about eight or ten inches; and the plants should be examined and supported in this manner. Cornfield says, that, instead of the sticks, he uses a strong cord, with about two inches of the top white. (*Gard. Mag. vol. iv. p. 222.*)

5884. If any small, green, winged insects appear on the stems of the plants, particularly the scarlet and purple flakes, the flower-pots, they must be effectually exterminated or destroyed, either by the means of a small soft brush or feather, or the application of a strong infusion of tobacco-water, or some similar airy and safe expedient: even Scotch snuff dashed upon

the infested parts early in the morning, while the plants are wet with the dew of the night, has been sometimes tried in this case with success. Cornfield gets rid of the aphides by dusting the plants, when wet by dew or rain, with Scotch snuff, puffed from an Indian-rubber bottle, having a small tube fixed in its neck. (*Ibid.*)

5855. *The calyx of many sorts contains a great number of petals, which, as they increase in bulk, will distend and burst it, if not timely prevented: this generally happens a few days previous to the proper time for the blossom opening, and will, if neglected, soon manifest the effects of such neglect, by letting out the petals on one side, and thereby producing a loose irregular appearance, totally destroying that compact, graceful, circular form which flowers ought to possess, and which is one of its greatest ornaments; but this disagreeable effect may be easily avoided, by fastening a small narrow slip of bladder round the middle of the pod, where it is most swollen, and appears to have the greatest inclination to burst. The slip of bladder should be rather longer than is required to go once round, so that one end of it may lie over the other a little, which, by the application of a little gum-water, will adhere firmly together, and answer the purpose completely. Small slips of wet bast mat may be substituted for those of bladder, and being tied with a single knot round the same part of the pod, will answer nearly as well. (Fig. 560. b.)*

5856. *When any of the flowers begin to open and expand, each should be shaded, both from sun and rain, by means of strong caps or paper covers (Fig. 561. a), about twelve inches in diameter, painted white, and furnished like an umbrella, to throw off rain; each should have a square tin tube on the summit, that will permit the stick, to which the stem is tied, to pass through it as far as is necessary. The tube should be about two inches long, and have a small hole bored through one of its sides, that it may be fixed by a nail to any part of the stick where required. But when the major part are in bloom, it is necessary that the plants should be covered, and be drawn up or let down by means of lines and pulleys, exactly in the same manner, and on the same occasions, as for the bloom of hyacinths and tulips. The same frame that was used for the hyacinths (Fig. 561. c), will, with some alterations, or taken down, answer in every respect for carnations: nor can any other more suitable be contrived or adopted.*

5857. *In order that the flowers may appear to the greatest advantage, it is necessary that the pots should stand on a stage or platform of boards, raised about twelve or fifteen inches above the ground; this stage should be very strongly supported, in order to sustain the immense weight of the plants, without danger of giving way; the supporters of this platform should stand in shallow leaden or earthen vessels, filled with water, to prevent the access of earwigs, which are destructive enemies to the blossoms of carnations; they should be removed commonly during night in the calyx (Fig. 560. e), and soon commence their depredations, by biting off and devouring the lower ends or claws of the petals, which of course will cause them to drop out, and thereby disfigure the flower.*

5858. *The stands, or receptacles, should be broad enough to allow an intermediate space of water; three or four inches wide, between their sides; the supporters placed in the centre of each. Earwigs will nevertheless be frequently found amongst the flowers, having been brought upon the stage with the pots, where they remain concealed, or dormant; till the flowers are in bloom; or perhaps they may have gained access by having crept up the external frame, and from thence fallen down upon the pots; or they may possibly have flown upon them, as they are evidently provided with wings, though it does not appear that they make use of them. (See *Nat. Hist.*, vol. iv. p. 436.) At all events, it is necessary frequently to examine the plants, and the sticks which support the stems, as earwig will be often found concealed there in the daytime, particularly the part where the stems are tied, which affords them a more secure hiding-place. If any of the petals hang loose, or drop out, it is a certain sign that an earwig is, or has been, there: in the first case, blowing forcibly with the mouth into the blossom, two or three times, will cause it to creep out; but if it has quitted the blossom previous to the discovery, it should be carefully sought after and destroyed, or it will continue its depredations the succeeding night; it will, however, most probably be found scuffling somewhere about the same pot, but not farther distant than the next, or next but one, unless the search has been deferred too long.*

5859. *The flowers should be suspended from the sticks by small pieces of fine elastic brass wire (Fig. 562. e), of unequal lengths (sold in the pin-shops), to support them in as graceful manner, neither too near together nor remote from each other: one end of the wire should be introduced into the stick by means of a small awl, and there be fixed sufficiently tight to prevent its slipping out; the other end of the wire should be formed into a small ring, about a quarter of an inch in diameter, to enclose the stem below the calyx: this ring should be a little open on one side to admit the stem, without too bruising it, which would materially injure the bloom.*

5860. *Those who are particularly curious in blowing their carnations, carefully extract such petals as are plain, or run from their true colour; they perform this by means of an instrument adapted to the purpose (Fig. 562. j), and with the same arrange the remaining petals, so as to supply the defect: in like manner they dispose the whole with such regularity that the flowers appear to have an equal distribution of beautiful petals, nearly alike on every side, without imbricating each other, so as to hide their respective beauties; and if the blossom consists of too great a number of petals, they extract the smallest, and therefore afford the others more room to expand, which takes off the confused effect always produced by redundancy. The pots must be kept regularly and constantly watered during bloom, in the manner before described, and no favourable opportunity should be neglected to afford them the full advantage of exposure to light and air, by drawing up the cloth covering, in the manner before described; but no rain must be admitted on the blossoms at any period of the bloom. Some place their stage, or platform, on one side, others in the centre; but a double row of pots on each side, with a commo-*

dious path in the middle, is preferable. If the pots contain only two plants each, they consequently are not required to be so large as for four or five; but the latter have much the best appearance in bloom, producing a greater number of blossoms: it is not, however, advisable to permit every bud to flower, especially of such sorts as are naturally of a small sort of petals: because it would render each blossom smaller and thinner than if only one or two were left on each plant: it is, therefore, proper in this case to cut off, or draw out the small lateral buds, close to the main stem, as soon as they can be ascertained, in order that the remainder may have time to reap due benefit by it; but those sorts that have remarkably large short buds, abounding with petals, must be suffered to bloom them all, or the greater part, although in general only three or four buds are as many as ought to be suffered to blow on one plant. These rules, or remarks, admit of some few exceptions, but the instances seldom occur.

5861. *Carnations are to be treated, during winter, much like auriculas: with respect to the weather, they are seldom injured by a moderate dry frost, though it is safer to defend them from too much of it; but it is very necessary to caution against covering them up close when the plants are wet, as they are, in that state, very liable to contract a destructive mildew, if they have not the benefit of a free circulation of air; this mildew makes its first appearance in purple spots on the foliage, which can only be cured or prevented from spreading among the adjacent plants, by cutting out the infected part, or removing the pot, as soon as discovered, it being clear from analogy that such a disease is altogether owing to the moisture developed by the warmth generated at such times. Plants thus infected have been frequently known to communicate the contagion to others which stand near them, therefore no time should be lost in cutting off the spotted leaves, and removing the plants to a distant part of the garden. A repository, constructed in the manner already described, is less liable to the above evil, than any close frame or situation, because it has the advantage of a free circulation of air at all times, even when shut up, unless indeed when closely covered up with mats, &c., as in cases of severe frost; but at those times frost is such a general enemy, as to be dreaded. (See *Metast.*, in *Gard. Mag.*, vol. iv. p. 344.)*

5862. *The rains of autumn and winter are generally more than sufficient for carnations, as well as for auriculas, from an excess of which it is proper to defend them of the two extremes, it is safer to keep them rather too dry than too wet at these seasons, especially during winter; but a moderate degree of moisture is always to be preferred, except when the weather is severely frosty. It is too long a deprivation of light is at all times prejudicial to plants, therefore, whenever the winter repository is required to be closely covered up with mats, for several days at night, with little intermission, the repository should be lost during the middle of the day, if the sun shines, to take off the mats in front of the glasses, in order to admit light and warmth. Whenever the surface of the earth in the pots is covered with moss or too much decayed matter, it will be proper to stir it up carefully, about half an inch deep, and to sprinkle a little coarse dry sand regularly upon it: this will prevent any great degree of tenacity in future, and be of great service to the plants as here required.*

5863. *In spring, the pots will probably require to be frequently watered, and by the middle of March the operation of watering is to commence, as already described. The blossoms of carnations, particularly the high-coloured sorts, are very apt to run from their striped or variegated colour to a plain one; they are then esteemed of little or no value; but when they are partially run, they may sometimes be restored to their former state, by being planted in a poor dry soil, that will but just afford sufficient nourishment for their existence. (*Florist's Direct.*, p. 166.)*

5864. *When the flowers have past their blooming plants, supports them with green sticks, in the manner of Maddock, and top-dresses about the middle of June "with about half an inch of rotten horse-dung passed through a sieve," which he finds materially to assist the plants, and promote the growth of the layers, on which depends the preservation of the collection. "Many," he says, "top-dress with some of the hotter manures of a sugar-baker's scum, &c.; but, in my opinion, that is not necessary for carnations, and is attended with danger: for, if they are not reduced to a perfect mould, they will corrode, and burn the plants." He waters freely while the buds are swelling, and during the whole time they continue in blossom. As soon as the side shoots appear, he places "a paper collar round the bottom of the blossom to support it. These collars are made of white card-paper, in the form of a circle of three or four inches in diameter (Fig. 563. g), with a hole in the centre, stamped out with a steel die, just large enough to admit the calyx or bud, without much compressing it, and with a cut extending from the centre to the outside or circumference, like the radius of a circle. On each side of the flower is preserved in shape and form a long time; on these the petals are also finely disposed, and the beauty of the carnation is completed to great advantage. When the plants are in bud, they should have the benefit of the morning sun till about nine or ten o'clock, according to the intense heat of its rays; the same in the evening, with as much open exposure to the air at all times as they can give them, without any hindrance. In winter Hogg preserves them in frames, in the same manner as he recommends for auriculas. When he has more plants than he can blow in pots, he plants them in beds of the same compost used for the others, and keeps them from severe frost and heavy rains, and in other respects treating them in the same manner as in pots. (*Traveller*, &c., and *Supp.*, pp. 140-146.)*

5865. *Ferms of various descriptions attack the carnation, independently of the earwig, already mentioned, sect. 5857. The wireworm, when in the soil, may be prevented from attacking the roots by removing the soil, and turning it over, then, covering them up again with soil. The wireworm, however, should always be removed by handpicking before the carnations are planted or potted. Gnats, slugs, and caterpillars, as well as the usual insects of the garden, may be got rid of in the usual manner, by the use of tobacco or lime water; and the different species of aphids, black, green, and white, by tobacco water.*

SUBJECT 18. *Pink*. — *Dianthus hortensis* L., *D. plumarius* Dec.; *Decan.* Trig. L. and *Caryophyllæ* J. L'aillet, Fr.; *Nelke*, Ger.; *Angelier*, Dutch; *Garofano*, Ital.; and *Cloveline*, Span. (fig. 861. b.)

5896. The *pink* is considered by many to be a subspecies of the *D. Caryophyllus*; and by others to have proceeded from *D. deltoides*, a British species, and the pheasant-eye pinks from *D. plumarius*. This flower, Professor Martyn observes, does not seem to have attracted any notice among our ancestors; and it is only within the latter half of the eighteenth century that it has become so much improved and varied, as to be greatly valued among florists. It is now much cultivated everywhere, and especially in the manufacturing districts; in the neighbourhood of Manchester and Paisley, it is carried to a high degree of perfection. The pink is much harder than the carnation, and less liable to the casualties incident to the latter.

5897. *Varieties*. Parkinson, in 1629, mentions six or eight sorts. Rea, in 1704, says, there are many sorts, but of little esteem. Hogg, in 1820, gives a list of nearly one hundred names, as containing the best sorts in England; but Davey, who has raised more fine varieties of this flower than any one else, has above double that number; and the Paisley growers reckon above three hundred sorts.

5898. *Criteria of a fine double pink*. "The stem should be strong, elastic, erect, and not less than twelve inches high. The calyx rather smaller and shorter, but nearly similar in form and proportion to that of a carnation, as well as the formation of the flower, which should not be the slightest less than a half in diameter. The petals should be large, broad, and substantial, and have very fine-fringed or serrated edges, free from large, coarse, deep notches or indentures; in short, they approach nearest to perfection when the fringe on the edge is so fine as scarcely to be discernible; but it would be considered a very desirable object to obtain them perfectly rose-leaved, i. e. without any fringe at all. The broadest part of the lamina, or broadest of the petals, if it should be perfectly white and distinct from the eye, unless it be a laced pink, that is, ornamented by a continuation of the colour of circumstances. Such sorts of pinks as are most inclined to burst their buds, sometimes produce larger and finer flowers than others which have smaller buds; because the latter generally consist of too few petals: it is, however, more desirable to have them strong and longer than broad, and to have the petals surrounding increase, are most proper to select for the best bed; these will seldom put up more than one or two stems, which will, however, be very strong, grow tall, and produce those of the finest and truest colour." (See fig. 861. a.)

5899. *Propagation*. Generally by pipings for ordinary purposes, sometimes by layers to preserve rare sorts, and by seed for new varieties.

5900. *By pipings*. The time to commence this operation is immediately previous to or during the bloom, or indeed as soon as ever the new shoots are grown of a sufficient length for that purpose. Hogg commences about the 21st of June. The operation is the same as in piping carnations. Bottom soil is generally used, but by some is considered rather rather rather than accelerates the process of rooting. Revel considers cold indispensible necessary to a successful striking. (*Floriculter's Cabinet*, vol. i. p. 107.) Some gardeners, instead of either piping or layering, half separate the young from the parent stock; but as this must injure the latter, and at the same time not produce very handsome plants, we can by no means recommend it. For the details see *Gard. Mag.*, vol. vii. p. 458.

5901. *By seed*. Proceed as directed for carnations.

5902. *Seed* has found great advantage from impregnating double and semidouble pinks with single kinds, both in respect to founding more stems, and in respect to the colour of the flower, but also in increasing the varieties, or new sorts, raised from such seed. (*Caled. Sec. Mem.*, vol. iii. p. 270.) The process of foundation is thus described by a French florist:— "Just before the flowers are to be opened, the flowers are examined, and abstract the anthers with small pinners. About eight or nine o'clock, place the ripe pollen upon the stigma of the flower, and repeat this two or three times in the course of the day. If the act of impregnation has taken place, the flower will fade in twenty-four or thirty-six hours; but if not, the flower will remain in full beauty; in which case, the attempt must be repeated. This should always be done in fine serene weather, and care should be taken to defend the impregnated flower from rain and mist. Plants raised from seeds which have been crossed always bear the form of the mother, but take the colours of the male parent. Fewer seeds are produced by art than by nature alone; and the impregnated flowers are less visited by bees than others." (*Gard. Mag.*, vol. iv. p. 366.)

5903. *Mode of growing*. The common sorts are introduced in borders, and the better varieties in prepared beds. Sometimes rare sorts are planted in pots, but in general they thrive better in the open ground.

5904. *Soil*. Macdonald says, "A good fresh loamy soil, dug and comminuted about two feet deep, and manured with a stratum of cow-dung, two years old, mixed with an equal proportion of earth (this stratum to be about six inches thick), and placed five or six inches below the surface, is all the preparation or compost that appears necessary for this flower."

5905. *General culture*. As soon as the pipings are struck and will bear removal, they are to be planted in a bed of common garden-mould, where they may be surrounded with a ditch, which is the strongest plants to remove to the blooming-bed. "This bed should be raised three or four inches above the surrounding ground, and its surface may be surrounded with an edging of boards, to come up even with, or one inch higher than, its surface: this last, more for the sake of neatness than any particular utility it will be of to the plants."

5906. *The place selected for the principal bed for bloom*, should be placed upon it in August, or early in September, as they do not blow quite so well if removed later in the season; they should be placed in the ditch from six to eight inches from each other, and the bed should be laid rather convex, or rounding, to throw off excess of rain; but will require no other covering than a very slight one in case of severe frost. The bed should be kept free from weeds, and its surface stirred up a little if it inclines to bind, or, in other words, whenever it has become too firm and adhesive. Larger strong plants will put up numerous flower-stems, but it is proper to thin them out a month or

six weeks before bloom; in doing which, the largest and strongest should be left, especially the leading stem, which proceeds from the heart or centre of the plant, together with all its best pods; but no plant, however strong, should be permitted to bloom more than ten or twelve blossoms, nor really plants more than four or five. In order to obtain them large and well coloured, all the small lateral buds should be cut or pulled off, as they never produce any other than diminutive flowers, and at the same time rob the plant of a certain part of the nourishment, which, of course, prevents their attaining the size and beauty they would otherwise arrive at.

5907. *The longest and most luxuriant plants do not produce the finest flowers*: they naturally put forth numerous small stems, which their roots are not able to support sufficiently to produce large blossoms. Strong healthy plants, not too large, and containing a capital leading stem in the centre, with a few small surrounding increase, are most proper to select for the best bed; these will seldom put up more than one or two stems, which will, however, be very strong, grow tall, and produce those of the finest and truest colour." (See fig. 861. a.)

5908. *Those buds that appear in danger of bursting* should be tied in the same manner as directed for carnations under similar circumstances. Such sorts of pinks as are most inclined to burst their buds, sometimes produce larger and finer flowers than others which have smaller buds; because the latter generally consist of too few petals: it is, however, more desirable to have them strong and longer than broad, and to have the petals surrounding increase, are most proper to select for the best bed; these will seldom put up more than one or two stems, which will, however, be very strong, grow tall, and produce those of the finest and truest colour." (See fig. 861. a.)

5909. *At the time of bloom*, which is towards the end of June, it is proper to defend the bed by a covering or awning, somewhat similar to that used for the bloom of tulips and carnations; they should, in like manner, enjoy the advantage of light and air, and the soil should be kept regularly moist by soft water, and the plants should be examined carefully avoiding to wet the blossom. (*Floriculter's Direct*, p. 220.)

5910. *Hogg observes*, that "pinks moved and transplanted in the spring never do well, nor show half the beauty which they would if they were planted in September, or October; in particular appear almost plain, and without their distinguishing character: they should likewise never be suffered to remain longer than two years without either change of soil or situation."

5911. *Stems of pinks*. These are to be placed close underneath the guard-leaves, so as to support them horizontally, and will, when they extend just as far as the extreme points of the petals, give the blossom a very circular and pleasing appearance. Some kinds do not require any support at all, but others, especially after being wet, and must either be taken off entirely, or exchanged for new ones, as they will no longer answer the intended purpose. Some kinds do not require any assistance of this sort; but the greater part, not having their guard-leaves sufficiently strong at the base to support themselves in a horizontal position, are considerably improved by this little contrivance, which, perhaps, by the foregoing description, will not be difficult to comprehend.

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5912. *Plants of pinks* will be easily destroyed by caterpillars and indeed cuttings of herbaceous plants, or tender shoots of any kind, it has been suggested, may be packed in charcoal powder. (*Gard. Mag.*, vol. iv. p. 190.)

SUBJECT. 19. *The Violet and Pansy.* — *Viola odorata* and *V. tricolor* L. (*Eng. Bot.* t. 619. and t. 1287.); *Pentán. Monog.* L. and *Violetaria* J. *Violette*, Fr.; *Veilchen*, Ger.; *Viol*, Dutch; *Viola*, It.; and *Violetta*, Span.

5913. *The Neapolitan violet (Viola odorata var.)* is a very desirable plant for forcing, or protecting by glass during winter, on account of the fragrance of its blossoms. It is propagated by runners like the strawberry, and indeed is as easily cultivated as that plant. It grows most vigorously in a loamy soil; and may either be planted in beds in warm situations in the open ground, in beds under glass frames, or in pots for forcing in the same manner as the strawberry. The double Neapolitan is considered the best of all violets for forcing. There is a variety called the single Russian, which commences flowering in the open air during autumn, and continues so during the winter, even when the ground is covered with frost and snow. (*Gard. Mag.*, vol. iv. p. 99.)

5914. *The Hartmann, or Pansy (Pensée, Fr. ?)* was originally the name applied to the *Viola tricolor*, but it is now extended also to *V. futes*, *grandiflora*, and *amœna*, and the hybrids produced by fecundating these species with each other. The varieties thus obtained amount to some hundreds, of which Mr. Hogg, in his *Supplement*, has given a list of nearly one hundred, with names. The prevailing colours are purple and violet, each with many shades; purple or violet, variegated with white or yellow; and plain red, brown, white, yellow, &c. Pansies are in flower from the beginning of June to the beginning of July, when they pass a little, owing to the great heats; but after the rains they commence flowering again, and continue till they are destroyed by frost.

5915. *The canon or criterion of a good pansy* is thus given by Mr. Gorrice:—"Large and round petals, the flower forming nearly a circle, not much undulated [$\frac{1}{4}$ in. across is large

enough, but some are broader]; colour [brilliant], distinct and permanent; eye, rather small, and not deeply pencilled; flower-stalk, strong and straight; and the stigma filling the open part of the eye." (*Gard. Mag.*, vol. viii. p. 373.)

5916. *Propagation and culture.* Nothing can be more easy than the propagation of this plant, either by seeds or cuttings. It is propagated by the latter mode with the greatest ease in common garden soil. Seeds may be sown early in spring under hand glasses or in a cold frame; and the plants may be first pricked out under glass, and afterwards transplanted into beds in the open garden, or put into pots. The situation best adapted for *pansies* should be open to the east or west; the surface should be low, relatively to the surrounding ground, so as to retain moisture and be cool; and the soil should be a sandy loam, highly manured.

SUBJECT. 20. *Double Rocket.* — *Hesperis matronalis* L. (*Lam. ill.* t. 564. f. 1.); *Tetrad' Siliq.* L. and *Crucifera* J. *Julienne*, Fr.; *Nachtviolen*, Ger.; *Esperide*, Ital.

5917. *The double rocket* is a biennial or imperfect perennial; a native of Italy, and cultivated by Gerard in 1597.

5918. *The varieties* are the white and purple, both very double, and forming a spike of about a foot long, of great beauty and fragrance, and considerable duration.

5919. *Propagation and culture.* The plant is extremely difficult to preserve, especially near large towns. It does not thrive either near London or Paris; and both capitals, especially the latter, are supplied with it from provincial groves. It is very much grown in the west of Scotland, and in the Netherlands; and between Calais and Abbeville it may be seen in great perfection in most cottagers' gardens. Van Mons (*Fort. Treves*, vol. ii. p. 135.) says it prospers best in a clayey soil, but flowers best in one of a lighter texture, like the *Lobelia cardinalis*. The best directions which we have met with for its culture are given by Robertson. (*Cult. Men.*, vol. ii. p. 245.) He says, "After the flower is beginning to fade, cut down the stalks and divide them into ordinary lengths of cuttings; next cut off the leaves, and smooth the ends; then make three slits with a knife in the bark or rind, lengthwise, so as to separate or raise the bark for half an inch in length. When the cutting is inserted in the

ground, the loose bark naturally curls up; and it is from this bark that the young roots proceed. The partial separation, and the turning up of the bark, seems to promote a tendency to throw out roots. The cuttings may be put into flower-pots, as they may thus be sheltered during winter with more ease; or they may be placed in the natural earth, provided the soil is light and fresh. Covering them with a hand-glass will forward the rooting of the cuttings; or with the aid of a hot-bed they will succeed excellently. I have used this simple way for six years back, and never without success; not one in twenty having failed. This method, it may be remarked, will hold good in cuttings of stock-gilliflowers, and double wallflowers. Whiddon cuts the flower-stems half way down, from which shoots fit for making cuttings are protruded, which he strikes in equal parts of loam, leaf soil, and sand. (*Gard. Mag.*, vol. ii. p. 300.) Cuttings of the flower-stems will very frequently strike root, and throw up shoots, though this mode is not so much to be depended upon as the two preceding ones.

SUBJECT. 21. *Cardinal Flower.* — *Lobelia* L.; *Pent. Monog.* L. and *Lobeliaceæ* J. *Lobelia*, Fr.; *Kardinalsblume*, Ger.; *Fior Cardinale*, Ital. (*figs.* 863. and 864.)

5920. There are several species of *Lobelia* which rank high as showy flowers.

5921. *The Common Cardinal Flower (L. cardinalis, Bot. Mag.* 20. and *fig.* 863.), a native of Virginia, where it is found abundantly.



antly by the sides of rivers and ditches, was introduced in 1629. Justice is in raptures with it, describing it as "a flower of most handsome appearance, which should not be wanting in curious gardens, as it excels all other flowers I ever knew in the richness of its scarlet colour." There is a dwarf variety, but it is very liable to perish.

5922. *Propagation and culture.* By seeds, offsets, or cuttings; but the former method produces the strongest plants. Sow in pots of rich earth soon after the seed is ripe, and place them under the protection of a frame. The seeds will appear the following spring; and after they have two or three leaves, should be planted in separate small pots, and shifted into larger ones once or twice during the season. Place them in an eastern exposure, and supply them freely with water. Protect, during winter, by a frame; and the following spring, shift them into

pots, six or eight inches diameter, in which they will flower. If not much exposed to the sun, they will continue long in beauty. The roots do not last above two or three years; and therefore a succession of young plants, from seed or slips, should be regularly provided. (*Müll.*)

5923. *The Fulgent Cardinal Flower (L. fulgens W. en., Bot. Rep.* 659. and *fig.* 864. a) is a native of Mexico, was introduced



into England in 1809, and flowers in July and August. Though a native of a warm climate, it has been found to bear the severity of our winters, by being immersed in water, as an aquatic, and with this treatment it has flowered well by the sides of ponds and in cisterns.

5924. *Propagation.* By suckers or cuttings, which strike with remarkable facility in any shady situation, and by seed. According to Professor Van Mons, "the seed should be sown, as soon as it is ripe, in earthen pans; the earth should be moistened, and after it has imbibed the water, the seed must

be spread over it without being covered. The pans should be sheltered from the frost, and the young plants may be transplanted in April and May. Very few of them remain, more than the second year, without sowing."

5925. Culture. This plant has assumed a character of uncommon significance under the management of Hedges, which is thus detailed by Sabine:—"In October, he takes off the suckers, which are thrown up; and puts them into small pots; one in each pot, and keeps them in a cold-frame till the middle of January: he then removes them into a cucumber-frame, where the heat is kept up to 65° of Fahrenheit's scale, by linings of hot dung; a fine succession-stove of the same temperature will equally suit them. In the middle of February, they are shifted into pots a size larger; and at the end of March, or in the beginning of April, they are again moved into larger pots, and in the middle of May they are a third time shifted: the pots to be used for this last shifting are twelve. As soon as the plants are well rooted after the last removal, they are carried into a peech-house or green-house, in which they continue till they flower, and are hardy enough to bear the open air. When they are preparing to throw up their flowering stems, and during their growth, it is necessary that they be kept very moist, which is effected by putting pans under the pots, and keeping the pans constantly filled with water. The plants thus managed, begin to flower early in July, and the splan continue to blow, and are covered with flowers through the autumn. The composition in the pots is formed of equal parts of brown or yellow loam, and of leaf or bog mould, to which is added sand, equal to one fourth of the previous quantity, the whole being well mixed together. The plant of *Lobelia fulgens*, which was exhibited to the Society on the 19th of last month, by Hedges, had been managed as above directed; but as no notes of its size and height were made at the time, the following dimensions may be taken from another plant in the garden at Kenwood. The base

of the stem was near six inches in circumference; the height of the centre spike was five feet and a half; the shoots from the bottom and sides of the main stem were in number seventeen, rising together round the principal stem, to the height of about four feet and a half. Hedges states, that the plants were, in the two preceding years, much taller than that now described. Some few plants were observed to be rather shorter, and to have a more bushy appearance: this is produced by stopping the centre stem, after the last shifting, by which the side shoots become more vigorous and fuller of flower, and in this state they form handsome companions to the flowering plants of *Campanula trachelium*, whose beautiful spikes of blue flowers, so strongly contrast with the brilliant scarlet of the *lobelia*." (*Refr. Trans.*, vol. ii. p. 400.)

5926. The Splendid Cardinal Flower (*L. apicalis* W. & A.) (*Bot. Reg.* 60. and *fig.* 663. b.), a native of Mexico, and introduced in 1816, may be treated like *L. fulgens*; and the *Blue Cardinal Flower* (*L. apicalis*) (*Jac. Ic. iii. t. 567.*), a native of Virginia, and introduced in 1665, may be treated like *L. cardinalis*.

5927. There are several other showy species, such as *L. Tupa*, *apicalis*, *apicalis*, *colombica*, *caerulea*, *puberula*, and *amara*; all of which will succeed with the same general culture.

5928. The dwarf self-flowered Lobelia may be divided into those with blue flowers, such as, *bellicifolia*, *decumbens*, *triquetra*, *Claytoniana*, *alana*, *infinita*, *brunna*, *tenella*, *Grynera*, *color*, *paludosa*, *carolina*, *crucioloba* (*distensa* *salicaria* *Lincl.*), *dentata*, *inundata*, and the intensely coloured *undulata*; those with white flowers, such as, *secunda*, *mixta*, *mixta*, and *campanuloides*; and those with red or pink blossoms, such as, *corymbosa* and *filicifolia*. All these species are much demanded for planting out in beds so as to produce masses of flower all the summer, and they are easily propagated by cuttings early in spring, and kept under glass in very small pots, till the weather admits of their being turned out.

SUBJECT. 22. Pyramidal Bellflower.—*Campanula pyramidalis* L. (*Park. Parad.* 354.); *Pent. Monog.* L. and *Campanulacea* B. P. *Campanelle pyramidale*, Fr.; *Pyramidenlocken*, Ger.; *Klokjes*, Dutch; *Campanella*, Ital.; and *Campanula*, Span.

5929. The pyramidal bellflower is a native of Istria and Savoy, and was cultivated by Gerard in 1586. Formerly it was much in demand as an ornament to halls, and for placing before chimneys in summer, being planted in large pots, and trained in the fan manner, so as to cover a large surface. Its flowers are blue; but there is a white or very pale blue variety. In the shade it continues in flower for two months or more.

5930. Propagation and culture. By seed, cuttings from the stem, or by dividing the roots: the last method makes the strongest plants in the shortest time. The season for this operation is after the bloom has faded in September: the sections are to be planted in pots, and protected by a frame during winter. In spring they may be transplanted into small pots, and gradually shifted into larger ones, in the manner of shifting balsams and cockscombs. The plants raised by seed, Miller says, are always the strongest, the stalks rise higher, and produce a greater number of flowers. Good seeds are to be obtained by placing a strong-flowered plant in a warm situation, against a wall or under a glass case. They are to be sown in pots of light earth soon after being gathered, protected by a frame during winter, and will come up in spring. When the leaves decay in October, they are to be transplanted to beds of light sandy earth, without any mixture of dung, which is a great enemy to this plant. Here they are to remain two years, being protected in winter by rotten tan; they are then to be removed to their final destination in September or October, and the year following, being the third from sowing, they will flower. The plants, Miller observes, of this species, as of

many others which have been long propagated by roots, offsets, or cuttings, do not so readily bear seed as those which have been raised from seed.

5931. Brown, in the *Horticultural Register*, gives directions for cultivating this plant, of which the following is the essence:—"Take off offsets or cuttings in spring, and plant them in a shady situation till they have struck root. This done, remove them to a very shady situation, where they should remain twelve months from the following March. Then take them up with good balls, and put them in pots of from ten to twelve inches in diameter, using a soil composed of good rich loam and rotten dung. They may now be set in a green-house, on a frame, or in the windows of a dwelling-house, where they will flower, and attain the height of ten or twelve feet. The rationale of this practice consists in retarding the flowering of the plant by keeping it in a very shady situation, till it has attained great vigour. If not kept in a very shady situation, it will flower the first year." (*Refr. Reg.*, vol. i. p. 638.)

5932. The Campanula bellidifolia (*Platycladon grandiflora*, *lucifera*, and several other very showy species, may be similarly treated.

SUBJECT. 23. Chrysanthemum.—*Chrysanthemum indicum* L., *C. sinense* Sab., *A'nthemis artemisiifolia* W.; *Synq. Polyp. Supér.* L. and *Corymbifera* J. *Chrysantème*, Fr.; *Goldblume*, Ger.; and *Crisantero*, Ital.

5933. The Chinese chrysanthemum was introduced in 1764. A sketch of its history has been given by Rudge in the *Gardener's Magazine*, vol. viii. p. 691. It contributes greatly to the beauty of the flower-garden in a fine autumn, and to that of our conservatories in November and December, when scarcely any other plants are in flower.

5934. Varieties. The Chinese are supposed from good authority to have fifty varieties or upwards: there are forty-eight sorts described by Sabine, in the *Horticultural Transactions*.

1. *Roseusculi-flowered*: 15 varieties; yellow, white, brown, bluish, buff, pink, and light purple.
2. *Incurving* or *trailing*: six varieties; lilac, bluish, pink, orange, red, and white.
3. *China-aster-flowered*: six varieties; yellow,

- low, red, crimson, pink, bluish, and white.
4. *Marigold-flowered*: seven varieties; golden yellow, with bronzed back, yellow, less downward, pale buff, and purple.

5. *Tweed-flowered*: 11 varieties; yellow, salmon-coloured, lilac, purple, and white.
6. *Half-double* or *trailing*: five varieties; white, pink, buff, and orange. (*Gard. Mag.*, ix. 226.)

5935. Propagation and culture. No plant is more easily propagated and cultivated than the chrysanthemum. The root may be divided, suckers may be taken off, or cuttings taken at any season of the year, and at any period of the plant's growth. The following is the practice in the gardens of the Horticultural Society, given by Mr. Moore:—"In the beginning of April, cuttings are taken from the top shoots of last year's plants; they are planted in the pots called small sixties, in mould made up, one half of equal portions of loam, sand, and bog mud (for which leaf-mould, if any light vegetable soil may be substituted), and one half sand. The cuttings are taken off about three inches long, and smoothly cut across at a joint; one is put in each pot, and the pots are removed to a gentle bottom heat. In seven weeks or a month they are well rooted, and then hardened in a cold frame till the beginning of June, when they are shifted into 48-sized pots, and placed in an open airy situation. Here they are watered with liquid manure, in which soap suds have been mixed. About this time the tops of the plants are nipped off to make them bushy, but no more side shoots are allowed to remain for flowering than the plants are likely to be able to support. In August, shift into 32-sized pots, using strong loam, with about one third of rotten dung, and tie the plants to sticks. The pots are never planted, but frequently moved to prevent the roots

growing through their bottoms. The old plants, from which the cuttings are taken, if shaken out of the mould, freed from their suckers and repotted in 48-sized pots, afterwards in thirty-twos, and in August in sixteens, will form large showy plants." (*Gard. Mag.*, vol. ii. p. 156.)

5936. Leach selects in the month of May as many suckers as are wanted for the following year, from plants which have flowered the preceding year. He plants them then in a pot four inches wide, and places them on the north side of a wall, or in an open shady situation. When they begin to grow, he removes them to where they are fully exposed to the sun and free air. When the pots are nearly full of roots, he shifts them into other six inches deep, in which they are to remain till they flower. When there is an appearance of frost he removes them to the green-house, or to a cold frame, putting a few pots into the planty every week for a succession of flowers. The flowers being expanded, they are then removed to the conservatory or the drawing-room, and a display of flowers is thus kept up from the beginning of October to the middle of January. (*Gard. Mag.*, vol. ii. p. 591.)

5937. Michxins made of treating the chrysanthemum has for its object the attainment of plants of different sizes. To procure the highest plants, he takes the largest suckers from the old plants about the 1st of March, pots them singly, and

shifts three times in the course of the summer. His second-sized plants are from cuttings, struck about the middle of May, and treated in a similar manner. His third or lowest rank which form bushy plants, from eight to eighteen inches high, are obtained by laying the points of the shoots about the middle of August. These three different sizes are arranged on stages so as to show every flower to the spectator. (*Gard. Mag.*, vol. iv. p. 37.) Cuttings taken off after the flower buds have formed may be struck in heat, and will make very dwarf plants in pots of the smallest size. This mode has been practised by Mr. Ellis with very great success. (See the details in *Gard. Mag.*, vol. xii. p. 457.) "To obtain a regular bush, and large flowers, I place my old plants on a north border, in the month of July, at good distances from each other; round these I set 44-sized pots, filled with proper compost: I then lay the points of the shoots one in a pot, giving each shoot a gentle twist, and fixing it down firmly with a hook. In a month the layers will be sufficiently rooted, when they may be taken off, and shifted into larger sized pots, there to remain to flower. The young plants, after being shifted, must be set in a shady situation, and well supplied with water." (Sparrow, in *Gard. Mag.*, vol. iv. p. 99.)

5938. The soil used generally for the chrysanthemum, is two thirds of turfy or virgin loam, and one third of leaf mould or decayed dung.

5939. Culture in the open border. Many of the sorts may be planted out in warm borders, or compartments, or against walls, and will flower well in fine autumn; but their roots require protection through the winter, and they should be renewed about every two years; for as they increase much in size by suckers from the roots, and set for a longer period, they become unsightly, and produce small and imperfect flowers. The early-flowering varieties, as the purple, changeable white, rose, and buff, seen the hardiest and most suitable for borders. (See in *Hort. Trans.*, vol. iv. p. 324.) The plants, to look well in the border, should be large, and with many stems; their flowers are consequently more numerous, and produce a greater effect at a distance. The appearance of the flowers on many of the kinds is very different when blooming in the border from those which expand under glass, so much so, that they might be easily mistaken by an inexperienced observer for different varieties. (*Hort. Trans.*, vol. v. p. 162.)

SUBJECT. 24. *Hydrangea*. — *Hydrangea horténsia* Ser. (*Bot. Mag.* 438.); *Decán. Dig. L.* and *Saxifragæ*? *J. Caprifoliaceæ* § *Hydrangeaceæ* Lindl. *Hydrangelle*, Fr.; *Kehlknopf*, Ger.; and *Hydrangea*, Ital.

5940. The *Hydrangea* is reputed to be a native of China and Japan, whence it was introduced to Kew, by Sir J. Banks, in 1788. It is much valued as a chamber plant, and, in consequence, extensively cultivated near London and most large towns of Europe.

5941. *Varieties.* Since after it was introduced, some plants were found with blue flowers, which some supposed to be produced by salt or saltpetre, and others by oxide of iron. The yellow loam of Hampton Heath and some other places, and some sorts of peat earth are found to produce this effect; but the cause is not yet ascertained. Dr. Daalen, of Antwerp, finds that turfashes, and still more effectually those of the Rowan spruce, the wood generally used for fuel by him, applied to the roots of hydrangea, produced the blue colour of the petals. (*Hort. Tour*, p. 122.) According to an eminent gardener in Russia, the finest blue is produced by planting the hydrangea in a mixture of clay and a peculiar sort of bog earth, which is found in the neighbourhood of St. Petersburg. The two soils are intimately mixed, and are passed through a fine sieve. Another mode practised by the same gardener is to add one table spoonful of alum to as much common garden earth as will fill a pot about seven inches by ten inches; but the blue so produced is never so perfect as that from the bog earth and clay. Busch also asserts that the hydrangea will be turned blue by watering the young plant, the summer before, with alum water. The grey-washed soil, under the black moor earth at Petersburg, M. Busch observes, has the same effect, being combined with aluminous salt. (*Hort. Trans.*, vol. iv. p. 368.) A writer in the *Horticultural Register* finds that potting in a mixture of sandy loam and fresh sheep's dung, and watering with an infusion of that dung, produces the same effect; and another in the same work that cultivating the plants in sandy peat and watering them twice a week with an infusion of that material, is effectual. A writer in the *Gardener's Magazine*, vol. ii. p. 405, has succeeded by using earth so impregnated with oxide of iron, that, when watered, a red oxide filtered from it. This soil killed his mignon plants, but turned the flowers of his hydrangea blue.

5942. *Propagation and culture.* Hedges, who has been "very successful" in treating this plant, gives the following directions:—"As the hydrangea is not a tender plant, it may be sown each year by taking, in the beginning or middle of July, young shoots with three or four joints, cutting them off close to the joint which is at the bottom of the shoot; these are planted in rich earth, in a warm border, and covered with a hand-glass; they are shaded during the middle of the day, and sprinkled with water from a fine rose watering-pot, two or three times a week, in the evening, so as to keep them moist: the glass being kept close over them at all times. They will also grow by layers made in July, in the same way as is usual with carnations. The cuttings or layers will be well rooted by the end of August, at which time, or early in September, they may be put singly into small pots, and placed under a frame, which at first must be shut up close: if they can be assisted by a temperate dung heat, at this time, it will be better for them. In the frame they must be watered as before. About the middle or end of October, they are to be taken into the

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green-house, or other shelter, where they can be protected from wet and frost; during the winter, they must be watered once a week or fortnight, as they may require. In the latter end of May, or early in June following, the plants must be turned out into a bed of rich mould, in the open ground, to remain there till September, when they must be taken up and potted, and kept protected from damp and cold, as in the preceding winter. Instead of turning them out, as stated in the spring, they may be retained in pots; but they must be shifted twice during the summer. By either method fine strong plants will be formed, fit for forcing or turning out in the succeeding spring. If wanted for the borders, let them be put out when all danger of their sustaining injury by frost is over; they will stand the winter in the borders, and will also bear flowers, though not so well as when protected by a house. Those which are to flower in pots, are taken as soon as their buds begin to swell in the spring; all the old mould being removed from their roots, they are planted in fresh earth, in pots of about eight inches diameter at the top, and placed in front of the green-house or peach-house; if the plants are not over large, pots of smaller dimensions should be used; these will come into flower in June. Care must be taken to supply them plentifully with water whilst they are coming into bloom, and it is best to place waterpans under the pots to secure a continual supply of moisture. If it is desired to have plants in flower early in the spring, they must be shifted into their new pots in January, and brought forward with forcing heat. The mould I generally give to my hydrangeas is a compost of loam and bog earth or leaf mould, with a little sand, well incorporated together; in this they will produce red flowers; if they are exposed to blow blue, they must be planted in the pure yellow Hamstead loam."

5943. *Fintelmans* grows finer hydrangeas in the neighbourhood of Potsdam, than he saw in 1828, during a tour through Great Britain and Ireland. The soil he uses is found where rotted leaves and branches have lain for a century in the bottom of a shady valley, and form there a moist black earth on which few plants are found growing from the dark shade of the trees. When this earth is collected, turned over, dried, and reduced to powder, the colour is of a bluish black, the consistency soft, spongy, and loose, and rather wet. When this soil cannot be had, M. Fintelmann takes the mould formed by the rotted peat used at Potsdam as fuel. The propagation and culture differ little from the English mode; but it is stated that the most experienced German gardeners prefer keeping the plants at the growing season under the shade of trees, to keeping them under the shade of a wall, a hedge, or a building; from which M. Fintelmann concludes that the leaves of the hydrangea consume a good deal of carbonic acid. In Prussia they have no fixed mode of turning the flowers of the hydrangea blue; but M. Fintelmann has observed, that this effect takes place in different soils, and that these always contain a good deal of oxide of iron. (*Gard. Mag.*, vol. v. p. 273.)

SUBJECT. 25. *Balsam*. — *Impatiens Balsamina* L., *Balsamina horténsia* Riv. (*Blackb.* t. 583.); *Pent. Monog. L.* and *Geraniæ J.* *Balsamineæ* Richard. *Balsamine*, Fr. and Ger.; *Balsam*, Dutch; *Balsamina*, Ital.; and *Balsamo*, Span.

5944. The *balsam* is a tender annual, rising from one to two feet high, with a succulent branchy stem, serrated leaves, and various-coloured flowers. It is a native of the East Indies and Japan, where the natives, according to Thunberg, use the juice prepared with alum, for dyeing their nails red. Cultivated by Gerard in 1596.

3945. *Verbena*. These are infinite, but not so marked or prominent as to have acquired names. The seed from one plant will hardly produce two alike. Double flowers are chiefly held in esteem, and especially those that are striped like flukes and bizarre curvatures.

3946. *Propagation and culture*. It is almost always raised from seed, but it may be propagated by cuttings. The seed ripens readily from semi-double plants, and should not be less than three or four, or even nine years old, gardeners having experienced that most seldom produces double flowers. The best soil is a rich loam, rather lighter than that used for growing annuals. At any period between the 1st of March and 1st of May, and, as soon as the plants are placed in a box or pot as near the glass as possible. When the plants are five inches high, transplant into No. 48. pots, one plant in the centre of each pot. As soon as the roots have filled the pots, move them into pots a size or two larger and repeat this operation three or four times, till at last they are in pots of eight inches diameter or upwards, keeping the plants all the while in a hotbed or pit, and near the glass. Balsams so treated will rise four feet high, and diffuse feet in circumference, with strong thick stems, furnished with side branches from bottom to top, and these covered with large double flowers. (*Paisiweyer*, in the *Horticultural Transactions*, vol. iii. p. 406.) (See *Gard. Mag.*, vol. ii. pp. 47. and 118.)

3947. The *Amarantus tricolor*, *Cabalis cristata* or cockscomb, *Composita globosa* or globe cressant, *Monarda purpurea*

crystallina or ice plant, *Solanum Melampyrum* or egg plant, and most other tender annuals, will attain to corresponding luxuriance, if similarly treated.

3948. *Knight*, in October, 1820, sent to the Horticultural Society a cockscomb (*Celsia cristata*), the flower of which measured eighteen inches in width and seven inches in height, from the top of the stalk: it was thick and full, and of a most intense purplish-red. To produce this, the great object was to retard the production of the flower-stalk, that it might become of great strength. The compost employed was of the most nutritive and stimulating kind, "consisting of one part of manure-dung, fresh from the stable, and without straw, and one part of burnt turf, and seven inches of decayed leaves, and two parts of green turf, the latter being in lumps of about six inches in diameter, in order to keep the mass so hollow, that the water might have free liberty to escape, and the air to enter. The seeds were sown in spring rather late, and the first pot first into pots of four inches diameter, and then transplanted to others a foot in diameter; the object being not to compress the roots, as that has a tendency to accelerate the flowering of all vegetables. The plants were placed within a few inches of the glass, in a heat of from 70° to 100°; they were watered with pigeon-dung water, and due attention paid to remove the side branches when very young, so as to produce a strong head or flower." (*Hort. Trans.*, vol. iv. p. 322. See *Gard. Mag.*, vol. iv. p. 101, 350, 351; vol. v. p. 96, and 578; vol. vi. p. 226, and 302; and vol. vii. p. 98.)

SUBJECT. 26. Mignonette. — *Reseda odorata* L. (*Bot. Mag.* 29.); *Dodecém. Trig. L.* and *Resedaceae* Lindl. *Reseda odorata*, Fr.; *Wohlbriehende Reseda*, Ger.; *Reseda*, Dutch; *Reseda odorosa*, Ital.; and *Mignoneta*, Span.

1849. The *mignonette* is a trailing hardy annual, a native of Africa, and introduced in 1752. It is "the Egyptian bastard-rocket, with most sweet smelling flowers," of Justice and the Dutch florists of his day. The flowers are highly odorous, and the plant in pots is in universal request at all seasons of the year for placing in rooms.

3950. *Varities*. There is a sub-biennial semitrescent variety, rather more odorous than the common sort, which forms an elegant winter plant the drawing-room, which is not yet in very general cultivation.

3951. *Propagation and culture*. Rabson, who cultivated this plant extensively for the London market, gives the following instructions, as applicable to the common variety: — "To obtain fine plants, strong and ready to blow, during the winter, and through the months of January and February, the seed should be sown in the open ground the end of July; by the middle of September, the plants from this sowing will be strong enough to be removed into pots; for a week after this removal they must be shaded, after which they may be freely exposed to the sun and air, care being taken to protect them by frames from damage by heavy rains, and from injury by early frosts, until the beginning of November, at which time many of them will show their flowers; and they should then be removed to a green-house or conservatory, or to a warm window in a dwelling-house, where they will branch out, and continue to blow until the spring. The crop for March, April, and May should be sown in small pots, not later than the 1st of August; and plants from this sowing will not suffer by exposure to rain, whilst they are young; they must, however, be protected from early frosts, like the winter crop; they are to be thinned in November, leaving not more than eight or ten plants in each pot; and at the same time, the pots being sunk about three or four inches in some old tan or coal-ashes, should be covered with a frame, which it is best to place fronting the west; for then the lights may be left open in the evening, to catch the

sun whenever it sets clear. The third or spring crop should be sown in pots, not later than the 25th of February; these must be sown in a frame, on a gentle bed, and as the heat declines, the pots must be set down three or four inches into the dung-bed, which will keep the roots moist, and prevent their leaves turning brown, from the heat of the sun, in May and June. The plants thus obtained will be in perfection by the end of May, and be ready to succeed those raised by the autumnal sowing." (*Hort. Trans.*, vol. ii. p. 575.) See *Gard. Mag.*, vol. iii. p. 445; and vol. v. p. 37.

3952. The *tree-mignonette*, according to Sabine, "is to be propagated from seeds sown in spring; it may also be increased by cuttings, which will readily strike root. The young plants should be put singly into small pots, and brought forward by heat, that of a gentle border being preferable, but they will grow well without artificial heat. As they advance, they must be staked to a stick; taking care to remove the lower and smaller side shoots, by pinching them off, but allowing the leaves of the main stem to remain on for a time to support and strengthen it. When they have attained the height of about ten inches, or more, according to the fancy of the cultivator, the shoots must be suffered to extend themselves from the top, but must be occasionally stopped at the ends, to force them to form a bushy head, which, by the autumn, will be eight or nine inches in diameter, and covered with bloom. Whilst the plants are attaining their proper size, they should be shifted progressively into larger pots, and may ultimately be left in the same pots, if desired, until the spring." (*Hort. Trans.*, vol. iii. p. 181.) See also *Gard. Mag.*, vol. v. p. 532, 703.

SUBJECT. 27. Miscellaneous choice Flowers.

1853. A *miscellaneous collection of choice flowers* is here presented as suitable for the more select flower-garden borders. We have not, however, included half the number of species which we might have done; because the number of ornamental plants which have within the last few years been subjected to extraordinary culture would require a work on purpose to treat of them. Nevertheless, all those gardeners who understand the general principles of culture, and have been in the habit of thinking for themselves in the application of these principles, can never be at a loss, let the plant to be cultivated be what it may. For routine practitioners, the following assemblage may be useful: —

3954. The *Lupinus* is well known and most beautiful genus of herbaceous plants, and most of the species are as hardy and of as easy culture as the common bean. In the *Floris Britannica* above twenty species are enumerated, seeds of most of all of which may be obtained in the seed shops, and especially of Mr. Chantwood, of Tavistock Row, Covent Garden.

3955. The *Gillyflower* or stock (*Cheiranthus L.*, Matthioli R. B.), of which there are several species and varieties, and numerous sub-varieties, is one of the oldest inhabitants and greatest ornaments of the garden. Of the ten-week stock (*M. annua* Swt.) the double-flowered variety is the most common; and there are many named varieties, chiefly known as German stocks; or the Brompton or simple-stemmed stock (*M. simplicifolia* Swt.), which is a biennial, there are also several varieties, though not so many as the two former species. The ten-week stock, to flower the same year, should be raised on heat, and transplanted, when all danger from frost is over, to where they are finally to remain. The Brompton stock should not be encouraged to flower till the second year, and therefore it may be sown in the open air in April, or the beginning of May, and transplanted in July to where it is to flower. All stocks should be transplanted when very young; because, having fusiform roots, and few side fibres, they seldom recover from the check which they receive from being transplanted after two or three months' growth from the seed. A judicious writer, in the *Horticultural Cabinet*, recommends marking such flowers for seed as have more than the usual number of petals, say six or seven instead of four, and pulling up all the other plants. From practising this, he says, he never fails to have a considerable proportion of double-flowered offspring. (*Hort. Cab.*, vol. i. p. 85.)

3956. The *Perennial Aster* (*Aster L.*) consists of numerous species, all of which are valuable as flowering late in the autumn. There are seven species in common culture which bloom in August, six which bloom in September, eleven which flower in October, and three which continue in bloom from the

1st of November till Christmas. The propagation and culture of all these species is of the very easiest kind, and they will grow in almost any soil. See a very interesting paper on this subject in the *Gardener's Magazine*, vol. vi. p. 584, by an amateur cultivator of this genus.

3957. The *Chinese Aster* (*Aster chinensis L.*, Callistemma herbstii DC.) is a well-known variety, which has lately had an accession of some beautiful new varieties from Germany. These have quilled flowers, striped and of larger size than the common Chinese aster, and they richly deserve a place in every garden. The seeds should be sown in the first week in April, in order to get the plants strong and forward, either in pots, or seed pans, keeping the sorts distinct; the pots may then be placed in a cold frame till the plants come up. When they are of the proper size, they may be transplanted to the borders, where they are to flower like the common variety. A few of the finest and most distinct varieties of the German Chinese aster are: deep red, deep red striped, deep red pale red tipped with white, dark blue, dark blue striped, pale blue, blue striped, yellow tinged, white, silver white, flesh coloured, ash grey, &c. (*Hogg's Supplement*, &c.)

3958. The *Phloxes* are a numerous family of most elegant flowers, and the number of varieties has been lately increased by cross fecundation. They are all of the easiest culture, and there are sorts in bloom from February to November.

3959. The *Coleus*, *perfoliatus* and other species are very neat little plants, well adapted for pots. The *C. perfoliatus* ripens seeds freely, and by them may be easily increased. The seeds should be sown immediately after they have become ripe, and kept in a frame or green-house till the beginning of May. They may then be transplanted into a bed of light garden soil, and covered with a frame till midsummer. By the follow-up spring autumn they will be found strong vigorous plants, when they may be taken up, potted singly in very small pots, and placed in the green-house, where they will flower beautifully, producing from fifty to eighty blossoms from

a single bulb. (*Gard. Mag.*, vol. i. p. 386.) *Oxycnemum* blooms ripens its seeds in May, when they should be immediately sown in pots or pans, and if subjected to the usual routine they will flower in the January twelvemonth following. The plants should be kept in a green-house or frame during winter, and freely exposed to the light and air. (*Gard. Mag.*, vol. vii. p. 562.) Of *C. persicum*, there is a variety with fragrant flowers, and another, it is said, with a doubled corolla: see *Gard. Mag.*, vol. x. pp. 187, 189, 272.

5960. *Pectunia neriiflora*, and *P. phœnicea*, are among the most splendid ornaments of the flower-garden. A few plants may be preserved in a frame or green-house through the winter, and cuttings from them brought forward in heat during spring till they are in a fit state to turn out; or, cuttings may be struck in autumn and preserved through the winter in small pots. (*Gard. Mag.*, vol. iii. p. 295; vol. ix. p. 561.)

5961. *The Portulaca* (*P. chamaedrifolia*, *venosa*, *Lamberti*, *Aubletii*, *pulchella*, &c.) are beautiful half-hardy perennials, which form brilliant ornaments to the flower-garden during summer. They are propagated by cuttings, kept through the winter in small pots, and turned out when all danger from frost is over. Light rich soil suits them best. (See *Gard. Mag.*, vol. v. p. 106.)

5962. The *Scorbutia triphylla* Sal., of which there are two varieties, the smooth-leaved and the pubescent, is a beautiful ornament to the flower-garden from June to November. It is propagated by cuttings of the shoots in sandy loam on heat, and grown under glass from the first of February. When the danger from frost is over in the second year, the plants are turned out into beds of light rich soil, where they grow vigorously and flower freely till they are destroyed by frost.

On the first appearance of severe weather, they should be taken up, and preserved in a frame or green-house till spring, when they may be removed to a hot-bed, or stove, to produce cuttings for a new supply of plants. If this be considered too much trouble, the old roots may be taken up every autumn, and preserved during winter in a green-house, or in a dry cellar. (Don's *Miller's Dictionary*, and *Flor. Cab.*, vol. p. 38. See also *Gard. Mag.*, vol. vi. p. 56.)

5963. *Strepocarpus Rozii* may be sown in April in pots filled with loam and peat, and placed in a hotbed till the plants are fit to transplant into separate pots. They may be preserved under glass till June, and then placed in the open air. On the approach of winter, they should again be put under glass, and in the following May they may be turned out into a bed of peat, where they will produce a splendid mass of flowers from May to October. (*Flor. Cab.*, vol. i. p. 56.)

5964. The numerous kinds of China roses, varieties of the species *Rosa indica* and *sempervirens*, and some of them deemed by botanists distinct species, though all of them may be advantageously treated as herbaceous or dwarf plants for beds and borders. The sweet-scented China rose, and the deep red variety, as well as the different noisettes, are particularly well adapted for this purpose. They may be planted out either singly or in beds in the beginning of May, when they will continue flowering without intermission, till they are destroyed by frost. The best mode of propagation for this purpose is easy and expeditious. Put a plant or two of the rose to be propagated into a hot-house or hotbed in January or February. It will soon throw out young shoots. As soon as these have three or four leaves, take them off, no matter how tender or succulent, but never remove or shorten a leaf: plant the cuttings in sand with a glass over them, and place them in the same heat as the parent plants. In three weeks they will be ready to pot off. In this way continue to take from cuttings from the old plants, or top the young transplanted ones for that purpose, till you have as many as you want for the season. (*Gard. Mag.*, vol. vi. p. 427.) We do not know a finer ornament for the flower-garden, or the flower-garden, than the different varieties of China rose so treated. The different noisettes will continue covered with flowers till they are destroyed by frost.

5965. The *Fuchsia* (*Fuchsia* L.) are elegant and ornamental shrubs, natives chiefly of Chile and Mexico, and therefore requiring the green-house in the winter, though they will grow vigorously and flower freely in the open air during summer. Above a dozen species are enumerated in our *Hortus Britannicus*, of which the most beautiful are, *coccinea*, *gracilis*, *viridis*, *conica*, *microphylla*, and some hybrids lately raised, such as *globose*, *Thompsonii*, and *Rondeletii*. All are propagated with the greatest ease by cuttings, and they may either be planted out of a small size in spring, singly or in masses,

or trained in pots for two or three years till they form tree-like shrubs of five or six feet in height, when they may be turned out at the beginning of every summer, and taken up every winter. In some situations the more hardy species, especially *viridis*, which is the hardiest, will stand out the winter, dying down to the ground or nearly so, and springing up vigorously the following spring. (See *Gard. Mag.*, vol. vi. p. 16, 426; vol. v. p. 613; vol. vi. p. 728; and vol. vii. p. 598, 607.) *F. longiflora* has flowers of a remarkable length. (*Gard. Mag.*, vol. x. p. 375.)

5966. The green-house *Calceolarias* (*Calceolaria* L.), of which there are above twenty species, one of the finest of which is *C. flexilis*, an innumerable variety, all will be raised from cuttings or seeds in hotbeds early in spring, and turned out in beds or borders during summer. Some herbaceous kinds will stand the winter; others of the woody kinds may be trained as standards, like the *fuchsias*, and will thus form splendid ornaments as single plants on lawns. (See *Gard. Mag.*, vol. v. p. 272; vol. vi. p. 493; vol. vii. p. 48.)

5967. The green-house *Saxifraga*, such as *formosa*, *coccinea*, *fulgens*, *splendens*, *intolucrata*, *purpurea*, *speciosa*, *Gracilaria*, &c., are fine plants for turning out into beds on a lawn or in a flower-garden. Old plants may be kept through the winter in a green-house to supply cuttings in February, and these, by means of heat, may be rendered plants of considerable size by the beginning of May, when, after being hardened, they may be turned out for growth and the production of flowers until winter. (See *Gard. Mag.*, vol. vi. p. 17.)

5968. *Erythrina Crista-galli* and *E. laurifolia* are splendid hot-house plants, which, however, may be grown in the open garden in the same manner as *geraniums*, the roots being taken up on the approach of winter, and preserved dry and free from frost till the following spring. The following mode of propagation is by Mr. Elias, who has been singularly successful in the culture of this plant. As soon as the plants have done flowering, or have ripened their wood, cut them down and make as many cuttings of the stems as there are buds, preserving, if possible, the three leaves to each bud. Then separate the top and bottom roots more readily than those from the intermediate part. Plant the cuttings separately in small pots, with the bud just below the surface of the mould, which should be light and sandy, the pieces of stem being cuttings being laid flat; then immediately place them under a hand-light on a strong bottom heat, so that the heat under the glass may range from 75° to 80° of Fahrenheit, shading regularly when the sun is shining on them, or dry up the moisture; for they should be kept constantly well watered. In three weeks they will be rooted, when they may be gradually hardened, till they will bear a shady place in the open air. Thus from a single plant you may have from twenty to thirty plants may be annually reared; and if the flowering plants are forced, so as to make them flower twice a year, double that number may be obtained. (*Gard. Mag.*, vol. vi. p. 18.)

5969. *Aletrisandra* is a genus of splendid-flowered plants, with tuberous roots, which it is found will stand the winter in some situations, such as in a cold frame, or in a pit of southern exposure. All the species (fifty are known) grow luxuriantly in sand and vegetable earth, and are increased by division of the roots or by seeds. (*Gard. Mag.*, vol. iii. p. 20.)

5970. The *Commelina cælestis* is a perennial which, like the *geranium*, and the *marvel* of Peru, will flower the first year if treated like a tender annual; while, if its fleshy roots are preserved through the winter in sand and excluded from the light, they may be planted out in the following spring, after being brought forward a short time in a hotbed. The cultivation of the *Commelinas* from seed is thus given in the *Irish Farmer's and Gardener's Magazine*. Sow the seeds in a hotbed on a moderate hotbed, and bring the plants forward in separate pots, turning them out in the open garden in the beginning of May, or in the open ground in the open air in the month of March. Light rich soil is preferable. (*Irish Farmer and Gard. Mag.*, vol. i. p. 11.)

Mr. Austin, in the *Gardener's Magazine*, vol. ix. p. 231, recommends that the roots be taken up, and kept in a moist state during winter, by being sprinkled occasionally with water, if not moist enough without it, and that they should be replanted in the beginning of March, being again taken up before the frosts of winter. By this treatment, he says, the plants may be preserved for five years. Seeds which have fallen upon the soil, and lain through the winter, will sometimes produce plants in the following year.

SECT. II. Border-Flowers.

5971. *Border-flowers* are hardy plants, with showy blossoms, of easy culture, and their use in floriculture is to decorate the flower-garden, shrubbery, and other spots or borders considered as ornamental. We shall take them in the order of perennials, bulbs, biennials, hardy annuals, and half-hardy annuals; and arrange each of these subdivisions according to their time of flowering, heights, and colours: indicating by letters some of those which require peat-soil (p); are rather tender (t); are most showy (s); and continue in flower for two or more months. (3) At the end of each subdivision we shall give its general mode of propagation and culture. It may be added, that most of the plants mentioned as flowering in any particular month will often come into flower the month preceding, and continue in bloom during one or more of the following months. Hence the importance of selecting such plants as are at once the most easy of cultivation, beautiful in appearance, and that continue longest in blossom. Flowers are rarest in the hardy flower-garden at the very dawn of spring, and late in the autumn. Every genus, species, and variety, whose habit it is to bear flowers at either of these times, is, therefore, deserving of especial appropriation and cultivation. Of the species of plants which blossom in autumn, it is found that the flowers of the majority are yellow; therefore, in contribution to variegation, autumnal flowers of any other colour are especially valuable. Several species of the genus *Aster*, and the varieties, except the yellow-flowered ones, of *Georgina variabilis*, render welcome service towards this end.

SUBJECT. 1. *Species and Varieties of Perennial fibrous, ramose, tuberous, and creeping-rooted Herbaceous Border-Flowers, arranged as to their Time of Flowering, Height, and Colour.*

5979

PERENNIAL BORDER-FLOWERS

FEBRUARY AND MARCH

APRIL

Height from 0 to ½ of a ft.	From ½ of a foot to 1 foot.	Height from 0 to ½ of a ft.	From ½ of a foot to 1 foot.	From 1 of a foot to 1½ ft.	From 1½ of a foot to 2 ft.																																		
RED. <i>Stellis perennis</i> f. rubro Hedyscra trilobis, b. pleno-rubro <i>Primula vulgaris</i> f. rubro, <i>Alibani</i>	RED. <i>A'rabis rosea</i> <i>Corydalis bulbosa</i> <i>Heliborbus viridis</i> <i>Tussilago fragrans</i> <i>Viola Krokoti</i>	RED. <i>Corydalis longiflora</i> <i>Phlox subulata</i> 3 <i>Primula Aliboni</i>, caly- cina, helveticis, nivalis, violacea	RED. <i>Cortusa Matthiolii</i> p. <i>Phlox setacea</i> 3 <i>Primula piedmontana</i>, varis f. rubro, pubescens	RED. <i>Aquilegia canadensis</i> <i>Asperula taurina</i> <i>Dodecatheon Meadia</i> p. <i>Lychnis Viscaria</i> <i>Primula longiflora</i> Saxif. cordifolia, crassifolia.	WHITE. <i>Stellis perennis</i> <i>Cortusa lanceolata</i> p. Hedyscra trilobis f. albo <i>Heliborbus albus</i>, b. verna- lis <i>Corydalis vernalis</i> <i>Potentilla alba</i> <i>Primula vulgaris</i> pleno albo <i>Ranunculus canadensis</i> <i>Trollius alpinus</i> <i>Viola odorata</i> f. albo, albo pleno	WHITE. <i>A'rabis alba</i>, and many others <i>Corydalis tuberosa</i> 3 a. alibitica <i>Isopyrum thalictrifloris</i> <i>Corydalis autica</i> <i>Potentilla micrantha</i> <i>Stellaria Holostea</i>, gramin- mima <i>Tussilago palmata</i> alba <i>Valeriana tripteris</i>	WHITE. <i>A'rabis alpina</i>, and many others <i>Arenaria verna</i> 3, and many others <i>Stellis perennis</i> f. albo <i>Cortusa Meadia</i> p., ca- nadensis <i>Saxifraga hypnoides</i>, and many others <i>Saxifraga alpi</i> f. al. p. <i>Thalictrum anemoides</i> p. f. pleno p. <i>Viola odorata</i> f. albo, f. pleno	WHITE. <i>Anemone nemorosa</i>, and p., quincquefolia p. f. vicia, vernaalis p. <i>Cardamine amara</i>, bellidifolia <i>Cortusa Meadia</i> p., ca- nadensis <i>Jeffersonia triloba</i> <i>Plyrre macrocarpa</i>, b. lepera <i>Phlox niva</i> 3 <i>Primula decora</i>, <i>Rimul</i> <i>Tiaradia cordifolia</i>	WHITE. <i>Aquilegia canadensis</i> <i>Asperula odorata</i> <i>Auriclea decandra</i> <i>Dodecatheon Meadia</i> var. alibitica p. <i>Macrorrhiz racemosa</i> <i>Ranunculus officinalis</i> <i>Pulmonaria saccharata</i> <i>Tiarella M. emodi</i> <i>Tussilago niva</i>, lobata	YELLOW. <i>Anemone ranunculoides</i> D. aba <i>Atroen</i> <i>Erithria bysanalis</i> <i>Franchia ranuncul.</i>, f. pl. f. luteo-ens <i>Potentilla verna</i>, glaberrima <i>Primula vulgaris</i> <i>Saxifraga bronchialis</i>, capitata <i>Tussilago Fitchii</i> folia variegata <i>Viola alba</i>	YELLOW. <i>Adonis vernalis</i> <i>Anemone pulsatilla</i> <i>Corydalis lutea</i> <i>Dodeca Euphratica</i> p. <i>Lonicera Chrysanthemum</i> p. Leontopodium p. i. <i>Onodra glaucum</i> <i>Potentilla oxypha</i> <i>Primula elatior</i>, invo- lacrata, inflata, suave- lens	YELLOW. <i>Chrysanthemum alterni- folium</i>, oppositifolium <i>Draba strobilata</i>, brachy- stemon, ciliata <i>Onodra stellulatum</i> <i>Primula Auricula</i> f. rubr., balda, fallida <i>Ranunculus alpinus</i>, auricomus, montanus <i>Viola biflora</i>	YELLOW. <i>Adonis spinnia</i> <i>Alyssum murale</i> <i>Anemone sulphurea</i>, vernalis var. lutea <i>Androsapha neglecta</i> <i>Onodra simplicifolium</i>, viridum, arenarium <i>Primula</i> <i>Ranunc. millefolium</i> <i>Viola lutea</i>	YELLOW. <i>Alyssum gemmosum</i> <i>Alyssum saxatile</i> 3 <i>Antirrhinum albidum</i> <i>Aquilegia grandiflora</i> <i>Chelidonium grandiflor.</i> majus, laciniatum <i>Scrophularia macrantha</i>, dyschidnifolia, macro- phyllum, plantagin. <i>Euphorbia spathyroides</i> <i>Silene acaulis</i>	BLUE. <i>Hedyscra acutisoba</i>, eme- ricana, trilobis and pl. <i>Gentiana axillaris</i>, verna- lis <i>Veronica officinalis</i>, seti- gera	BLUE. <i>Anemone spinnia</i> <i>F'ris perilla</i> <i>Onophiodon verna</i> <i>Ornithopus saxatilis</i> <i>Viola odorata</i> and pleno	BLUE. <i>Gentiana brachyphylla</i> <i>Gibbularia vulgaris</i> <i>Solidanilla alpina</i> p. Chialp p., minima p. <i>Viola canina</i>, <i>prunella-</i> folia	BLUE. <i>Dietes maritima</i> <i>Veronica intermedia</i> <i>Phlox divaricata</i> <i>Pulmonaria aur.</i>, mollis <i>Viola primulifolia</i>, pur- pureascent	BLUE. <i>Anemone pratensis</i> 3, Paeonia 3 <i>F'ris nepalensis</i> <i>Polemonium reptans</i> <i>Pulmonaria virginica</i> <i>Salvia Barret.</i> 3, lacina. 3.	PURPLE. <i>Primula marginata</i> <i>Saxifraga</i>, pauciflora <i>Corydalis p.</i>, rubra <i>Viola odorata</i> pl. pur- purea, alba, f. pur- purea	PURPLE. <i>Corydalis caucasicola</i> <i>Alchemilla pauciflora</i> <i>tuberosa</i>, longiflora <i>Orobus verna</i> <i>Tussilago alpina</i>	PURPLE. <i>F'ris hirsuta</i> <i>Primula vulgaris</i> f. purp- pl., anca <i>Tussilago decolor</i> <i>Viola odorata</i> flore purp.	PURPLE. <i>Anemone Halleri</i>, Pul- satilla <i>Cardamine pratensis</i> pl. <i>Dodecatheon integrifol-</i> <i>F'ris biflora</i>, umbellifera, verna, violacea	PURPLE. <i>Dentaria bulbifera</i> <i>Hyoscyamus orientalis</i>, pyramidalis <i>F'ris Humei</i> <i>Primula angustifolia</i>	VARIEGATED. <i>Stellis perennis</i> b. varie- colis <i>Viola tricolor</i>	VARIEGATED. <i>Primula Auricula</i> a. a. variegata, elatior a. polyantha <i>Pardanthus chinensis</i>, nepalensis	VARIEGATED. <i>Stellis perennis</i>, varieties <i>Alchemilla regina</i>, f. <i>Primula vulg.</i> b. pl. var. <i>Viola variegata</i>	VARIEGATED. <i>Primula Auricula</i>, var.: elata, alba, polyantha, c. plena, f. caly- cintha	VARIEGATED. <i>Anemone coronaria</i>, var. <i>variegata</i> <i>Orobus verna</i>	GREEN. <i>Adonis Noctachitina</i>	GREEN. <i>Heliborbus viridis</i>	GREEN. <i>Aconit. latebrosa</i>	GREEN. <i>Heliborbus dumetorum</i>, purpureascent	GREEN. <i>Chenopodium</i> <i>Bonus Henricus</i>	BROWN. <i>Symplocarpus forficatus</i>	BROWN. <i>Heliborbus viridis</i>	BROWN. <i>A'aron canadensis</i>	BROWN. <i>F'ris virida</i>	BROWN. <i>F'ris hirsuta</i>

MAY.

Height from 0 to 1/2 a ft.	From 1/2 a foot to 1 foot.	From 1 foot to 1 1/2 ft.	From 1 1/2 foot to 2 feet.	From 2 feet upwards.
R.E.D.	R.E.D.	R.E.D.	R.E.D.	R.E.D.
<i>Anthyllus montana</i>	<i>A'juga reptans</i> n. s. rub.	<i>Aquilegia canadensis</i>	<i>Armoria scrocarosefolia</i>	<i>Centrinthus angustifolius</i>
<i>Arenaria rubella</i>	<i>Anemone borealis</i>	<i>A'ster alvaricus</i>	<i>latifolia</i>	<i>medius</i> , <i>ruber</i>
<i>Artemisia filifolia</i>	<i>Artemisia filifolia</i>	<i>Cerophyllum</i> <i>virginicum</i>	<i>Cerophyllum roseum</i>	<i>Geranium amoensolum</i>
<i>Spiridium alpinum</i>	<i>Artemia vulgaris</i> , <i>cephalotes</i> , and many others	<i>Chrysanthemum abachifolium</i>	<i>Geranium macrochiton</i> , <i>retusum</i>	<i>Hum f.</i>
<i>Erinus alpinus</i> , <i>hispid.</i>	<i>Convolvulus majalis</i> <i>f.</i>	<i>Dentaria diphtica</i> , <i>pinnatifida</i>	<i>Lychinus Vicia</i> and <i>pl.</i>	<i>Hesperis matronalis</i> <i>f.</i>
<i>Erodium alpinum</i>		<i>Diandria</i> , several	<i>Medeola</i> <i>virginica</i>	<i>pleno-rubro</i> , <i>retusum</i>
<i>Geranium robertianum</i>	<i>Dianthus</i> , several	<i>Gnaphalium chilense</i>	<i>a. rubescens</i> , <i>c. Hamel</i> , <i>c. triflorum</i>	<i>Phyllis alba</i> , <i>rubra</i>
<i>Gladix maritima</i>	<i>Dietzia formosa</i>	<i>Geranium longipes</i>	<i>a. fragrans</i> , <i>critica</i> , <i>arctica</i> , <i>hybrida</i> , <i>virginica</i>	<i>Dorycnium heterophyllum</i>
<i>Hutchinsonia stylosa</i>	<i>Dodecatheon Meadei</i>	<i>Hieracium glabrum</i> , <i>villosa</i>	<i>a. virgata</i> , <i>virginica</i>	<i>Milva Henningii</i> , <i>syriaca</i>
<i>Lupinus borealis</i> , <i>a. americana</i>	<i>Erigeron philifolius</i>	<i>Hyssopus officinalis</i> <i>f.</i>	<i>phobea</i> , <i>Rasai</i> , <i>villosa</i>	<i>Onocrotis</i> , <i>rotundifolia</i>
<i>Lycchnis alpinus</i> <i>f.</i>	<i>Lamium rugosum</i>	<i>Paeonia amala</i> , <i>decora</i>	<i>Polygonum Bistorta</i> , <i>elipicum</i>	<i>Paeonia officinalis</i> , <i>officinalis</i>
<i>O'chia papilionacea</i>	<i>Meibomia Meibomia</i>	<i>tenuifolia</i> , <i>humilis</i>	<i>Sparganium angustifolium</i>	<i>Pulsatilla nuttalliana</i> , <i>virginica</i>
<i>Phlox maculata</i>	<i>Phlox amara</i> , <i>stolonifera</i>	<i>Diandria</i> , <i>virginica</i> , <i>paradoxa</i>	<i>Sanguinella purpurea</i>	<i>Salvia officinalis</i> , <i>orientalis</i>
<i>Phlox maculata</i> (varia <i>Hort.</i>)	<i>Pulmonaria officinalis</i>	<i>Phlox pilosa</i> <i>p.</i>	<i>Silene virginica</i>	<i>Valeriana pyrenica</i> , <i>sambucifolia</i>
<i>Primula acedula</i> , and var. <i>calycina</i> , <i>laevifolia</i> , <i>sedifolia</i> , <i>f. stricta</i> , <i>alabastr.</i>	<i>Rubus strigosus</i>	<i>Pulmonaria virginica</i>		
<i>Rapontia cymoides</i> <i>f.</i>	<i>Salix caudata</i>	<i>Saxifraga hirsuta</i> , <i>umbellata</i> , <i>crassifolia</i> , <i>cordifolia</i>		
<i>Silene acedula</i>	<i>Tradescantia virens</i> <i>p.</i>	<i>Tallium grandiflorum</i>		
	<i>Valeriana dioica</i> , <i>tuberosa</i>			
WHITE.	WHITE.	WHITE.	WHITE.	WHITE.
<i>Androsace Chamajensis</i> <i>s. p. f.</i> , <i>villosa</i> <i>s. p. f.</i>	<i>Anemone alba</i> , <i>p. caroliniana</i> , <i>parviflora</i> <i>p.</i>	<i>Actis alba</i> and <i>rubra</i>	<i>Amphedusa alba</i>	<i>Actis alba</i>
<i>Anemone baldensis</i>	<i>syriaca</i> , <i>virginiana</i>	<i>Anemone dichotoma</i> , <i>peninsularis</i>	<i>Androsace decandra</i>	<i>Androsace rubra</i>
<i>Anemone verana</i> , and <i>virginiana</i>	<i>Antennaria plantaginifolia</i>	<i>Campylosiphon fl.</i> <i>f.</i>	<i>Centrinthus ruber flore alba</i>	<i>Crimbe cordifolia</i>
<i>Arctis borealis</i> , <i>occ.</i> <i>p.</i>	<i>Artemisia filifolia</i>	<i>Albo</i> <i>virg.</i> and <i>rotundifolia</i> <i>al.</i> <i>f.</i>	<i>Cerophyllum maritima</i>	<i>Phyllis alba</i>
<i>Artemia vulgaris</i> <i>f. albo</i>	<i>a. albiflora</i>	<i>Cerophyllum tenuifolia</i>	<i>Cucubaba Bakes</i>	<i>Lupinus polypholus</i> <i>cor</i>
<i>Artemia majalis</i> , and <i>id.</i>	<i>a. bellidifolia</i> , <i>virginica</i>	<i>Chrysanthemum tenuifolia</i>	<i>Cactaria Liliatum</i>	<i>Malva sylvestris flore</i>
	<i>Artemia majalis</i> , and <i>id.</i>	<i>Chrysanthemum tenuifolia</i>	<i>Cucubaba</i> , several	
		<i>Chrysanthemum tenuifolia</i>	<i>Echinops</i> , <i>virginica</i>	
		<i>Chrysanthemum tenuifolia</i>		

PERENNIAL BORDER-FLOWERS.—MAY—continued.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to $\frac{1}{2}$ foot.	From $\frac{1}{2}$ foot to 2 feet.	From 2 feet upwards.
WHITE. <i>Dianthus barbatus</i> <i>Dianthus</i>, several <i>Draba repens</i>, stellata, tomentosa <i>Epimedium alpinum</i> <i>Fragaria monophylla</i> <i>Houstonia erythraea</i> f. <i>Hutchinsii</i> alpina, petraea, procumbens <i>Iberis ciliata</i> <i>Iris pumila</i> s. alba <i>Jooptrum halictro-</i> <i>ides</i> p. <i>Lycinis quadridentata</i> <i>Pachyandra procumb.</i> <i>Potentilla alba</i> <i>Primula vulgaris</i> fl. albo, fl. alb. pl., nivea <i>Saxifraga granulata</i>, and fl. pl. <i>Schizoclelea podolica</i> <i>Silene alpestris</i>, <i>rupestris</i> <i>Sunifera bifida</i> p., umbellata p. <i>Tussock cordifolia</i> <i>Tridentata europaea</i> p., americana p. YELLOW. <i>Alysum creticum</i> 3, olympicum 3 <i>Arcia Vitalba</i> p. <i>Bistorta Gmelina</i> <i>Calophyllum halictro-</i> <i>ides</i> p. <i>Draba ciliolata</i>, <i>ciliata</i> <i>Fragaria indica</i> 3 <i>Mieracium alpinum</i> 3, adurem 3 <i>Lychnis nemorum</i> 3 nummularia 3 zosteria f. <i>Mimulus monchana</i> f. <i>Potentilla multifida</i> <i>Primula involucrata</i>, vulgaris, and pl. <i>Ranunculus flammula-</i> <i>folia</i> f. p., <i>gracilis</i> p. f. <i>Saxifraga areolata</i> p. <i>Bursera</i>, <i>cecidia</i> <i>Silene monchana</i>, tri- folia <i>Urtica flava</i>, <i>semifolia</i> <i>Valeriana alba</i>, <i>glabra</i> <i>Viola biflora</i> f., <i>chry-</i> <i>santha</i>, <i>alba</i>, <i>modica</i> BLUE. <i>Anemone arvensis</i> <i>Arum</i> <i>virginiana</i> <i>Campidula exilis</i> p., hederacea p. <i>Gentiana verna</i> p. <i>Iris cruenta</i>, and others <i>Linaria alpina</i> f. <i>(Oxytropis cynosa)</i> <i>Phlox procumbens</i> <i>Polemon. Richardsoni</i> <i>P. imula minima</i> <i>hetvelica</i>, <i>integerrima</i>, <i>marginalis</i> <i>Vernonia alpina</i>, <i>saxifolia</i> <i>Viola pedata</i>, <i>corata</i>, <i>obliqua</i>, <i>cauculata</i>, <i>pedata</i> p., <i>pedata</i> var. <i>habellifolia</i> p., <i>ro-</i> <i>thomagensis</i> PURPLE. <i>Aster alpinus</i> <i>Aurinia deltoidea</i> 3, purpurea 3 <i>Gentiana axillaris</i> <i>He-penis aprica</i> <i>Iris pumila</i> <i>Primula villosa</i> <i>Ranunculus pyrenicus</i> <i>Saxifraga biflora</i> p., retusa p. f. <i>Viola grandiflora</i>, ortensis, palmata VARIEGATED. <i>Anemone hortensis</i> <i>Iris pumila</i>, <i>variegata</i> <i>(Oxytropis scordica)</i> p. f. <i>Trifolium uniflorum</i> <i>Viola striata</i>, <i>palmata</i> var. <i>striata</i> GREEN. <i>Amantaria viridis</i> p. f. BROWN. <i>Astrum europaeum</i>, <i>ca-</i> <i>nadense</i> <i>Trifolium striale</i>, erectum, prolatum	WHITE. <i>Astrantia minor</i> <i>Bellis sylvestris</i> <i>Campidula Vandaei</i> <i>Dianthus violaceus</i>, several <i>Diphylleia cymosa</i> p. <i>Epimedium alpinum</i> <i>Hydrophyllum cana-</i> <i>dense</i>, <i>virginicum</i> <i>Iris scordica</i> <i>Iberis Tenoreana</i> <i>J. flavida</i> <i>diphylla</i> p. <i>Lamium album</i>, <i>molle</i> <i>Mitella diphylla</i> <i>Palmatoria saccharata</i> <i>Ribes Chamaemorus</i> <i>Semilacina borealis</i> p., <i>racemosa</i> p., <i>stellata</i> p. <i>Tenella palmata</i>, <i>alba</i> <i>Tillium nemorosum</i>, grandiflorum <i>Xerophyllum tenax</i> YELLOW. <i>Androsace lanata</i> <i>Anthylla vulneraria</i> 3, polyphylla 3 <i>Astragalus depuratus</i>, polyphyllus <i>Berberis petraea</i> <i>Conopogon Doniana</i> <i>Cheiranthus alpinus</i> <i>Eriophyllum caespitosum</i> <i>Iris flavida</i> <i>Oxalis echinoides</i> <i>Mitella lutea</i>, var. reticulata f., <i>guttata</i> <i>Potentilla macrantha</i>, sericea, splendens <i>Primula elatior</i>, <i>vera</i> <i>Ranunculus pedatus</i>, gramineus, bulbosus fl. pl., monspeliacus <i>Trifolium canadense</i>, ochroleucum <i>Valeriana perfoliata</i> <i>Valeriana chironioides</i> <i>Vesicaria utriculata</i> f., reticulata f., <i>sinuata</i> BLUE. <i>Aquilegia grandiflora</i>, alberica <i>Aster alba</i> <i>Commelina hirtella</i> <i>Hydrophyllum appendicu-</i> <i>lata</i> <i>Iris amara</i>, <i>notha</i>, orientalis, hematophyl- la <i>Lupinus venosus</i> <i>Lupinus nootkatensis</i>, laxiflorus, perennis <i>Nepeta Mussini</i> <i>Phytolacca heterochry-</i> <i>sos</i> <i>Phytolacca mexicana</i>, repens <i>Palmatoria virginica</i> <i>Statice latifolia</i>, <i>Limon-</i> <i>Veron. multifida</i>, <i>pallida</i>, and several others PURPLE. <i>Anemone pratensis</i> <i>Aquilegia atropurpurea</i>, lutea, perfoliata <i>Dentaria polyphylla</i> <i>Geranium dahuricum</i>, notatum <i>Hedera hirsuta</i> <i>Lamium Orontis</i> <i>Myosotis perfoliata</i> <i>Oxalis venosus</i> <i>Platanus maritimum</i> <i>Platystyle cyanus</i>, semifolia VARIEGATED. <i>Aquilegia glandulosa</i> <i>Campanula punctata</i> <i>Geranium atropur-</i> <i>pureum</i> <i>Vitis rotundifolia</i> <i>Iris praemorsa</i>, <i>tenax</i> <i>Mitella variegata</i>, <i>Semilab. Youngi</i> GREEN. <i>Phlox quadrifolia</i> BROWN. <i>Primula elatior</i>, <i>polyan-</i> <i>tha</i> var.	WHITE. <i>Hebeche caulescens</i> <i>Orobancha lactuca</i>, <i>angust-</i> <i>ifolia</i> <i>Phlox glauca</i>, <i>Lillago</i>, <i>A. minor</i> <i>Podophyllum peltatum</i> <i>Potentilla fragarioides</i>, rupestris <i>Ranunculus acronotifolius</i> fl. pleno, plantasti- folia fl. pleno <i>Salvia candidissima</i> <i>Saxifraga ligulata</i> <i>Streptopus amplexi-</i> <i>caulis</i>, <i>distortus</i> <i>Thalictrum saxatile</i> <i>Tradescantia virginica</i> <i>A. alba</i>, <i>C. pilosa</i> YELLOW. <i>Aristolochia Clematis</i> <i>A. trica scopulorum</i>, Citrus <i>Asphodelus luteus</i> <i>Campanula longifolia</i> <i>C. rotundifolia</i> <i>Cephalanthus majus</i> fl. pleno <i>Cerithia longifolia</i> <i>Doronicum plantagi-</i> <i>neum</i>, <i>caudicatum</i>, austriacum <i>Eridogon longifolium</i> p. <i>Euphorbia dila</i> <i>Lithospermum orienta-</i> <i>le</i> p. <i>Mimulus lanatus</i> <i>Ranunculus bulbosus</i> fl. pleno, acris fl. pleno <i>Smyrnum Dodonea</i> <i>Sophora flavescens</i> BLUE. <i>Anchusa. Barrelieri</i> <i>Aquilegia vulgaris</i>, and varietas <i>Carduncellus vulgaris</i> <i>Geranium acutifolium</i>, pratense and pl., syri- acum and pl. <i>Iris laetitia</i>, <i>chimonis</i>, ultrina, tenella <i>Lithospermum panicu-</i> <i>latum</i> <i>Nep. ta caritosa</i> <i>Salvia laetitia</i>, phlomisoides, <i>Tendrei</i> <i>Stenactis procumbens</i>, geranioides, <i>sphora</i> PURPLE. <i>Aquilegia hybrida</i> <i>Iris biflora</i> <i>Paeonia dactylis</i>, hamilla, molles, trivertata <i>Pentstemon atropur-</i> <i>pureus</i>, <i>campanulatus</i>, diffusus, elegans f., robora f. <i>Pisum cuneatum</i> VARIEGATED. <i>Aquilegia vulgaris</i> variegata <i>Astrantia caradica</i>, major <i>Geranium pratense</i> fl. variegato GREEN. <i>Aquilegia viridiflora</i> BROWN. <i>Astrum triphyllum</i> var. zebrinum	WHITE. <i>Paeonia nymphaeiflora</i> f. <i>hercynica</i>, <i>fragans</i>, longifolia <i>Pseudanemum album</i>, gillium <i>Polygonatum latifolium</i>, macrophyllum <i>Polygonum nigricum</i> <i>Abum australe</i>, <i>aust-</i> <i>riacum</i>, <i>frustratum</i>, hybridum, palmatum, urduum <i>Salvia argentea</i> <i>Symphitum bulbatum</i>, orientale, induricum <i>Thalictrum pratense</i>, aquileg- ifolium s. alba <i>Valeriana Ph</i> YELLOW. <i>Bistorta orientalis</i> <i>Doronicum macrophyll-</i> <i>um</i>, <i>Parladanthes</i> <i>Euphorbia epithymoides</i> <i>Pseudanemum italicum</i>, officinale <i>Salvia verticillata</i> <i>Scotium grandiflorum</i> <i>Smyrnum Diancordis</i>, perfoliata <i>Symphitum cordatum</i> <i>Thalictrum flavum</i>, lucidum, nigrum BLUE. <i>Anemone angustifolia</i>, latifolia, racifolia <i>Anchusa paniculata</i>, angustifolia, italica <i>Iris acuta</i>, <i>geranioides</i>, neglecta, pallida, sarmatica, ultrina <i>Nepeta grandiflora</i> <i>Omphalodes sempervi-</i> <i>rens</i> <i>Lupinus polyphyllus</i>, cratus <i>Salvia pratensis</i>, indica, f. <i>verbenacea</i> <i>Symphitum asperum</i> hybridum, patens PURPLE. <i>Geranium angulatum</i>, collinum, maculatum, pyrenicum <i>Lunaria rediviva</i> <i>Lupinus leucophyllus</i> <i>Orobancha alpestris</i> 3, niger 3 <i>Oxyclaphus viscosus</i> f. <i>Paeonia byzantina</i>, <i>para-</i> <i>dica</i>, var. <i>fimbriata</i> <i>Thalictrum aquilegifol-</i> <i>ium</i> s. atropur- pureum, f. formosum VARIEGATED. <i>Iris plicata</i> <i>Lupinus leucophyllus</i>, trivertis <i>Symphitum asperum</i> fl. hybridum <i>Verbascum cyprium</i>, sarragenum GREEN. <i>Phormium tenax</i> BROWN. <i>Geranium phaeum</i>	

PERENNIAL BORDER FLOWERS - JUNE[illegible]

PERENNIAL BORDER-FLOWERS.—JUNE.—continued.

Height from 6 to 12 ft.	From 12 to 15 ft.	From 15 to 20 ft.	From 20 to 25 ft.	From 25 to 30 ft.
BLUE. <i>A'juga alpina</i>, foliosa, genovefida, rupestris <i>Aphyllanthus monspeliensis</i> <i>Campylna Cervicaria</i>, pallia, pusilla, nitida <i>Globularia repens</i>, nudicaulis, vulgaris <i>Houstonia cernua</i> p. <i>Myosotis alpestris</i>, caespitosa <i>Polemonium Richardsonii</i> p., villum p. <i>Polyschia amara</i> p. <i>Pulsatorium montanum</i>, p. parviflorum <i>Scutellaria hastifolia</i>, integrifolia, scordifolia <i>Statice bellidifolia</i>, reticulata, spumilata <i>Veronica bellidifolia</i>, orientalis, saxatilis, tatarica <i>Viola calcarata</i>, cucullata, oblique, tricolor var. <i>Waldsteinia carinthiaca</i> PURPLE. <i>Anthyllus montana</i> <i>Arenaria</i>, many <i>Asotragalus hypoglossis</i>, monspeliensis, physodes <i>Eragrostis repens</i> <i>Erythronium alpinum</i> <i>Galium saxatile</i>, purpureum <i>Pris pumila</i> <i>Linaria cymbalaria</i>, pilosa <i>Nemesia pulchra</i> <i>Ononis montana</i>, procumbens, supina <i>Orobanchia Fischeri</i> <i>Ranunculus pyrenaicus</i> p. <i>Rhoxia maritima</i> <i>Silene pumila</i> <i>Stachys angustifolia</i> <i>Thalictrum alpinum</i> <i>Viola amara</i>, pennsylvanica, tricolor var. VARIEGATED. <i>Gentiana septentrionalis</i>, h. guttata <i>Geranium macranthemum</i> <i>Pris pumila</i> var. <i>Saxifraga androsacea</i> <i>Scutellaria alpina</i>, h. <i>Tecserium pyrenaicum</i> <i>Viola striata</i>, tricolor numerous varieties. GREEN. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> BROWN. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>	BLUE. <i>A'juga alpina</i>, foliosa, genovefida, rupestris <i>Asterocaulis elegans</i>, graminifolia, h. belveticus <i>Astragalus arenarius</i> <i>Campylna alpina</i>, barbatula, fedicula, carpat., imifolia, pubescentifolia <i>Dracopis alpina</i> <i>Geranium ibericum</i> <i>Horminum pyrenaicum</i> <i>Pris graminis</i>, ventricosa <i>Polemonium montanum</i> <i>Pulsatorium montanum</i> <i>Scutellaria columbina</i>, alba grandifolia, purpurata <i>Veronica latifolia</i>, Teucrium <i>Viola montana</i> PURPLE. <i>A'juga alpina</i> <i>Asotragalus longus</i> f. <i>Serpentaria</i> f. <i>Dianthus plumarius</i>, and many others <i>Physostegia dentulata</i> <i>Lamium maculatum</i> <i>Lycium Flos-cuculi</i>, h. pl. <i>Onosmodium</i>, and many others <i>Phlox ovata</i> <i>Physostegia ovata</i> <i>Pris pumila</i> <i>Potentilla formosa</i>, Hopwoodiana <i>Succisa pratensis</i> <i>Tecserium Chamædris</i> <i>Thymus vulgaris</i> <i>Stachys bracteatus</i>, medium <i>Veronica Lambertii</i> <i>Viola palmata</i> VARIEGATED. <i>Campylna punctata</i> <i>Dianthus barbatus</i>, hortensis <i>Pris variegata</i>, verticillata <i>Salvia veruculosa</i> <i>Statice speciosa</i> <i>Mimulus variegatus</i>, guttatus GREEN. <i>Campanula umbellata</i> <i>Silene saxatilis</i> BROWN. <i>A'juga alpina</i> <i>Hebe americana</i>	BLUE. <i>Adenophora nemophylla</i>, verticillata, mar-supulifera <i>Anemone angustifolia</i>, latifolia, calicifolia <i>Asterocaulis caucasicus</i>, tomentosa, columbaris <i>Campylna alpina</i>, congesta, peregrina <i>Campanula hirsutula</i> <i>Dracopis alpina</i> <i>Geranium ibericum</i> <i>Horminum pyrenaicum</i> <i>Pris graminis</i>, ventricosa <i>Polemonium montanum</i> <i>Pulsatorium montanum</i> <i>Scutellaria columbina</i>, alba grandifolia, purpurata <i>Veronica latifolia</i>, Teucrium <i>Viola montana</i> PURPLE. <i>A'juga alpina</i> <i>Asotragalus longus</i> f. <i>Serpentaria</i> f. <i>Dianthus plumarius</i>, and many others <i>Physostegia dentulata</i> <i>Lamium maculatum</i> <i>Lycium Flos-cuculi</i>, h. pl. <i>Onosmodium</i>, and many others <i>Phlox ovata</i> <i>Physostegia ovata</i> <i>Pris pumila</i> <i>Potentilla formosa</i>, Hopwoodiana <i>Succisa pratensis</i> <i>Tecserium Chamædris</i> <i>Thymus vulgaris</i> <i>Stachys bracteatus</i>, medium <i>Veronica Lambertii</i> <i>Viola palmata</i> VARIEGATED. <i>Campylna punctata</i> <i>Dianthus barbatus</i>, hortensis <i>Pris variegata</i>, verticillata <i>Salvia veruculosa</i> <i>Statice speciosa</i> <i>Mimulus variegatus</i>, guttatus GREEN. <i>Campanula umbellata</i> <i>Silene saxatilis</i> BROWN. <i>A'juga alpina</i> <i>Hebe americana</i>	BLUE. <i>Adenophora nemophylla</i>, verticillata, mar-supulifera <i>Anemone angustifolia</i>, latifolia, calicifolia <i>Asterocaulis caucasicus</i>, tomentosa, columbaris <i>Campylna alpina</i>, congesta, peregrina <i>Campanula hirsutula</i> <i>Dracopis alpina</i> <i>Geranium ibericum</i> <i>Horminum pyrenaicum</i> <i>Pris graminis</i>, ventricosa <i>Polemonium montanum</i> <i>Pulsatorium montanum</i> <i>Scutellaria columbina</i>, alba grandifolia, purpurata <i>Veronica latifolia</i>, Teucrium <i>Viola montana</i> PURPLE. <i>A'juga alpina</i> <i>Asotragalus longus</i> f. <i>Serpentaria</i> f. <i>Dianthus plumarius</i>, and many others <i>Physostegia dentulata</i> <i>Lamium maculatum</i> <i>Lycium Flos-cuculi</i>, h. pl. <i>Onosmodium</i>, and many others <i>Phlox ovata</i> <i>Physostegia ovata</i> <i>Pris pumila</i> <i>Potentilla formosa</i>, Hopwoodiana <i>Succisa pratensis</i> <i>Tecserium Chamædris</i> <i>Thymus vulgaris</i> <i>Stachys bracteatus</i>, medium <i>Veronica Lambertii</i> <i>Viola palmata</i> VARIEGATED. <i>Campylna punctata</i> <i>Dianthus barbatus</i>, hortensis <i>Pris variegata</i>, verticillata <i>Salvia 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pumila</i> <i>Potentilla formosa</i>, Hopwoodiana <i>Succisa pratensis</i> <i>Tecserium Chamædris</i> <i>Thymus vulgaris</i> <i>Stachys bracteatus</i>, medium <i>Veronica Lambertii</i> <i>Viola palmata</i> VARIEGATED. <i>Campylna punctata</i> <i>Dianthus barbatus</i>, hortensis <i>Pris variegata</i>, verticillata <i>Salvia veruculosa</i> <i>Statice speciosa</i> <i>Mimulus variegatus</i>, guttatus GREEN. <i>Campanula umbellata</i> <i>Silene saxatilis</i> BROWN. <i>A'juga alpina</i> <i>Hebe americana</i>
JULY.				
WHITE. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>	WHITE. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>	WHITE. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>	WHITE. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>	WHITE. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i> RED. <i>Alchemilla alpina</i>, pentaphylla p. <i>Medeola virginica</i>

PERENNIAL BORDER FLOWERS.—JULY.—continued

Height from 0 to ½ of a ft.	From ½ of a foot to 1 foot.	From 1 foot to 1½ feet.	From 1½ feet to 2 feet.	From 2 feet upwards.
WHITE. <i>Gentiana Nepon. f. albo</i> <i>Gentiana verna</i> p. <i>Gypsophila grandiflora</i>, <i>procurrens</i>, <i>repens</i> <i>Levinsia nativa</i> <i>Oenothera can. acutula</i> <i>Oxycoccus simplicifolius</i>, p. <i>Parasola palustris</i> p. <i>Polygala Senega</i> <i>Prunella vulgaris</i> f. <i>albo</i> <i>Rhusia angustifolia</i> p. <i>major</i> f. <i>albo</i> <i>Saxifraga</i>, many species <i>Scutellaria albidifl.</i> p. <i>Sedum spectabile</i>, <i>oppositifolium</i>, <i>anglicum</i>, <i>las. phylum</i> <i>Silene alpestris</i>, <i>repens</i> <i>Teucrium Imperati</i> <i>Teucrium pyrenaicum</i> <i>Valeriana scutell.</i>	WHITE. <i>Oxalis angustifolia</i> f. <i>albo</i> <i>Oxalis angustifolia</i> <i>Polygonum bistorta</i>, <i>Hernand.</i> <i>Plantago sericea</i> <i>Polygonum diffusum</i> <i>Prandithus</i> f. <i>albo</i> <i>Scutellaria albidifl.</i>, <i>pal-</i> <i>lida</i> <i>Sedum populiifolium</i>, <i>maximian.</i>, <i>albicans</i> <i>Silene amara</i> <i>Teucrium montanum</i> <i>Tradescantia virginica</i> <i>f. albo</i> <i>Trifolium albidum</i>, &c.	WHITE. <i>Agrostemma coron-</i> <i>arium</i>, f. <i>albidum</i> <i>Asperula cynodactylus</i> <i>capitata</i>, <i>molliorima</i> <i>Gypsophila adscandens</i>, <i>collina</i>, <i>Siberica</i>, <i>Struthium</i> <i>Lupinus polyphyllus</i> f. <i>al-</i> <i>bicus</i> <i>Nepeta hirsutifolia</i>, <i>hirs. folios.</i>, <i>multifida</i> <i>Nolina georgiana</i> <i>Oxalis albus</i> <i>Pentstemon</i>, <i>Parthenium</i> <i>f. pl.</i>, <i>marthianum</i>, <i>incanum</i> f. <i>pl.</i>, <i>stam-</i> <i>ineum</i> <i>Palis. emarginatus</i>, <i>fol. var.</i> <i>Spiraea Filipendula</i>, <i>f. pl.</i>, <i>lobata</i> p. <i>Veronica gibbera</i> f. <i>albo</i>	WHITE. <i>Gypsophila grandiflora</i>, <i>paniculata</i> <i>Hibiscus syriacus</i> <i>Leonurus crispus</i> <i>Lespedeza polytricha</i> <i>Lycium chalcidifolia</i> <i>f. albo</i>, <i>albo</i>, <i>pl.</i> <i>Melva moschata</i> f. <i>albo</i> <i>Marrubium canadense</i> <i>Monarda</i> <i>Mentha rugosa</i> <i>Parthenium integrifol.</i> <i>Polygonum alpinum</i> <i>Salix reticulata</i> <i>canadensis</i> <i>Silene arvensis</i> <i>Spiraea</i> f. <i>Ulmaria</i>, f. <i>pl.</i> <i>Stipa pennata</i> <i>Veronica gracilis</i>, <i>longi-</i> <i>folia</i> f. <i>albo</i>, <i>maritima</i> <i>f. albo</i>	WHITE. <i>Euphorbia albidissima</i> <i>canadensis</i> f. <i>albo</i>, <i>rubra</i> <i>Galega perfol.</i> <i>Kalanchoe distilla</i> <i>Campanula latifolia</i> <i>Lycium chalcidifolia</i> <i>Lycium chinensis</i> <i>Lysimachia Euphorbia</i> <i>Pentstemon Digitalis</i> <i>Pulsatilla nuttalliana</i> f. <i>albo</i> <i>Polygonum divaricatum</i>, <i>undulatum</i> <i>Scutellaria arvensis</i> <i>canad.</i> <i>albidifl.</i> <i>Spiraea</i> f. <i>Arctica</i> <i>Veronica canadensis</i>, <i>urticifolia</i> <i>Ficula syriaca</i>
YELLOW. <i>Abrotanum canonicum</i> <i>Acidalia odorata</i> <i>Alchemilla alpina</i> <i>Alyssum montanum</i> <i>A. ramosa</i> <i>corollata</i> p. <i>Asperula longifolia</i> <i>Bupleur.</i>, <i>Burserianum</i>, <i>caribolicum</i>, <i>maritimum</i> <i>Coronilla minima</i> p. f. <i>Erigeron tuberosus</i> <i>Hyperic. lucida</i> <i>H. peritum elodes</i>, <i>humifusum</i>, <i>Liondardi</i> <i>Oenothera macrocarpa</i>, <i>microcarpa</i> p. <i>primula</i> <i>Oxalis corniculata</i>, <i>Lyoni</i>, <i>stricta</i> <i>Oxytropis campestris</i>, <i>foliata</i> <i>Pentstemon sediflora</i> <i>Prunella laciniata</i> <i>Pyrola asarifolia</i> p. <i>convolvata</i> p. <i>Ranunculus anemoneifolius</i> <i>Saxifraga autumnalis</i>, <i>caerulea</i> <i>Scutellaria orientalis</i> <i>Sedum quadrifidum</i>, <i>repens</i>, <i>sediflorum</i>, <i>sexangulare</i>, <i>rotundum</i> <i>Scilla sibirica</i> <i>Stachys germanica</i> <i>Styracium granifolium</i> <i>Solidago p. f.</i>, <i>tenuifolia</i>, <i>p. f.</i> <i>Solidago cimb.</i>, <i>minor</i> <i>Tetragolobus maritimus</i>, <i>aliquobus</i> <i>Tortilis palustris</i> p. <i>Vicia lutea</i>, <i>grandiflora</i> <i>var.</i>	YELLOW. <i>Acidalia odorata</i>, <i>compacta</i> <i>Aconitum</i> f. <i>Nithora</i> <i>Anemone patens</i> <i>Antirrhinum</i> f. <i>albus</i> p., <i>montana</i> <i>Astragalus macrophyllus</i> <i>Asperula tinctoria</i> <i>Centaurea</i>, <i>calceolaria</i> <i>fol. glab.</i> p. <i>Euphorbia asperula</i>, <i>Gerardiana</i> <i>Gallandia arvensis</i>, <i>boc-</i> <i>calium verum</i> <i>Hypericum pulchrum</i> <i>Hyssopus</i> f. <i>nigra</i>, <i>apuro-</i> <i>linaria vulgaris</i>, f. <i>Palustris</i> <i>Linum catharticum</i> <i>Lonic. Dioecris</i> <i>Lysimachia</i>, <i>perfoliata</i>, <i>sericea</i>, <i>thyrifolia</i> <i>Oenothera hybrida</i> <i>Oenothera scutellaria</i> <i>Phacelia</i> f. <i>albus</i> <i>Physalis acumin.</i>, <i>percar-</i> <i>potentilla bifurca</i> <i>Scilla asarifolia</i> <i>Scabiosa terebinth.</i> <i>Scutellaria orientalis</i> <i>Senecio abrotanifolius</i>, <i>phidifolius</i>, <i>Doronicum</i> <i>Silene Onites</i> <i>Stachys californica</i> <i>f. p.</i>, <i>fridolens</i> f. p. <i>Stachys pennsylvanica</i> <i>Taraxac. officinale</i>, <i>florida</i> <i>Trifolium olympicum</i> <i>Urtaria lanceolata</i> <i>Valeriana glabra</i> <i>Verbena sulphurea</i>	YELLOW. <i>Acidalia abrotanifolia</i> <i>Aconitum</i> <i>hyacinthinum</i>, <i>macrophyllum</i>, and many others <i>Agrimonia Euphorbia</i>, <i>napellensis</i> <i>A. nithora</i> tinctoria <i>Asperula tinctoria</i> <i>Asterophyllus tenuis</i> <i>Asterophyllus ochroleucus</i> <i>Astragalus alpestris</i>, <i>chalcidifolia</i>, <i>maritima</i>, <i>maximiana</i>, <i>maritima</i>, <i>rubra</i> <i>Humulus lupul.</i> <i>Sila f. nivalis</i> <i>Silene maritima</i> <i>Stachys</i> f. <i>albus</i>, <i>maritima</i>, <i>sericea</i> <i>Lithyrum pratense</i> <i>Linaria heterophylla</i>, <i>macrocarpa</i> <i>Linum catharticum</i> <i>Lysimachia longifolia</i>, <i>quadrifolia</i>, <i>ciliata</i> <i>Medicago canaliculata</i>, <i>foliata</i> <i>Oenothera undulata</i> <i>Physalis viscosa</i> <i>Pentstemon pennsylvanica</i> <i>Senecio scutellaria</i> <i>Solidago ambigua</i>, <i>laevigata</i>, <i>virgata</i> <i>Stachys germanica</i> <i>Thymus</i> f. <i>albus</i> <i>Thermopsis corymbosa</i> f.	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BLUE. <i>A. cynos alpinus</i>, <i>grandifl.</i> <i>Campanula pinnatifida</i>, <i>inter-</i> <i>media</i> <i>Dracopis alpinus</i> <i>Alchemilla</i>, <i>grandiflora</i> <i>Erigeron alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	BLUE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	BLUE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	BLUE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	BLUE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.
PURPLE. <i>Anthriscus montana</i> <i>Aster alpinus</i> <i>Astragalus monspeli-</i> <i>anus</i>, <i>ursinifolia</i> <i>Betula pallida</i> <i>Centaurea aspera</i>, <i>hy-</i> <i>brida</i>, <i>Sibirica</i> <i>Dracopis alpinus</i> <i>Erigeron alpinus</i> <i>Gentiana Sibirica</i> <i>Hedysarum argenteum</i>, <i>candidum</i>, f. <i>humile</i>, <i>brachyrrhiza</i>, <i>humile</i>, <i>obovatum</i> <i>Lespedeza procumbens</i> <i>prostrata</i>	PURPLE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	PURPLE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	PURPLE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.	PURPLE. <i>Adenophora macro-</i> <i>phylla</i>, <i>dentifolia</i>, <i>inter-</i> <i>media</i> <i>Campanula carpatia</i>, <i>barbata</i>, <i>caerulea</i>, <i>dis-</i> <i>color</i>, <i>gummifera</i>, <i>ul-</i> <i>trata</i>, <i>petula</i>, <i>Raineri</i> <i>Dracopis alpinus</i> <i>Frankenia hirsuta</i> f. p. <i>Gentiana adscandens</i> f. p. <i>hirsuta</i> f. p., <i>clavata</i> <i>f. p.</i>, <i>crucifolia</i>, <i>macro-</i> <i>phylla</i>, <i>punctata</i>, <i>sep-</i> <i>temfida</i> f. p. <i>Globularia vulgaris</i> <i>Linaria alpinus</i> <i>Linum alpinum</i> <i>Linum catharticum</i> f. <i>seric-</i> <i>ifolium</i> <i>Oxytropis asarifolia</i> <i>Platycodon grandiflorus</i> <i>p. f.</i> <i>Prunella grandiflora</i>, <i>Asperula</i>, <i>incana</i>, <i>pennsylvanica</i> <i>Scutellaria galericulata</i> <i>Styracium anceps</i> <i>Nuttallii</i> p. f. <i>Statice Willdenowiana</i> <i>Veronica asarifolia</i>, <i>multi-</i> <i>folia</i>, <i>orientalis</i>, <i>laetifica</i> <i>Vicia coccinea</i>, <i>cucullata</i>, <i>flabellifolia</i> <i>Vicia tricolor</i> var.

PERENNIAL BORDER-FLOWERS. — JULY — continued.

Height from 0 to ½ of a ft.	From ½ of a foot to 1 foot.	From 1 foot to 1½ foot.	From 1½ foot to 2 feet.	From 2 feet upwards.
PURPLE. <i>Lupinus arbustus</i> <i>Lithrum Graeferi</i> p. t. <i>Nemesia pulchra</i> <i>Oxyphlogos spicatus</i> t. <i>Oxytropis campestris</i> , montana, uralsensis <i>Rhexia maritima</i> p. vir- ginica p., ciliosa p. t. <i>Suaeda alpina</i> , discolor <i>Sedum Anacampsis</i> , dentatum, spartium, Telephium c. minus Stachys reticulata <i>Thymus Serrylum</i>	PURPLE. <i>Melittis Melisophyllum</i> <i>Mimulus ringens</i> , alatus <i>Nepeta anemolydina</i> <i>Oxybaphus angustifolius</i> t., <i>Cervantesi</i> t., <i>capensis</i> t., <i>hirsutus</i> t., <i>mycagines</i> t., pilosa t. <i>Plum maritimum</i> <i>Serratula arguta</i> , ren- tauræoides <i>Teucrium hyrcanicum</i> <i>Trandescantia virg. purp.</i> <i>Trifolium alpinum</i>	PURPLE. <i>Lithrum tomentosum</i> <i>Medicago sativa</i> <i>Pentstemon atropurpureus</i> p. t., campanu- latus p. t., diffusus, p. t., <i>levis</i> , <i>vir- gatus</i> , <i>Künthii</i> p. t., pubescens, <i>Richard- soni</i> p. t., <i>roseus</i> p. t. <i>Phlox suffruticosa</i> , trillora <i>Salvia hematodes</i> <i>Sedum Teleph. b. majus</i> <i>Trifolium Lupinaster</i> , purpureus	PURPLE. <i>Echinacea purpurea</i> <i>Forstaea cuspidata</i> , esculenta, incana, Lupinellus <i>Rhaphanica scariosa</i> <i>Suaeda alba</i> , angus- tifolia, elongata, sal- icifolia <i>Silvia pratensis</i> , <i>Grahami</i> <i>Scutellaria altissima</i> <i>Serratula elegans</i> , pul- chella <i>Ferula phoeniceum</i>	PURPLE. <i>Lavatera thuringiaca</i> <i>Lobelia speciosa</i> <i>Lupinus plumbosus</i> <i>Lithrum Salicaria</i> <i>Monarda fistulosa</i> , oblongifolia, <i>purpurea</i> <i>Phlox acuminata</i> <i>Phytolacca decandra</i> <i>Prenanthes purpurea</i> <i>Rheum australe</i> <i>Scaevola arvensis</i> <i>Serratula coronata</i> , cy- athoides, <i>pinnatifida</i> , <i>arguta</i> <i>Trandescantia subsp. a.</i>
VARIEGATED. <i>Anemone alpina</i> , micrantha <i>Antennaria dioica</i> <i>Geranium argenteum</i> p. t., <i>lanceolatum</i> <i>Gypsophila Saxifraga</i> <i>Viola tricolor</i> , numerous varieties of	VARIEGATED. <i>Acanthus mollis</i> , spinulosus, and others <i>Astragalus leucophyllus</i> , bicolor <i>Campanula caribæa</i> <i>Dianthus Caryophyllus</i> <i>Gaillardia bicolor</i> p. t. <i>Fris graminea</i> <i>Melittis grandiflora</i>	VARIEGATED. <i>Fris spirea</i> , variegata <i>Gentiana pallida</i> <i>Polemonium ceruleum</i> var. maculatum <i>Scrophularia ambucifolia</i> , mediflora, lanata <i>Syrinchium striatum</i>	VARIEGATED. <i>Gypsophila paniculata</i> <i>Linaria monspeliensis</i> <i>Monarda dinopolia</i> <i>Scrophularia grandiflora</i> <i>Stachys lanata</i> <i>Ficula sylvatica</i> , <i>sepium</i>	VARIEGATED. <i>Aconitum rhynchanthum</i> b. bicolor, variegatum, b. bicolor <i>Campanula versicolor</i> t. <i>Palago major</i> <i>Lithrum mutabilis</i> , platiormis <i>Tropeolum tricolorum</i>
GREEN. <i>Herniaria glabra</i>	GREEN. <i>Melanthium virginicum</i>	GREEN. <i>Poterrum Sanguisorba</i>	GREEN. <i>Desmodium viridiflorum</i>	GREEN. <i>Euphorbia palustris</i>
BROWN. <i>Fris squaleus</i> <i>Poterrum hybridum</i>	BROWN. <i>Arum atrovirens</i> <i>Ferula cupreum</i>	BROWN. <i>Geranium fuscum</i> <i>Scrophularia orientalis</i>	BROWN. <i>Arum Dracuncul.</i> <i>Cynanchum fuscum</i>	BROWN. <i>Phlox pungens</i> <i>Ferula ferrugineum</i>

AUGUST.

RED. <i>Canth. coccinea</i> <i>Gaura coccinea</i> <i>Saxifraga cernua</i> <i>Stachys coccinea</i> <i>Trandescantia rosea</i> p. t., virginica rosea	RED. <i>Aster fulgens</i> , nemo- ralis <i>Dianthus carthusianor.</i> <i>caucasicus</i> , latifolius <i>Phlox carnea</i> , and others <i>Stevia angustifolia</i> t., <i>Perovskia carnea</i>	RED. <i>Artemisia caerulea</i> <i>Collinsia scaberrima</i> <i>Epilobium angustatum</i> <i>Milva muscaria</i> <i>Nepeta hirsuta</i> , <i>hybrida</i> <i>Nepeta pannonica</i> <i>Pentstemon angustifol.</i> <i>Sida salvadora</i>	RED. <i>Aster tuberosa</i> <i>Asclepias incarnata</i> <i>Clematis crispa</i> <i>Cynodorus monspeliar.</i> <i>Echinacea serotina</i> <i>Lobelia cardinalis</i> , fulg., spindens, propinqua <i>Salvia fulgens</i> , spindens	RED. <i>Aster barbinervis</i> <i>Aster puniceus</i> <i>Centauria Centaureum</i> <i>Dactylis glomerata</i> , caput. <i>Gaillardia bicolor</i> <i>Phlox rosea</i> <i>Lithrum heterophyllum</i> <i>Phlox decuss.</i> , pyramidal.
WHITE. <i>Achillea cretica</i> , serrata <i>Arenaria farinifolia</i> , montana, tetragyna, verticillata <i>Aster him.</i> , alpin. fl. al. <i>Astrantia minor</i> t. p. <i>Ornithog. officin.</i> , virgin. <i>Gypsophila prostrata</i> <i>Oxyphlogos Javan.</i> t. <i>Silene maritima</i> fl. pl. <i>Thymus Marisch.</i> , <i>Zygis</i> <i>Trandescantia virginica</i> v. alba, pilosa <i>Viola tricolor</i> , var.	WHITE. <i>Achillea cretica</i> , macro- phylla, squarrosa <i>Antennaria margarit.</i> <i>Artemisia campestris</i> , maritima, <i>Santolina</i> <i>Aster cynoides</i> , <i>himal.</i> , pauciflorus, tardiflorus <i>Conyza finifolia</i> <i>Eupatorium hyssopifol.</i> <i>Epilobium heracleotic.</i> <i>Phlox suaveol.</i> , fol. var. tardiflora	WHITE. <i>Agrimonia striata</i> <i>Aster acuminatus</i> , amygdalinus, divari- catus, finifolius <i>Collinsia scaberrima</i> <i>Cacalia albifrons</i> , cordi- folia, hastata, renifolia <i>Eupatorium hyssopifol.</i> <i>Epilobium perfoliatum</i> , fuscifolium <i>Mirabilis Jalapa alba</i> , longifolia, suaveolens <i>Sarcocolla leucantha</i> <i>Scutellaria peregrina</i> <i>Stevia involucrata</i> , ovata	WHITE. <i>Acanthus spinosus</i> <i>Argemone grandiflora</i> <i>Aster albus</i> , cornifolius, reticul., <i>salig.</i> , <i>jumbel.</i> <i>Cacalia atriplicifolia</i> <i>Cheilone glabra</i> <i>Eryngium aquaticum</i> t. <i>Eupatorium ageratoides</i> , album, <i>Yucca filiformis</i> <i>Digitalis purpurea</i> b. alba <i>Marrubium peregrynium</i> <i>Polygonum virginicum</i> <i>Sedum Carvifolia</i> <i>Serratula tinctor.</i> fl. al. <i>Silene chloroceph.</i> , longifolia	WHITE. <i>Asclepias polystachya</i> <i>Aster polystachya</i> <i>Cacalia suaveolens</i> <i>Campanula latifolia</i> , albo. perispermifolia alba <i>Cheilone glabra</i> <i>Clematis angustifolia</i> <i>Dianthus Libanotis</i> <i>Epilobium angust.</i> alba <i>Eupat. ageratoid.</i> , <i>ceanoth.</i> <i>Leptandra virginica</i> alba <i>Nepeta laevis</i> , scabra <i>Phlox paniculata</i> alba <i>Yucca concava</i> , <i>filiformis</i> , obliqu., puber., <i>flum.</i> , superba
YELLOW. <i>Artemisia glaciata</i> <i>Coronilla minima</i> p. t. <i>Gentiana aurea</i> <i>Mimulus moschatell.</i> <i>Narthecium ossifragum</i> <i>Primula involucrata</i> p. t. <i>Primula pinnatifida</i> <i>Ornithog. maritimum</i> <i>Saxifraga aizoides</i> , <i>Hieracium</i> <i>Sedum albidum</i> <i>Sideritis hyssopif.</i> , <i>acordi</i> <i>Solidago humil.</i> , minuta <i>Teucrium saxatile</i> , pyrena.	YELLOW. <i>Achillea Ageratum</i> , pec- tinata <i>Asclepias tuberosa</i> <i>Baptisia tinctoria</i> <i>Drumhodium maritim.</i> <i>Conyza bifrons</i> <i>Gentiana ochroleuca</i> <i>Paula Oculis Christi</i> , provincialis, squarrosa <i>Mirabilis dichotoma</i> <i>Geotheca serotina</i> <i>Potentilla stipularis</i> , obscura <i>Tagetes lucida</i> , florida	YELLOW. <i>Buphthalmum salicifol.</i> <i>Centauria alata</i> , ochrole. <i>Centrocampa chrysom.</i> <i>Chrysocoma biflora</i> <i>Collinsia tuberosa</i> <i>Coronilla arguta</i> , grandif. <i>Fabago major</i> <i>Fula crithmifolia</i> <i>Mirabilis Jalapa flava</i> <i>Geotheca tinctoria</i> <i>Solidago ambigua</i> , bicolor, memoralis, purpurea	YELLOW. <i>Asteraceae urceolata</i> <i>Baptisia perfoliata</i> <i>Cacalia tinctoria</i> p. t. <i>Centauria alata</i> <i>Centrocampa fulgida</i> <i>Collinsia alba</i> <i>Coronilla alba</i> , tenui- folia, verticillata <i>Oxalis crenata</i> <i>Rudbeckia columnaris</i> <i>Solidago arguta</i> , <i>aspera</i> , caesia, <i>ciliata</i> , <i>elliptica</i> , latifolia, latifolia	YELLOW. <i>Achillea Eupatorium</i> <i>Cacalia tinctoria</i> <i>Coronilla pinnatifida</i> <i>Dactylis glomerata</i> , <i>laetifl.</i> t. <i>Helianthus autumnalis</i> <i>Helianthus decapetalus</i> , multiflorus, and fl. pl., pubescens <i>Helianthus imbr.</i> , scaber <i>Polymnia canadensis</i> <i>Rudbeckia dig.</i> , <i>pinn.</i> <i>Silphium Asteracum</i> , complanatum, <i>perfoliatum</i> <i>Solidago altissima</i> <i>Ferula album</i>
BLUE. <i>Aster acris</i> <i>Gentiana asclepiadifolia</i> , bavaria, p. <i>Frederici</i> p. <i>Oxytropis verticillata</i> <i>Phytolacca orbiculata</i> <i>Salvia Forskahlia</i> <i>Trandescantia virginica</i> , plena <i>Viola mirabilis</i> <i>Wulfenia carinthiaca</i>	BLUE. <i>Aster cordifol.</i> , <i>tripolium</i> <i>Dryopteris linearifolia</i> <i>Campanula erecta</i> <i>Eryngium maritimum</i> <i>Lupinus perennis</i> p. <i>Salvia lyrata</i> <i>Trandescantia congesta</i> <i>Ferula candida</i> , in- cana, longistachya	BLUE. <i>Aster cordifolius</i> , ele- gans, spectabilis, ta- bulatus <i>Eryngium Andersoni</i> , aetereum, alpinum <i>Glycerhiza asperifolia</i> <i>Poa tridentata</i> <i>Lobelia sylvatica</i> <i>Lupinus littoralis</i> , le- pidus	BLUE. <i>Aster cyan.</i> , rigid., undu- latus <i>Commelina coelestis</i> t., tuberosa t. <i>Diplotaxis incanus</i> <i>Eryngium planum</i> <i>Lobelia coelestis</i> , pube- rula var. glaberrima <i>Lophanthus crist.</i> , <i>emis.</i> <i>Lupinus latifolius</i> <i>Ferula venosa</i> <i>Ferula neglecta</i>	BLUE. <i>Aconitum japonicum</i> etc. <i>Aster Novi-Belgii</i> , re- curvatus, tardiflorus, vineus <i>Campanula pyramidalis</i> <i>Eryngium giganteum</i> <i>Ferula pinnatifida</i> <i>Petersonia bonariensis</i> t.
PURPLE. <i>Aster alpinus</i> , pulchellus <i>Ergonon uniflorus</i> <i>Liatris pinnata</i> <i>Mimulus Lewisii</i> <i>Nuttallii</i> , dig. p. t., ped. p. t. <i>Oxytropis Lamberti</i> , desulcata, glabra <i>Rhexia virginica</i> <i>Teucrium hyrcanicum</i>	PURPLE. <i>Aster coccineus</i> , <i>ibericus</i> <i>Gentiana Saponaria</i> <i>Phlox dichotoma</i> <i>Mentha crispata</i> , <i>piperita</i> <i>Nuttallia Papaver</i> <i>Pentstemon diffusus</i> p. t., pubescens <i>Phlox carolina</i> <i>Stevia purpurea</i>	PURPLE. <i>Aster pannonicus</i> , rigid. <i>Cacalia alpina</i> <i>Liatris gracilis</i> p. t. <i>Milva purpurata</i> <i>Nesaea triflora</i> , verticil. <i>Pentstemon eriantherus</i> , levis, <i>Richardsoni</i> <i>Stendestis speciosa</i> <i>Teucrium canadense</i>	PURPLE. <i>Asclepias purpurascens</i> <i>Liatris corymbosa</i> p., intermedia p., <i>edora-</i> tissima p., <i>paniculata</i> , p. <i>pycnostachya</i> p., spiderifolia p., <i>squar-</i> rosa p., <i>turbinata</i> p. <i>Lupinus March.</i> , <i>revular.</i> <i>Lithrum virgatum</i>	PURPLE. <i>Aster coccineus</i> <i>Cheilone obliquus</i> , <i>Lobelia</i> <i>Echinacea purpurea</i> <i>Eupatorium maculatum</i> , trifolium, verticillat. <i>Georgina</i> , many <i>Lithrum grandif.</i> , latifol. <i>Phytolacca decandra</i> <i>Serratula quinquefolia</i>
VARIEGATED. <i>Gypsophila repens</i> <i>Oxytropis myriophylla</i> t. <i>Physostegia denticulata</i>	VARIEGATED. <i>Mirabilis Jalapa</i> var. rubro-alba, var. rubro- flava <i>Trandescantia virginica</i> caerulea albidula	VARIEGATED. <i>Astrantia carniolica</i> , major <i>Gaillardia bicolor</i> aris- tata, <i>Richardsoni</i> <i>Monarda Russeana</i>	VARIEGATED. <i>Aster bicolor</i> , multistilis <i>Chymocarpus penta-</i> phyllus <i>Linaria monspeliensis</i>	VARIEGATED. <i>Aster versicolor</i> <i>Campanula versicolor</i> <i>Georgina</i> , many <i>Gypsophila altissima</i> <i>Hibiscus moscheutos</i> <i>Physostegia speciosa</i>
BROWN. <i>Artemisia spicata</i>	BROWN. <i>Artemisia rupestris</i>	BROWN. <i>Artemisia canescens</i>	BROWN. <i>Artemisia Santonica</i>	BROWN. <i>Artemisia vulgaris</i>

PERENNIAL BORDER-FLOWERS. — SEPTEMBER AND OCTOBER.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to $\frac{1}{2}$ ft.	From $\frac{1}{2}$ foot to 2 feet.	From 2 feet upwards.
RED. <i>Epilobium alpinum</i> , <i>alpinifolium</i> <i>Saxifraga cernua</i> WHITE. <i>Achillea cretica</i> , serrata <i>Artemisia spicata</i> <i>Aster humilis</i> YELLOW. <i>Artemisia glacialis</i> <i>Cornifolia minima</i> <i>Prunella pennsylvanica</i> <i>Sideritis asynopifolia</i> , <i>acordifolia</i> <i>Solidago humilis</i> , mi- <i>nuta</i> BLUE. <i>Gentiana Canadensis</i> , <i>ciliata</i> , <i>Pneumonanthe</i> , <i>Pneumonanthe</i> <i>Silene Forbesii</i> <i>Tradescantia virginica</i> , pi- PURPLE. <i>Aster paniculatus</i> <i>Liatris pumila</i> , p. f. <i>Lithium Grisebii</i> , p. f. <i>Mimulus lewisii</i> , p. f. <i>Nuttallia digitata</i> , p. f. <i>Oxytropis Lambertii</i> <i>Sedum spumum</i> <i>Statice reticulata</i> <i>Veronica hederifolia</i>	RED. <i>Gentiana incarnata</i> <i>Phlox triflora</i> <i>Silene asynopifolia</i> WHITE. <i>Achillea</i> , macrophylla <i>Artemisia spicata</i> , <i>asynopifolia</i> , <i>linifolia</i> YELLOW. <i>Chrysopsis nudica</i> <i>virgata</i> <i>Paula oculis Christi</i> <i>Mirabilis dichotoma</i> <i>Euthesia serotina</i> <i>Tetradlea Scordonia</i> , <i>acordifolia</i> BLUE. <i>Aster acris</i> <i>Commelina erecta</i> <i>Mirabilis orientalis</i> <i>Euthesia serotina</i> <i>Succisa pratensis</i> , glabr. <i>Sternodia chilensis</i> PURPLE. <i>Aster concinnus</i> , com- <i>planus</i> , <i>graminifolius</i> , <i>lymphioides</i> , <i>luteus</i> <i>Tetradlea nudica</i> <i>Phlox carolina</i> <i>Physostegia speciosa</i> <i>Silene purpurea</i> , f.	RED. <i>Aster alpicolor</i> <i>Lobelia fulgens</i> , f., <i>splendens</i> , f. WHITE. <i>Aster diffusus</i> , divar- <i>icatus</i> , <i>fragilis</i> , <i>hispidus</i> , <i>macrophyllus</i> , and others <i>Eupatorium semilifo-</i> <i>rum</i> , <i>truncatum</i> <i>Euphorbia corollata</i> YELLOW. <i>Chrysopsis dracuncu-</i> <i>loides</i> , <i>linceus</i> <i>Euphorbia emarginata</i> <i>Solidago caerulea</i> , flexilis, <i>viridis</i> , <i>viridula</i> , <i>pallida</i> BLUE. <i>Aster cernuus</i> , corym- <i>bosus</i> , <i>laevis</i> , <i>spectabilis</i> , <i>variegatus</i> <i>Gentiana Saponaria</i> PURPLE. <i>Aster bidentatus</i> , <i>gillies-</i> <i>ii</i> , <i>pulcherrimus</i> , <i>spara-</i> <i>lliflorus</i> <i>Gentiana intermedia</i> <i>Liatris turkestanica</i> , f., <i>pycnostachya</i> , p. <i>Phlox suffruticosa</i> <i>Physostegia virginica</i> <i>Silene napsifolia</i>	RED. <i>Aster viridulus</i> <i>Glycyne monacha</i> <i>Phlox Wherryana</i> WHITE. <i>Aster eminus</i> , <i>foliosus</i> , <i>macrophyllus</i> , for others <i>Eurybia corymbosa</i> <i>Clématis diversifolia</i> <i>Eupatorium artemisi-</i> <i>oides</i> YELLOW. <i>Chrysopsis biflora</i> <i>Hedysarum divaricatum</i> <i>Sedum hispidum</i> <i>Solidago serotina</i> , odora, <i>stricta</i> , <i>viridis</i> <i>Tetragonotheca heli-</i> <i>anthoides</i> BLUE. <i>Aster paludosus</i> , <i>serotinus</i> , <i>undulatus</i> <i>Diplopappus linearifol.</i> <i>Humulus europaeus</i> <i>Veronica elatior</i> PURPLE. <i>Aster grandiflorus</i> , <i>patens</i> , <i>radula</i> <i>Hyssopus asperifolius</i> <i>Liatris cylindrica</i> , p., <i>strepens</i> , p., <i>hercynica</i> , <i>phylla</i> , p., <i>pilosus</i> , p., <i>scariosus</i> , p., <i>spicata</i> , p.	RED. <i>Chrysanth. alpinus</i> var. <i>alpinus</i> , many varieties <i>Lobelia Tupa</i> , <i>macrantha</i> WHITE. <i>Aster eric.</i> , <i>mal.</i> , others <i>Chrysanth. alpinus</i> , <i>Chrysanth. sinensis</i> , var. <i>Georgeana</i> , varieties <i>Oplochea floridana</i> , f. <i>Pyrethrum uliginosum</i> <i>Sambucus chinensis</i> <i>Yucca acuminata</i> YELLOW. <i>Actinodorus albertii</i> , <i>proctori</i> <i>Chrysanth. sinensis</i> , sev. va. <i>Georgeana</i> , several <i>Helianthus</i> , in others <i>Polymnia canadensis</i> , <i>Uvedalis</i> <i>Solidago serotina</i> , others BLUE. <i>Aster amplexicaulis</i> , <i>foliosus</i> , <i>Novi Belgii</i> , <i>paniculatus</i> , <i>panicus</i> , <i>serotinus</i> , in others <i>Lobelia colorata</i> PURPLE. <i>Aster grandiflorus</i> , <i>Jan-</i> <i>senius</i> , <i>Nove Angliae</i> , <i>umbellatus</i> , and others <i>Chrysanthemum</i> , several <i>Chrysanth. sinensis</i> , sev. <i>Eupatorium purpureum</i> <i>Lobelia polyphylla</i> <i>Vernonia altissima</i> , non <i>verobaccata</i> , <i>praecox</i>

5973. *Propagation of perennial herbaceous plants.* All the modes of propagation, excepting such as are applicable only to woody plants, may occasionally be adopted; but the most general practice is by dividing at the root, by suckers or offsets, and by seed; the other modes are by cuttings of the stalks, shoots, roots, and by layers.

5974. *By dividing at the root.* This mode is applicable to nine tenths of hardy herbaceous plants. The plant may either be taken up, divided with the knife, and a portion replanted to continue the species in the spot allotted to it; or, the earth may be partially removed, and part of the roots and crown cut off to make new plants. The sections may, if well rooted, be planted at once where they are to remain and flower, or, what is preferable, they may be planted for one season in nursing beds in the reserve garden, and prevented from flowering that season by pinching off the flower-buds as they appear. The common season for performing the operation is spring, when the plant is beginning to push, or in summer or autumn immediately after it has flowered. The latter is generally the preferable period, unless the plant flowers very late, in which case the sections will not have sufficient time to form roots for their support during winter.

5975. *By suckers or offsets.* This mode is also applicable to nine tenths of common herbaceous plants; the best time for removing them is in spring, or early in summer, after the plant has begun to grow. Plant them in the nursing department, and pinch off their flower-buds, that they may flower strongly next season when removed to their final destination.

5976. *By seed.* This mode is applicable to all the single-flowering kinds; but is only adopted with a few species, which are otherwise difficultly multiplied. Collect the seeds from the flowers when they were expanded first, as being generally the strongest. If it is ripe before August, it may be sown the same season; but if otherwise, it will be preferable to defer sowing till the following spring. Sow on beds of light earth, thinly covering according to the size of the seed, and prick out the plants once or twice according to their strength, size, or weakness, so as they may be fit to remove to their final destination in August or September. They will flower strongly the following year, and probably may show some new varieties.

5977. *By cuttings from the side-shoots or flower-stems.* This mode is applicable to a number of the more delicate and double-flowering herbaceous plants, as to scarlet and pink lychnis, double rock-rose white and yellow, some hollyhocks, and a variety of others; but more to biennials and annuals than to

perennials. The cuttings may be taken off at any time when the shoots are tender, and, when properly prepared, planted in sandy loam in a warm situation, but shaded and covered with a hand-glass. Afterwards transplant them to the nursery department, and again the same season to where they are finally to remain. They will blow freely in the summer following.

5978. *By cuttings from the root-shoots.* This is applicable to some sorts which do not multiply fast at the root, or whose rooted stolons or suckers do not make handsome plants. The early part of summer is, in general, the most fitting season for performing the operation; plant in sandy loam under a hand-glass, and shade in the sunny part of the day; the cuttings will be ready for department for a few weeks, when the strongest plants will self themselves, and may be removed in September to their final destination. They will blow strongly next year.

5979. *By cuttings of jointed root-shoots or pipings.* This is chiefly applicable to the Dianthus tribe, Saponaria, the striped grass, or any other grasses or reedy plants. Proceed as in pipping plants or carnations (5866.); but no bottom soil will be required for the sorts that come under this section.

5980. *By cuttings from the roots.* This is strictly applicable only to such plants as form buds on their roots, as to most of the *Ranunculus*, to the mint, *epilobium*, *stachys*, *gaultheria*, *campanula*, *pyramidalis*, &c. About midsummer is the earliest period at which the roots are generally fit for this purpose; but with some others it may be done in spring. Plant the cuttings in the shade, and afterwards transplant and treat them like cuttings from the flower-stalks or root-shoots.

5981. *By layers.* Such plants as cannot easily be propagated by any of the foregoing modes may be increased by layers; such as the carnation, *Onoclea sensibilis*, *macrocarpa*, and *farfugifolia*, *Lychnis chalcedonica* fl. pl., &c. Commence the operation when the plant begins to flower, and when the layers are rooted treat them as directed for pipping.

5982. *General culture of fibrous-rooted herbaceous flowers.* Autumn after the plant has done flowering, or spring when it has begun to grow, as has been already observed (5271, 5975.), are the seasons for planting or transplanting. The general culture is, stirring the soil; renewing it according to the kind of plant (5835.); taking up overgrown plants, reducing them, and replanting; sticking, pruning, trimming, removing all useless, decayed, injured, or diseased parts; and supplying blanks. The general management consists in attending to order and neatness. (See 5632. to 5650. and 5184. to 5305.)

SUBJECT. 2. Species and Varieties of bulbous-rooted Border-Flowers.

5983.

BULBOUS-ROOTED BORDER-FLOWERS. — MARCH.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 0 to $\frac{1}{2}$ of a foot.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to $\frac{1}{2}$ ft.
RED. <i>Corydalis bulbosa</i> , longi- <i>folia</i> <i>Cyclamen coum</i> , <i>vernum</i> <i>Scilla liliacea</i> , f. rubra WHITE. <i>Allium Ch. unguiculatum</i> <i>Crocus albidiflorus</i> , bi- <i>florus</i> , <i>striatus</i> <i>Cyclamen pinnatifidum</i> , <i>albidiflorum</i> , <i>ciliatum</i> <i>Erythronium longifolium</i> <i>fl. al.</i>	RED. <i>Hyacinthus orientalis</i> <i>var. fl. rubro</i> , pleno, <i>semipлено</i> <i>Scilla non scripta</i> fl. <i>rubra</i> WHITE. <i>Corydalis tuberosa</i> & <i>albidiflora</i> <i>Hyacinthus orientalis</i> <i>albus</i> , c. plenus, <i>albiflorus</i> , c. semipлено <i>Narcissus crenulatus</i> , <i>mochatus</i> , <i>pétalus</i> , &c.	VARIATED. <i>Crocus pulchellus</i> , var. <i>col-</i> <i>latus</i> blue-streaked <i>Cyclamen pinnatifidum</i> <i>fl. persice</i> , <i>reticulata</i> From 1 foot to $\frac{1}{2}$ ft. WHITE. <i>Fritillaria</i> var. <i>præcox</i> <i>Narcissus orientalis</i> , pa- <i>pyracæus</i> , & <i>jaumeinus</i> , <i>angustifolius</i> , <i>poeticus</i> , <i>dilectus</i> , <i>cernuus</i> , <i>cernuus cornu</i> plenus, <i>&c.</i>	VARIATED. <i>Fritillaria</i> var. <i>præcox</i> <i>Narcissus</i> , many vars. <i>Scilla amoena</i> , biflora, <i>præcox</i> , <i>strobilata</i> <i>Trichomanes caelestinum</i> , <i>Coldme</i> From 0 to $\frac{1}{2}$ of a foot. BLUE. <i>Crocus nespulatus</i> , <i>vernum</i> , many vars. <i>Scilla amoena</i> , biflora, <i>præcox</i> , <i>strobilata</i> <i>Trichomanes caelestinum</i> , <i>Coldme</i>	VARIATED. <i>Narcissus florindus</i> , <i>Trewiana</i> , <i>tubiflorus</i> <i>Tulipa</i> , the <i>Clarendon</i> , <i>and other vernal kinds</i> From $\frac{1}{2}$ of a foot to 1 foot. BLUE. <i>Hyacinthus orientalis</i> , <i>albus</i> , c. plenus, <i>c. semipлено</i> <i>Scilla liliacea</i> , <i>umbellata</i> , <i>non scripta</i>

BULBOUS-ROOTED BORDER-FLOWERS. — MARCH — *continued*

Height from 2 to 4 of a foot.	From 4 of a foot to 1 foot.	From 0 to 4 of a foot.	From 0 to 4 of a foot.	From 1 foot to 1½ foot.
WHITE. <i>Aletris grandiflorus</i> <i>Galinsburg plicatus</i> , nivalis, and fl. pleno <i>Leucobium pulchellum</i> , vern. p., var. duplex <i>Ornithogalum amethystinum</i> , refractum <i>Scilla bifolia</i> alba	WHITE. <i>Scilla cernua</i> b. alba, non scripta b. alba, campanulata b. alba	WHITE. 	BLUE. 	BLUE.
YELLOW. <i>Crocus leucanthus</i> , a. flavus, maculatus, stellatus, sulphureus, a. flavus, maculatus, luteus <i>Eranthis hyemalis</i> <i>Gagea lutea</i> , and others <i>Iris caudata</i> <i>Narcissus albicans</i> , insulata, b. minor, minor, penalis	YELLOW. <i>Fritillaria lutea</i> <i>Narcissus A'jaz</i> , bifrons, compressus, nodosa, nitens, obvallaris, persequens, pulchellus, variegatus, a. flavus <i>Tulipa sylvestris</i>	YELLOW. <i>Narcissus aurantiacus</i> , infundibularis, italicus, a. plenus, c. semiplenus, lorifolius and varietal, major, Fendoo-Narcissus and varietal, semipallidus, variegatus	PURPLE. <i>Bulbocodium vernum</i> <i>Crocus minimus</i> , obvallatus, reticulatus, vernus <i>Cyclamen vernum</i> t. <i>Erythronium Dens canis</i> , longifolium <i>Tritochroma purpurascens</i> t., <i>Bulbocodium</i>	PURPLE.
— APRIL —				
RED. <i>Claytonia caroliniana</i> p. t., grandiflora p. t. <i>Cyclamen hederacifolium</i> , repandum <i>O'zalia A'costella</i> , florib. <i>Trillium obtusatum</i> <i>Tritochroma cappa</i> t.	RED. <i>A'lium amethystinum</i> <i>Anemone pavonina</i> and varietal <i>Hyacinthus orientalis</i> b. flore carnea, c. plena <i>Scilla cernua</i>	RED. <i>A'lium incarnatum</i> <i>Tulipa precox</i> , pubescens	RED. 	RED. <i>Fritillaria latifolia</i> , imperialis, a. flore pleno, c. major, other varietal
WHITE. <i>A'lium paradoxum</i> <i>Narcissus botryoides</i> alb. <i>Narcissus triandrus</i> <i>Ornithogalum umbellatum</i> <i>O'zalia americana</i> , divers. <i>Trillium cernuum</i> , erectum b. album, grandiflorum, pedunculatum	WHITE. <i>A'lium pendulum</i> , auratum <i>Fritillaria precox</i> <i>Narcissus montanus</i> , tenuifolius, albicans <i>Ornithogalum nitens</i>	WHITE. <i>A'lium cespitosum</i> <i>Leucobium autumnum</i> <i>Narcissus albus</i> , angustifolius, latifolius, grandiflorus, luteus, orientalis, a. plenus, tortuosus	WHITE. <i>A'lium longifolium</i> f.	WHITE.
YELLOW. <i>Erythronium lanceolatum</i> <i>Gagea bracteolata</i> , glabra <i>Narcissus capax</i> , umbellatus, minor, stridulus <i>Ophrys lutea</i> <i>Tulipa latifolia</i> t.	YELLOW. <i>Fritillaria messanensis</i> <i>Leontodon stictica</i> p. <i>Narcissus heminalis</i> , <i>Jaspeida</i> , nitens, odoratus, rugulatus, Sabini, trilobus <i>Tulipa alatica</i> , repens	YELLOW. <i>Narcissus bicolor</i> , gracilis, Haworthii, incomparabilis, interjectus, multiflorus, splens, Telamonus, and var. <i>Ornithog. stachyoides</i> p. t. <i>Tulipa tarda</i> , <i>sylvestris</i>	PURPLE. <i>Cypripedium ventricosum</i> , macranthum	PURPLE. <i>Fritillaria perkinsi</i> , a. minor
BLUE. <i>Muscari botryoides</i> , <i>apellidum</i> , <i>racemum</i> <i>Scilla pendula</i> , umbellata, verna	BLUE. <i>Hyacinthus amethystinus</i> <i>Muscari combeum</i> , b. monanthum, pedunculatum <i>Scilla italica</i> , non scripta	VARIEGATED. <i>Fritillaria humilis</i> p. t. <i>Iris perica</i> <i>Lachemilla glabra</i> p. t. <i>Tulipa occlusa</i> solis, b. perica, tricolor	PURPLE. <i>Fritillaria metagris</i> <i>Morae's Tenoreana</i> <i>Narcissus bicolor</i> , striatus, flaccidus, <i>Macleodi</i> <i>Tulipa Gomeritana</i> , and var.	PURPLE. <i>Fritillaria rubicunda</i> , variegata <i>Morae's Tenoreana</i> <i>O'zalia longica</i> , maculata, <i>Scilla</i> <i>Tulipa Gomeritana</i> pur. pl.
BROWN. <i>Ophrys arvensis</i> , <i>tendunculata</i>	BROWN. <i>Trillium erectum</i> <i>Scilla</i>	BROWN. <i>Fritillaria perkinsi</i> , <i>tulipifolia</i>	BROWN. 	BROWN.
— MAY —				
RED. <i>Arethusa bulbosa</i> <i>Erythronium longifolium</i> Dens canis	RED. <i>Cypripedium pacificum</i> p. t. <i>O'zalia latifolia</i>	RED. <i>Glaucolus byzantinorum</i> <i>Lilium odorum</i>	RED. <i>Lilium bulbiferum</i>	RED. <i>Lilium aurantiacum</i>
WHITE. <i>A'lium junceum</i> , striatum <i>Cyclamen neapolitanum</i> t. <i>Ornithogalum hexapetatum</i> , montanum <i>Trillium cernuum</i> p. <i>Zephyranthes Alouca</i> p.	WHITE. <i>A'lium Cinc.</i> , subulatum. <i>Bellavilla operculata</i> <i>Habenaria bleph.</i> , trid. <i>Narcissus galanthifolius</i> <i>Platanthera bifolia</i> <i>Scilla peruviana</i> b. alba	WHITE. <i>A'lium brachystemon</i> , medium, triquetrum <i>Narcissus niveus</i> , patellaris, a. exsertus, c. plenus <i>Scilla caudata</i>	WHITE. <i>Cypripedium album</i> <i>Narcissus pediculus</i> , a. plenus, rectus <i>Ornithogalum biflorum</i> t. <i>Pseudolirium hylicum</i> , martianum	WHITE.
YELLOW. <i>Narcissus Bulbocodium</i> <i>O'zalia sulphurea</i>	YELLOW. <i>Cypripedium parvif.</i> p. t. <i>Narcissus compressus</i> , <i>tend.</i>	YELLOW. <i>A'lium victor</i> , <i>acronotus</i> <i>Cypripedium pubes.</i> p. t.	YELLOW. <i>Calochortus luteus</i>	YELLOW. <i>Fritillaria imperialis</i> f. luteo
BLUE. <i>Morae's Mayrincium</i> <i>Fuschia</i> <i>Scilla</i> <i>Scilla</i> <i>Scilla</i>	BLUE. <i>Muscari pallens</i> <i>Scilla Lillo-Hyacinthus</i> , <i>lutea</i> , <i>maculata</i>	BLUE. <i>Scilla peruviana</i> , <i>prestrackata</i>	BLUE. 	BLUE.
PURPLE. <i>Fritillaria tenella</i> <i>Ophrys muscifera</i> <i>O'zalia ustulata</i>	PURPLE. <i>O'zalia morio</i> , <i>millaria</i> <i>Scilla campanulata</i> <i>Fritillaria minor</i>	PURPLE. <i>Calochortus nitidus</i> <i>O'zalia fusa</i> , <i>tephrosantha</i>	PURPLE. <i>Calochortus macrocarpus</i>	PURPLE.
VARIEGATED. <i>Anemone coron.</i> f. pib. <i>Cyclodactylus elegans</i> t. <i>Scilla peruviana</i>	VARIEGATED. <i>Muscari album</i> , <i>maculatum</i>	VARIEGATED. <i>Anemone coronaria</i> , cor. plena <i>Muscari macrocarpum</i>	VARIEGATED. <i>Cypripedium pubes.</i> p. t. <i>Tritochroma lineata</i> t.	VARIEGATED. <i>Tulipa cornuta</i> , <i>malcolma</i> , <i>mal.</i> <i>variegata</i>
GREEN. 	GREEN. <i>Muscari glaucum</i>	GREEN. 	GREEN. 	GREEN.
BROWN. <i>Ophrys arvensis</i>	BROWN. <i>O'zalia coriophora</i>	BROWN. <i>Fritillaria tulipifolia</i>	BROWN. <i>Fritillaria perkinsi</i>	BROWN. <i>Fritillaria imper.</i> f. ful.

BULBOUS-ROOTED BORDER-FLOWERS. — JUNE.

[illegible]

JULY.

RED. Faint red, by almost imperceptible degrees, to deep carmine red. f.	RED. Faint carmine, to almost pure red. Intermediate varieties Purple carmine	RED. Faint crimson, rose-lake, crimson f. to almost f. vermillion f. Lilium carolin.	RED. <i>Amaryllis Belladonna</i> L., & <i>pulchra</i> , f. <i>Gladiolus carolin.</i> , na- talensis	RED. <i>Lilium ampeloprasum</i> , Hilleri, rubicundum <i>Lilium canadense</i> , white- caned. rub., choice.
WHITE. <i>Lilium candidum</i>	WHITE. <i>Lilium candidum</i>	WHITE. <i>Ornithogalum nar- bonne</i> <i>Hesperandrium lac- tucum</i>	WHITE. <i>Lilium pomposum</i> <i>Ornithogalum latifolium</i>	WHITE. <i>Lilium japonicum</i> , <i>Martagon</i> S. & N. <i>Ornithog.</i> pyramidalis
YELLOW.	YELLOW.	YELLOW. <i>Lilium ochroleucum</i> <i>Lilium (Anab.)</i>	YELLOW. <i>Lilium ochroleucum</i> <i>Lilium carolin.</i> , pyram.	YELLOW. <i>Lilium canadense</i> , phila- delphicum, tigrinum
PURPLE. Faint purple, to almost pure moderate moderate	PURPLE. Faint purple, to pure, intense, pal- lidness	PURPLE. <i>Crocus oculatus</i> <i>Orchis hercyn.</i> , longi- loba, rotunda, purpurea <i>Calceolus spheodes</i>	PURPLE. <i>Lilium decedens</i> , rotundum <i>Calceolus macro- carpus</i>	PURPLE. <i>Lilium sphaerocphal.</i> <i>Lilium Martagon</i> fore pisso
VARIATED.	VARIATED. <i>Archibactra elegans</i>	VARIATED. <i>Lilium longipetalum</i>	VARIATED. <i>Achromerie hirtella</i> and several species	VARIATED. <i>Gladiolus striatatus</i> <i>Lilium Martagon</i> S. mac.

AUGUST AND SEPTEMBER

[illegible]

5981. Propagation of *bulbous-rooted* flowers. By offsets or by seed: the whole, with the exception of the Cichaceae, and one or two others, are propagated by offsets, which are to be taken off when the plant is in a state of rest, which happens in most sorts after it has done flowering; these, after arising, are to be planted in the autumn, in the same manner as the bulbs, in the place where they are finally to remain. Autumnal-flowering bulbs are not in a state of rest till the beginning of the following summer: as the Cichaceae, autumnal-flowering crocuses, and the *Scilla* (late), and a few others. These, therefore, are to be taken off in the summer, and planted in the autumn, in the same manner as the others separated and planted in the nursery-department; and the parent bulbs replaced in a month or six weeks, in order that they may have time to establish themselves and flower before winter.

3953. *General culture and management.* Bulbous-rooted flowers differ from others in requiring in their cultivated state to be frequently taken up and replanted. Fibrous-rooted plants, which grow much at the root, require this occasionally; but almost all bulbs, frequently. The reasons are, that, in deeply pulverised rich ground most sorts, but especially those which

form their new bulbs beside the others, usually so close that the old bulbs become crowded, small, and unfit to send up strong flowers; that many sorts, as tulips, hyacinths, etc., which form their new bulbs under the old ones, send down their bulbils to form new plants; that the old bulbs, which are the best, should be taken care to appear at all, as in the bulbous-rooted trees, colchicum, etc.; and that some, on the contrary, which form their new bulbs at the top of the old ones, should be cut off at the surface, as in crocus, anemone, etc.; that some are killed by the frost or drought. Hence the best bulbs of flowers require to be taken up every year, and all the border-bulbs at least, and to be planted in the garden, to which it is when the plant has flowered and the leaves have decayed. No bulb should be taken up for any purpose, or injured in its growth in any way, while the leaves are green; for it should be left to grow on, and the leaves should be cut off, leaving the root to maturity and prepare it for flowering the following year. If these are injured or cut off, or if the plant is cut off, it will not grow again, and the bulb will be a useless fibrous while in a good soil, with such a bulb as not to touch any of its neighbors, and to be able to grow in at least one year, and probably two, or

three. The time for keeping bulbs out of ground depends on their habits as to flowering. The object is to keep the bulb made by removing the offsets, and perhaps by setting the bulb more completely in a state of rest, to render it more excitable when planted. A month will in general be sufficient for this purpose, and more cannot be allowed with safety to the autumn-flowering bulbs: more than three months is more likely to be injurious than useful to most sorts, though hyacinths and other bulbs which form articles of great commerce, are frequently kept out of the soil half the year; when planted so late, however, they seldom flower well the first season, and commonly not at all for a year or two afterwards. The taking up, drying, and replanting of border-bulbs must be attended to by the flower-gardener with equal regularity, though not with equal frequency as the finer, select, or florist's bulbs: the offsets may be planted in beds in the reserve-garden, if wanted for stock; and the soil of the court where the plants stood in the border renewed according to its kind, and the flowering-bulbs replaced. Some bulbs multiply so fast by throwing out offsets, that they soon cease to need up flower-stems. Of these may be mentioned the *Ornithogalum umbellatum*, *Gagea lites*, and some other species; some species of *Scilla*, *Muscari*, *Trit. Althum*, *Oxalis*, and others. These should either be annually taken up, their offsets removed, or the parent bulb replanted; or the offsets, as soon as they send up leaves, should be destroyed. Indeed, whenever strong-blowing bulbs is the principal object, the offsets should never be allowed to attain any size; but as soon as they indicate this existence by showing leaves above ground, they should be removed with

a blunt stick, or in any way least injurious to the parent. By this practice a great accession of strength is given to the main plant, both for the display of blossom during the current season, and for invigorating the leaves to prepare and deposit nutriment in the bulb for the next year. In pursuance of the same object, every flower should be picked off as soon as it begins to decay, but the flower-stalk may remain till it begins to change colour with the leaves. Some bulbs are greedily sought after by vermin: as the crocus and tulip by the mouse and water-rat; and the snow-drop and some of the narcissi by the snail and slug; and the hyacinth by a particular sort of grubworm. We know of no method of mitigating these evils but by watching the mice and rats, gathering the snails and earth-worms, or watering the ground with lime-water, as before recommended. (1893.) Roots attacked by grubs, the wireworm, woodlice, and other insects that operate under ground, should be taken up, and replanted in fresh soil. The snail is perhaps the worst of these vermin, and, fortunately, it may be most effectually kept under, by scattering leaves of the brassica tribe (of any variety) over the ground, and picking from them, every morning, the snails which have fixed on them during the night; or by watering late in the evening or early in the morning with lime-water. (See *Gard. Mag.*, vol. ii. p. 283; v. p. 568. v. p. 49.)

Good. Most bulbs force well; to expedite this, retard the bulbs by keeping them in an ice-house till the autumn of the following summer; put them in water-glasses or pots in September, and they will be in full blow by Christmas. Ranunculus roots will keep two or three years, and yet vegetate freely. (See sec. 572.)

SUBJECT. 3. Species and Varieties of Biennial Border-Flowers.

5987.

BIENNIAL BORDER-FLOWERS.—MAY, JUNE.

From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to 1½ foot.	From 1½ foot to 2 feet.	From 2 feet to 2½ feet.	From 2½ feet upwards.
RED. <i>A'cyenos palustris</i> <i>Silene glaucophylla</i> <i>Thymus alpinus</i>, grandiflorus WHITE. <i>Androsace alamosides</i>, coronopifolia, lactiflora, septentrionalis <i>Sedum palense</i>, spatulatum YELLOW. <i>Calandula incana</i> <i>Corydalis adurea</i>, Götteri <i>Hesperis trietis</i> (<i>Geothiera densata</i>, mollis, undulata) <i>Vesicaria sinuata</i> BLUE. <i>Anarrhinum bellidifolium</i> <i>Campanula spicata</i> <i>Phyteuma comosum</i> <i>Salvia clandestina</i>, polymorpha PURPLE. <i>A'cyenos purpurascens</i> <i>Matthiola simplicifolia</i> <i>Tragopogon angustifolius</i> <i>Trifolium saxatile</i> VARIEGATED. <i>Maius vagans</i>	RED. <i>Agrostemma cor. fl. pl.</i> <i>Papaver floribundum</i> <i>Saponaria guttata</i> <i>Silene rubra</i> WHITE. <i>Asterocarpus luteolus</i> <i>Lepidium hirsutum</i> <i>Matthiola simplicifolia</i> alba <i>Salvia oppositifolia</i>, spicata <i>Statice dahurica</i> YELLOW. <i>Arthropogon Dalechampi</i> <i>Calandula officinalis</i>, fl. pl. aurantico, fl. pl. luteo <i>Geothiera sinuata</i> <i>Patrisa coronata</i> <i>Silene Prunellifolia</i> BLUE. <i>Anarrhinum bellidifolium</i>, pubescens <i>Campanula pend.</i>, alba <i>Echium luteum</i> <i>Lobelia urens</i> PURPLE. <i>Hesperis ma. fl. par. pl.</i> <i>Matthiola farinifolia</i> <i>Salvia pinnata</i> <i>Silene ramosissima</i> VARIEGATED. <i>Echium luteum</i> parviflorum <i>Monarda punctata</i>	RED. <i>Antirrhinum majus</i>, fl. p., and fol. var., angustifolium <i>Dianthus pubescens</i> <i>Silene spaldiana</i> WHITE. <i>Echium vulgare</i> albo <i>Echium spicatum</i>, brachypetalum <i>Lunaria biennis</i> var. albiflora <i>Silene lutea</i>, parviflora YELLOW. <i>Antirrhinum majus</i> flore luteo <i>Corydalis capnoides</i> <i>Ligusticum peregrinum</i> <i>Linum strictum</i> <i>Patrisa lutea</i>, scaberrima, scaberrima <i>Scrophularia vernalis</i> BLUE. <i>Campanula affinis</i>, corymbosa, divergens, lanuginosa, peregrina <i>Scrophularia octandria</i> PURPLE. <i>Anchusa paniculata</i> <i>Cynoglossum umbellatum</i> <i>Hesperis laciniata</i> <i>Scrophularia peregrina</i> VARIEGATED. <i>Asterocarpus atropurpureus</i> cor. variegata <i>Echium vulgare</i>, rub.	RED. <i>Agrostemma coronarium</i> <i>Antirrhinum medium</i> <i>Hesperis bicolor</i> <i>Silene nemoralis</i>, perfoliata WHITE. <i>Agrostemma cor. fl. albo</i> <i>Antirrhinum maj.</i> fl. al. <i>Campanula media</i> albo <i>Hedysarum coron.</i> albo <i>Hieracium ligusticifol.</i> <i>Hesperis matron.</i> albo YELLOW. <i>Callipais Atkinsoniana</i> <i>Orchis biennis</i> <i>Farsetia cypripetis</i> <i>Tragopogon dubius</i>, mutabilis, orientalis, pratensis, undulatus <i>Verbascum phloxoides</i> BLUE. <i>Campanula obliqua</i> <i>Cynoglossum bicolor</i>, sylv. <i>Delphinium pictum</i>, <i>Staphylegia</i> <i>Podocarpus laciniatum</i> PURPLE. <i>Antirrhinum majus</i> <i>Asterocarpus atropurpureus</i> <i>Cynoglossum elvaticum</i> <i>Lunaria biennis</i> VARIEGATED. <i>Hyoxyanthus muticus</i> <i>Ranunculus epifolius</i> <i>Verbascum formos.</i>, spec.	RED. <i>Hedysarum coronarium</i>, pallidum <i>Hesperis elata</i>, inodora <i>Salvia patula</i> WHITE. <i>Cochlearia plantifolia</i> <i>Echium luteum</i> <i>Feracanthus arvensis</i>, asperum, gummiiferum, speciosum, verrucosum, and others <i>Salvia arthropica</i> YELLOW. <i>Geothiera biennis</i>, parviflora, and many others <i>Succisa latifolia</i> <i>Tragopogon major</i>, villosus <i>Verbascum macranthum</i>, nemorosum BLUE. <i>Campanula patula</i>, pubescens, <i>Asperula</i> <i>Asperula striata</i> <i>Vicia biennis</i>, and others PURPLE. <i>Campanula pulchra</i> <i>Hesperis matronalis</i> <i>Tragopogon portifolius</i> VARIEGATED. <i>Adiantum ciliatum</i> <i>Althaea sinensis</i>, pilosa <i>Hyoxyanthus niger</i>
JULY.				
RED. <i>Dianthus chinensis</i>, ferrugineus <i>Matthiola sinuata</i> WHITE. <i>Althaea leucantha</i>, leucantha <i>Berterbe incana</i> <i>Hebe nana</i> <i>Oenothera acaulis</i>, uniflorum YELLOW. <i>Hyoxyanthus pinnatus</i> <i>Patrisa coronata</i> f., nudicaulis f. <i>Reedia Phytolacca</i> <i>Vesicaria sinuata</i> BLUE. <i>Antirrhinum bellidifolium</i> <i>Cerastium crinitum</i> <i>Lobelia urens</i> p. f.	RED. <i>Dianthus monspeliensis</i> <i>Antirrhinum</i> <i>Matthiola tatarica</i> f. WHITE. <i>Hebe nana</i>, ciliata <i>Königia maritima</i>, and var. foliis variegata f. <i>Trachelium campanulatum</i> <i>Reedia undata</i> YELLOW. <i>Androsace runcinata</i> <i>Cerastium minor</i> <i>Hyoxyanthus pallidus</i> <i>Linum virginianum</i> <i>Geothiera pubescens</i> BLUE. <i>Campanula alba</i> <i>Matthiola, pulcherrima</i> <i>Althaea crinita</i>	RED. <i>Echium ribium</i> <i>Matthiola incana</i> <i>Silene lutea</i> WHITE. <i>Anarrhinum pubescens</i> <i>Campanula thymoides</i> <i>Hyoxyanthus albus</i> f. <i>Reedia incana</i> albo <i>Reedia alba</i> <i>Salvia gigantea</i> YELLOW. <i>Farsetia lunarioides</i> <i>Geothiera grandiflora</i>, mollissima, necitima, ciliatissima, calicifolia, spectabilis, &c. <i>Pastinaca gravolens</i> <i>Reedia lutea</i> BLUE. <i>Campanula macrostachya</i> <i>Salvia coronophylla</i> <i>Trachelium caruleum</i> f.	RED. <i>Centaurea biennis</i> <i>Cynoglossum officinale</i> <i>Leonurus albus</i>, albus WHITE. <i>Althaea leucantha</i>, <i>Proclivaria</i> <i>Campanula Medium</i> fl. albo <i>Hebe nana</i> lutea <i>Hebe nana</i> lutea YELLOW. <i>Centaurea peregrina</i> <i>Diastylis parviflora</i> <i>Geothiera longiflora</i>, &c. <i>Wolffia tendriformis</i> <i>Verbascum biennis</i>, floccosum, glabrum, &c. BLUE. <i>Campanula Cervicaria</i>, patula, <i>Rapunculus</i> <i>Echium violaceum</i> <i>Verbena bonariensis</i>, alba, venosa	RED. <i>Althaea flosida</i>, rubes, <i>Digitalis purpurea</i> <i>Gilia aggregata</i>, corono. <i>Leonurus condensatus</i>, neg. luteus WHITE. <i>Althaea striata</i> <i>Digitalis purpur.</i> fl. alio <i>Diastylis infernalis</i>, pilosus <i>Hebe nana</i> lutea <i>Verbascum biennis</i> fl. albo YELLOW. <i>Althaea flosida</i> (<i>Centauria calophylla</i>), <i>Isatis tinctoria</i>, & others <i>Hebe nana</i> lutea <i>Geothiera muricata</i>, parviflora, striata <i>Geothiera muricata</i>, pyramidalis, &c. BLUE. <i>Campanula Medium</i> <i>Dipsacus</i> (<i>Umelis</i>) <i>Sonchus oleraceus</i> <i>Verbena scorbia</i> <i>Vicia biennis</i>

BIENNIAL BORDER-FLOWERS. — JULY — continued.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 $\frac{1}{2}$ foot to 1 $\frac{1}{2}$ foot.	From 2 feet to 2 $\frac{1}{2}$ feet.	From 2 feet upwards.
PURPLE. <i>Hydilla minor</i> <i>Gerardia tenella</i> p. l.	PURPLE. <i>Conyza squarrosa</i> <i>Knaidia orientalis</i> , propinqua <i>Matthiola fœminalis</i> , lancea purpurea <i>Verbena Aubletia</i> , bracteata	PURPLE. <i>Asteroccephalus atropurpureus</i> <i>Carlina vulgaris</i> <i>Centaurea amœrica</i> <i>Cirsium idæum</i> <i>Cynoglossum apenninum</i> <i>Malope malacoides</i> <i>Picla biennis</i>	PURPLE. <i>Anchusa italica</i> <i>Centaurea salmantica</i> <i>spodiœna</i> <i>Cirsium discoloratum</i> <i>Dipsacus atron</i> <i>Leonturus villosus</i> <i>Stachys biennis</i> , poly-stach <i>Verbena lasiostachya</i>	PURPLE. <i>Cirsium cœruleum</i> , erio-phorum <i>Digitalis purpurea</i> <i>Lupinus mutabilis</i> , & <i>Cruckshankiana</i> <i>Oenopodium liliiflorum</i> , tataricum, viscosum, &c.
VARIEGATED. <i>Aibacæ africana</i> , vesicarius	VARIEGATED. <i>Hyoscyamus agrestis</i> , reticulatus	VARIEGATED. <i>Phacelia Walteri</i> p. l. <i>Glaucium tricolor</i>	VARIEGATED. <i>Cynoglossum bicolor</i> , pictum	VARIEGATED. <i>Aithya sinensis pleno</i> , stript. variegata
BROWN.	BROWN.	BROWN. <i>Digitalis aërea</i> , lanata	BROWN. <i>Digitalis ferruginea</i>	BROWN. <i>Digitalis eriotachya</i>
AUGUST.				
RED.	RED. <i>Solan alatum</i>	RED. <i>Leonurus heterophyllus</i> , tataricus	RED. <i>Centaurea romana</i> <i>Æchium crœticum</i> <i>Leonurus tataricus</i>	RED. <i>Aithya rosea</i> , lake & flesh. <i>Erythraea composita</i> <i>Gaura biennis</i> <i>Lavatera arborea</i>
WHITE.	WHITE. <i>Solan Anabum</i>	WHITE. <i>Salvia cœlestophylla</i>	WHITE. <i>Digitalis leucophaea</i> <i>Æchium italicum</i>	WHITE. <i>Aithya nudiflora</i> , roses albo
YELLOW. <i>Onopordium syriacum</i>	YELLOW. <i>Scabiosa ucrainica</i>	YELLOW. <i>Gedra mutabilis</i>	YELLOW. <i>Crispis biennis</i> <i>Salvia tinctoria</i> , & others <i>Oenothera cruciata</i>	YELLOW. <i>Aithya liliifolia</i> , roses fl. luteo <i>Rhienis procera</i>
BLUE. <i>Gentiana barbata</i>	BLUE. <i>Erigonæ acris</i>	BLUE. <i>Æchium vulgare</i>	BLUE. <i>Verbena bonariensis</i>	BLUE. <i>Michælis campanulata</i>
PURPLE.	PURPLE.	PURPLE. <i>Gedra anotheriflora</i>	PURPLE. <i>Cirsium strigosum</i> <i>Saussurea alba</i>	PURPLE. <i>Æchium sanctum</i> <i>Onopordium arborescens</i>
BROWN.	BROWN.	BROWN.	BROWN. <i>Digitalis eriotachya</i>	BROWN. <i>Aithya rosea</i>

5058. Propagation and culture of biennial border-flowers. They are all raised from seed, but some of the finest double varieties are continued by cuttings. The seed of such sorts as ripen by August may be sown immediately after it is gathered; but the seed of those sorts which ripen later should be preserved till the following spring, and sown in May or the beginning of June. Sow thinly in beds in the reserve-garden, transplant into other beds when the plants are a few inches high, and in September or October remove the plants to their final destination. If this be, as it most generally will in the mingled flower-border, to provide a succession of the same sorts, then it can only be done in the case of those sorts which are done flowering by September or the 1st of October, and the others must be removed early in March with balls. Great care is re-

quisite in removing some sorts which have large tap-roots, as *Oenothera*, hollyhock, *Lavatera*, &c.; for if improperly checked, they will not flower strongly. The best mode is to rear these sorts in large pots, and transplant them in October or February, with their balls entire. The sorts continued by cuttings are chiefly fine double varieties of wallflowers, stocks, rose-campions, &c. The cuttings may be taken from the flower-stalks, or the root-shoots, early in summer, put under hand-glasses, and otherwise treated as cuttings of perennials. If the cuttings of some sorts, as *Agrostemma*, *Antirrhinum*, *Hesperis*, &c., are taken off early in the season, they will flower in the autumn. The plants once placed where they are to remain, their general culture and management are the same as for the perennial border-flowers. (5052.)

SUBJECT. 4. Species and Varieties of Hardy Annual Border-Flowers.

5059. HARDY ANNUAL BORDER-FLOWERS. — JUNE.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to 1 $\frac{1}{2}$ foot.	From 1 $\frac{1}{2}$ foot to 2 feet.	From 2 feet upwards.
RED. <i>Fidia Corniculata</i> <i>Glycyphila muralis</i> <i>Malcolmia maritima</i> , &c. <i>Silene dioica</i> , incana, arguta, rubra <i>Tithymalus ovata</i> <i>Valerianella eriocarpa</i> , platyloba <i>Ziziphora dinopodifolia</i>	RED. <i>Adonis æstivalis</i> , en-tamialis <i>Eritoca Frankii</i> <i>Glycyphila elegans</i> <i>Floris umbellata</i> <i>Lathyrus amphicarpos</i> , Nobilis <i>Oenothera roseo-alba</i> <i>Silene confinis</i> , cœnosa	RED. <i>Asteroccephalus Bieber-staini</i> <i>Eritoca multiflora</i> <i>Matthiola annua</i> <i>Papaver caucasicum</i> , floribundum <i>Salvia Horni</i> , & <i>rubrum</i> <i>Trifolium angustifolium</i> , purpurascens	RED. <i>Asteroccephalus micran-thus</i> <i>Centranthus Calcitrapa</i> <i>Fidia confusa</i> <i>Papaver pœticum</i> , Athena, and var. <i>Rapontaria perfoliata</i> <i>Senecio elegans</i> , & flore pleno	RED. <i>Asteroccephalus atropurpureus</i> & <i>rubra</i> <i>Centaurea Cyanus</i> , & <i>rubra</i> , <i>Crepina</i> <i>Convolvulus albidus</i> <i>Knaidia orientalis</i>
WHITE. <i>Androsace elongata</i> , diffusa, ægyptiaca <i>Claytonia perfoliata</i> <i>Helleborus europæus</i> <i>Hutchinsia pœnea</i> <i>Konigia maritima</i> <i>Triptilon cordifolium</i> <i>Valerianella Vesicaria</i>	WHITE. <i>Calandula hybrida</i> , plu-vialis <i>Campsis Specul.</i> & <i>albo</i> <i>Claytonia stans</i> <i>Glycyphila viscosa</i> <i>Lithris amara</i> , pinnata <i>Lamium moschatum</i> <i>Lepidium campestre</i>	WHITE. <i>Cleome filiculmis</i> , t., iberica <i>Matthiola annua</i> fl. albo, græca fl. albo <i>Nepeta hœtensis</i> <i>Omphalodes littoralis</i> <i>Polygonum Dryandri</i> , patulum	WHITE. <i>Agrostemma nicotiana</i> <i>Biflora rubra</i> <i>Clarkia pulchella</i> , flore albo <i>Lupinus Thermis</i> <i>Schizopetalum Walteri</i> <i>Senecio elegans</i> albo, & flore pleno	WHITE. <i>Asteroccephalus grandiflorus</i> , <i>atropurpureus</i> , cor. alb. <i>Centaurea Cyanus</i> fl. di., mocharia albo <i>Desfera Mæli</i> , la-vis
YELLOW. <i>Alyssum</i> many <i>Asteroccephalus fulcatus</i> <i>Cypripedium</i> <i>San Thomei</i> <i>Helleborus ægyptiacus</i> , <i>pan-</i> <i>Mimulus parviflorus</i> <i>Scorpiurus vermic.</i> , &c.	YELLOW. <i>Adonis æstivalis</i> <i>Bupleurum trifidum</i> <i>Eritoca</i> many <i>Erycimum procumbens</i> <i>Lathyrus</i> <i>albus</i> <i>Nones lutea</i>	YELLOW. <i>Biscutella</i> , many <i>Centaurea bened.</i> , <i>suav.</i> <i>Cerastium depense</i> , minor <i>Impatiens Noli me</i> <i>tingere</i> , <i>parviflora</i> <i>Ochrus pallida</i>	YELLOW. <i>Bupleurum rotundifolium</i> <i>Centaurea coronopifolia</i> <i>Impatiens biflora</i> , pallidiflora <i>Picla ochroleuca</i> , grandiflora	YELLOW. <i>Callipais bicolor</i> <i>Tropæolum majus</i> , minus <i>Picla grandiflora</i> , <i>serotina</i>
BLUE. <i>Asperula arvensis</i> <i>Collinsia parviflora</i> , grandiflora <i>Helleborus amplexicaulis</i> , pilosa, pilosa var. <i>incana</i> (<i>erubescens</i>), digit. <i>Lobelia</i> , many <i>Verbena cœnosa</i> , <i>hispida</i>	BLUE. <i>Campsis Specul.</i> & <i>albo</i> <i>Claytonia lutea</i> <i>Linaria</i> , many <i>Nemophila parviflora</i> , aurita <i>Prismatocarpus hirsutus</i> , hybridus, nit. perfolia. <i>Trichostema dich.</i> , lin.	BLUE. <i>Amethysa cœrulea</i> <i>Linaria</i> , many <i>Linum catharticum</i> <i>Nigella hispanica</i> <i>Salvia hirsuta</i>	BLUE. <i>Convolvulus pentapetaloïdes</i> , <i>scutell.</i> <i>Delphinium Ajacis</i> <i>Gardelia Nigellidærum</i> <i>Gilia capitata</i> <i>Salvia lanceolata</i> <i>Picla globosa</i> , <i>concin-</i> <i>tina</i>	BLUE. <i>Centaurea Cyanus</i> <i>Delphinium Consolida</i> <i>Linum catharticum</i> <i>Nellius cœrulea</i> <i>Salvia Æthiopum</i> <i>bract.</i> <i>erotic.</i> <i>Picla biflora</i> , <i>candescens</i> <i>concinna</i>

HARDY ANNUAL BORDER-FLOWERS. — JUNE — continued.

Height from 0 to $\frac{1}{2}$ of a ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to 1 $\frac{1}{2}$ feet.	From 1 $\frac{1}{2}$ feet to 2 feet.	From 2 feet upwards.	
PURPLE. <i>A'cyron vulgaria</i> <i>Astragalus reticulatus</i> <i>Choropsis tenell.</i>, & <i>arc.</i> <i>Erodium romanum</i> <i>Heliophila coron.</i>, <i>crith.</i> <i>Onothera tenella</i>, <i>decu.</i> <i>Prismato'crpus</i> Pentag. <i>Scherardia avensis</i> VARIEGATED. <i>Collinsia verna</i> GREEN. <i>Rumex spinosus</i> <i>Rumex bucephalophorus</i>	PURPLE. <i>Calandrinia speciosa</i> <i>Hedysarum flexuosum</i> <i>Onothera Lindleyana</i>, lineata, purpurea, quin- quevalvata, Roman- zovi, tenuifolia <i>Rumexia hybrida</i> VARIEGATED. <i>Collinsia grandiflora</i> <i>Silene quinquevalvata</i> GREEN. <i>Chenopodium Botrys</i>	PURPLE. <i>Clarkia pulchella</i>, elegans <i>Lupinus elegans</i> <i>Malva cretica</i>, stipulacea <i>Salvia hispanica</i> <i>Ziziphora tenuior</i>, elegans VARIEGATED. <i>Delphinium Ajacis</i> var. unique GREEN. <i>Chenopodium marginatum</i>	PURPLE. <i>Centaurea Cyanus</i> <i>h. purpurea</i>, Lippii <i>Nemophila aurita</i> <i>Onothera viminea</i>, &c. <i>Ficula mebrichoides</i>, peregrina VARIEGATED. <i>Ficula tricolor</i> <i>Lupinus elegans</i> GREEN. <i>Chenopodium frutidum</i>, gracile	PURPLE. <i>Amarantus cruentus</i>, melancholicus <i>Centaurea moschata</i> <i>Leonturus Marrubia-</i> <i>strum</i> <i>Ficula atropurpurea</i>, nar- bonensis, Nissolia VARIEGATED. <i>Callipais bicolor</i> <i>Lupinus mutabilis</i> GREEN.	
JULY.					
RED. <i>Antirrhinum Orlantium</i> <i>Collinsia heterophylla</i> <i>Dianthus dimidiatus</i> <i>Erythraea Centaureum</i>, latifolia, pulchella <i>Frankia pulverulenta</i> <i>Gryphalia muralis</i> <i>Holosteum umbellatum</i> <i>Lotus corniculatus</i> <i>Lichnis lae'ta</i> <i>Sedum pulchrum</i>, stellat. <i>Silene Aitoniæ</i>, &c. <i>Telium Botrys</i> <i>Valeriana ericarpa</i> WHITE. <i>Androsace nana</i>, & others <i>Arenaria</i>, several <i>Corydalis littoralis</i> <i>Eritia Nictella</i> <i>Illecebrum cymosum</i> echinatum, verticillat. <i>Nicotiana glauca</i> <i>Nigella coarctata</i> <i>Polycastrum tetraphyllum</i> <i>Sedum Cere'ia</i> <i>Trifolium scabrum</i>, strictum <i>Trigonella gladiata</i>	RED. <i>Adonis flammula</i> <i>Collinsia linearis</i> <i>Dianthus Armeria</i>, chimensis, and others <i>E'chium creticum</i> <i>Gladiolus falturn</i>, phoeniceus <i>Hedysarum Crista-galli</i> <i>Nemesia rosea</i> <i>Saponaria perigrinis</i>, orientalis, calabrica <i>Silene Armeria</i>, &c. <i>Trifolium incarnatum</i> WHITE. <i>Anthyllus cornici</i>, tetrap. <i>Antirrhinum chalcopneum</i> <i>Flumebachia insignis</i> <i>Calandrinia hybrida</i> <i>Campidula Specul. fl.</i> <i>Dracopis</i>, moldav. alb. <i>Eutonia stenoifolium</i> f. <i>Gynandropsis pulchella</i> f. <i>Nicotiana quadrivalvis</i> <i>Onothera clark.</i>, tetrap. <i>Onophodites foliolosa</i> <i>Polanisia dodocandra</i> t., gracile	RED. <i>Agrostemma Cr'li Rosa</i> <i>Blitum capitatum</i> <i>Callistemma hort. rub.</i> <i>Collinsia grandifl.</i> occ. <i>Dianthus prolifer</i> <i>Erodium grimum</i> <i>Fagopyrum esculentum</i>, marginatum, tatar. <i>Hedysarum caput galli</i> <i>Leonturus heterophyllus</i> <i>Nicotiana glauca</i> <i>Papaver horridum</i> <i>Silene compacta</i>, &c. WHITE. <i>Argemone albitrora</i> <i>Leonturus</i> <i>Callitriche hort.</i>, alb. <i>Cynodactylon latifolium</i> <i>Gynandropsis triphylla</i> f. <i>Iberis odorata</i> <i>Nicotiana octovalvis</i>, plumaginif. repanda <i>Nigella damascena</i>, dam. fl. pl. <i>O'cymum basil.</i>, c'cum <i>Silene Armeria</i> alba <i>Trigonella Foenum gr.</i>	RED. <i>Asteroccephalus atropur-</i> <i>pureus</i> h. ruber, hy- bridus, micranthus <i>A' triplex hortensis</i> h. rubra <i>Cephalaria transylvanica</i> <i>Delphinium Ajacis</i> rub. <i>E'chium orientale</i> <i>Ficula congesta</i> <i>Lupinus pilosus</i> <i>Malope trinda</i> <i>Malva trifida</i> WHITE. <i>Agrostemma latifolium</i> <i>Convolvulus elongatus</i> <i>Datura ceratocaulis</i>, f'rica, Stramonium <i>Delphinium Ajacis</i> alb. <i>E'chium violaceum</i> fl. al. <i>Gilia capitata</i> alba <i>Hedysarum comst.co. fl.</i> <i>Lupinus albus</i> <i>Nicotiana pinetiflora</i> <i>Onothera vinetiflora</i> <i>Papaver setigerum</i> <i>Petunia nictaginitiflora</i> <i>Salsola Soda</i> <i>Silene noctiflora</i>	RED. <i>Amarantus caudatus</i>, hypochond. heticus <i>A' triplex hortensis rubra</i> <i>Convolvulus ciliatus</i> <i>Fumaria capreolata</i> <i>Lathyrus Clymenum</i>, odoratus, tingitanus <i>Malva mauritiana</i> <i>Nicotiana macrophylla</i>, virginica, and others <i>Papaver somniferum</i> fl. rubro and pleno <i>Polygonum orientale</i>, tall and dwarf varieties WHITE. <i>Amarantus caudatus</i> albus <i>Asteroccephalus atropur-</i> <i>pureus</i> cor. alba <i>Cristum syriacum</i> <i>Echinops strigosus</i> <i>Hieracantha critica</i> <i>Lavatera trimestris</i> alb. <i>Malva crispa</i> <i>Nicotiana noctiflora</i>, perida, longiflora <i>Papaver somniferum</i> <i>Polygonum orientale</i> alb. <i>Succisa tyrica</i>	
YELLOW. <i>A'juga l'va</i> <i>Alysum campestre</i>, &c. <i>Astrolabium</i>, many <i>Hyssopus semivivum</i> f. <i>Euchroma coccinea</i> <i>Grangeria cuneifolia</i> <i>Hippocrepis</i>, many <i>Hymenoclepus circinnatus</i>, radiatus <i>Linaria</i>, many <i>Linum aureum</i>, gallic. <i>Lotus decumbens</i>, edulis, suaveolens <i>Onothera dent.</i>, micran. <i>Santivilla procumbens</i> <i>Tetragonolobus biflorus</i> <i>Trigonella</i>, several	YELLOW. <i>Argemone mexicana</i> <i>Astragalus contort.</i>, trim. <i>Duplecium Gerard.</i>, tenu. <i>Galandula stellata</i> <i>Centaurea eriophora</i>, mollissima, sulphurea <i>Chlora perfoliata</i> <i>Cosmos bipinnata</i> <i>Linaria</i>, many <i>Mimulus floribundus</i> <i>Nasemburgia trimerata</i> <i>Platystemon californicus</i> <i>Rosa mediterranea</i>, odorata, Phytoloma <i>Securiga corymbosa</i> <i>Spergularia anthelm.</i> mollis f. <i>Trifolium clypeatum</i>	YELLOW. <i>Anacyclus radiatus</i> <i>Argemone ochroleuca</i> <i>Astragalus bo'le</i>, f'rica. <i>Calandria officin.</i>, fl. pl. <i>Catananche latea</i> <i>Centaurea sic.</i>, sola, suav. <i>Cosmos sulphurea</i> <i>Eschscholzia californica</i>, creca <i>Impatiens Noli me tang.</i> <i>Linaria</i>, many <i>Lodna grandiflora</i>, nitida <i>Mellilotus indica</i>, segetalis <i>Scaphanthus volubilis</i> <i>Sedum tenuif. f.</i>, pect. <i>Tagetes patula</i> <i>Zinnia pauciflora</i>	YELLOW. <i>Argemone Barclayana</i> <i>Bidens grandiflora</i>, heterophylla <i>Centaurea Adami</i> <i>Hibiscus virginicus</i> <i>Lotus Placed</i> <i>Mellilotus italica</i>, meso- stomis, rotundif., lin. <i>Momordica Elaterium</i> <i>Nicotiana paniculata</i>, rutilica <i>Onothera sinuata</i> <i>Rhinanthus major</i> <i>Tagetes erecta</i>, micran. <i>Thapsia tenuifolia</i> <i>Tropis barbata</i> <i>Tropis ulmus minus</i>	YELLOW. <i>Amarantus flav.</i> hybr. <i>Cithraea Oxycantha</i>, tinctiora <i>Cassia spectabilis</i> <i>Clelia orientalis</i> <i>Cephalaria urinalis</i> <i>Centropetrum Chrysd.</i> <i>Helidiotus annuus</i>, mol- lis, ovatus, tubiformis <i>Helichrysum bracteatum</i> <i>Hieracantha arvensis</i>, lanata, laurica <i>Nicotiana Langsdorffii</i> <i>Nigella orientalis</i> <i>Onothera stricta</i> <i>Rudbeckia amplexicaul.</i> <i>Tagetes glandu.</i>, claudes.	
PURPLE. <i>Astragalus pentag.</i>, &c. <i>Heliophila amplexicaulis</i>, crithmifolia, trifida <i>Onothera tenella</i> <i>Sideritis elegans</i> <i>Tetragonolobus conjug.</i> <i>Trifolium pictum</i>, stel- latum var. purp. BLUE. <i>Astragalus oxyglossis</i> <i>Cintonia elegans</i> <i>Fenzlia dianthiflora</i> <i>Kauffussia amelloides</i> <i>Monarda convexa</i> <i>Nolina paradoxa</i>, prost. tenella, grandiflora <i>Wahlenb.</i> elong., pend. VARIEGATED. <i>Gilia tricolor</i> <i>Gilia dissecta</i> <i>Linaria triphylla</i> <i>Lotus corniculatus</i> <i>Nemesia picta</i>, versicolor <i>Folia banatica</i>, tricolor	PURPLE. <i>Amphiprepis aris.</i>, mut. <i>Astragalus cruciatus</i> <i>Baierula Pelecinus</i> <i>Borhania latifolia</i> <i>Clarkia pulchella</i>, eleg. <i>Dracopium peltatum</i> <i>Linaria bipartita</i>, tri- phylla <i>Silene</i>, several <i>Tetragonolobus purpur.</i> BLUE. <i>Anchusa capensis</i> <i>Campidula Broussaietia</i>, hybrida, Leetlingi, and others <i>Gilia capitata</i>, and others <i>Loelia inflata</i>, Kalmii <i>Lupinus microcarpus</i>, pusillus, nanus	PURPLE. <i>Centaurea Crocodilium</i>, moschata, muricata, nitens <i>E'chium macranthum</i>, micranthum <i>Iberis umbellata</i> <i>Leonturus multifidus</i> <i>Malope trifida</i>, grandiflora <i>Zinnia hybrida</i>, tenuif. BLUE. <i>Agrostemma cory. mex.</i> <i>Cephalaria diandra</i> <i>Convolvulus sculcus</i> <i>Dracopium calne-</i> cens, moldavicus <i>Hugelia</i>, four species of <i>Lupinus hirsutus</i> <i>Mellilotus ceruleus</i>	PURPLE. <i>Centaurea calcitrapodes</i> <i>Cristum stellatum</i> <i>Datura fastuosa</i>, <i>Tidula</i> <i>Delphinium Aja. h. purp.</i> <i>Malope maloides</i> <i>Malva altheoides</i> <i>Salpiglossis atropurp.</i> <i>Xeranthemum annuum</i>, insperum BLUE. <i>Dalia aelopurpurea</i> <i>Delphinium Ajacis</i>, consolida <i>Agelochia</i>, several <i>Gerardia purpurea</i> <i>Gilia capitata</i>, and others <i>Linum angustifol.</i>, &c. <i>Nemophila aurita</i> <i>Tradescantia erecta</i>	PURPLE. <i>Asteroccephalus atropur-</i> <i>pureus</i>, var. profler <i>Lathyrus alatus</i>, auricu- latus, cornutus, hirs- utus, spiritus <i>Onothera densiflora</i> <i>Opoponduum graecum</i> <i>Petensia phoenicea</i> BLUE. <i>E'chium violaceum</i> <i>Lathyrus incurvus</i>, rutilius <i>Lupinus angustifolius</i>, lunifolius <i>Nicandra physalides</i>	
GREEN. <i>Anchisa dichotoma</i> <i>Leetlingia hispanica</i>, pandora <i>Polycnemum arvense</i>	VARIEGATED. <i>Cerithe aspera</i>, major <i>Corydalis glauca</i> <i>Erodium serotinum</i> <i>Leptostemon grandiflorus</i> <i>Lupinus discolor</i>, densi- florus, nanus <i>Lupinus variegata</i> <i>Onothera roseo-alba</i> <i>Polygonum elegans</i> <i>Salpiglossis straminea</i> f.	VARIEGATED. <i>Callistemma hortense</i> h. variegatum, c. multip. <i>Convolvulus tricolor</i> <i>Papaver Rhe'ia</i> fl. var. <i>Salpiglossis picta</i>, Barclayana <i>Silene reticulata</i>, anato- mosans <i>Hibiscus Tristemon</i>, africans, vesicularis	GREEN. <i>Blitum capitatum</i>, vir- gatum, petiolare <i>Kochia dasyantha</i> <i>Salsola vermiculata</i>	VARIEGATED. <i>Asteroccephalus atropur-</i> <i>pureus</i> h. variegatus <i>Callipais bicolor</i> <i>Centaurea Cyanus</i> fl. stri. <i>Delphinium Ajacis</i> <i>Lathyrus articulatus</i> <i>Lupinus virgatus</i>, elegans <i>Silene picta</i>	VARIEGATED. <i>Corydalis claviculata</i> <i>Cysticopsis africana</i> <i>Delphinium Consolida</i> fl. pleno <i>Lathyrus odoratus</i>, var. <i>Nolia elegans</i> <i>Papaver somniferum</i> var. pleno <i>Ipomoea purpurea</i> var.
BROWN. <i>Nemes nigricans</i>	BROWN. <i>Rumex vesicarius</i>	BROWN. <i>Silene insipida</i>	BROWN. <i>Silene nocturna</i>	BROWN. <i>Tropaeolum majus</i> h. atrocaeruleum	

HARDY ANNUAL BORDER-FLOWERS.—AUGUST AND SEPTEMBER.

Height from 0 to 1/2 of a ft.	From 1/2 of a foot to 1 foot.	From 1 foot to 1 1/2 feet.	From 1 1/2 foot to 2 feet.	From 2 feet upwards.
RED. <i>Hedysarum caput galli</i> , <i>crus galli</i> <i>Fibris umbellata</i> , <i>taurica</i> <i>Polygonum minus</i> , <i>Pavica</i> WHITE. <i>Arenaria</i> , several <i>Heliotropium europæu</i> . <i>Sedum autumn</i> YELLOW. <i>Alyssum calycinum</i> <i>Anchusa verucosa</i> <i>Astragalus hamensis</i> , <i>uncatus</i> <i>Medicago</i> , many BLUE. <i>Evolvulus finifolius</i> <i>Vicia inconspicua</i> <i>Viola tricolor</i> PURPLE. <i>Crœma cretica</i> <i>Sedum atratum</i> VARIEGATED. <i>Helianthemum guttatum</i> GREEN. <i>Corydalis Inter.</i> , <i>Redow</i> . <i>Kochia scoparia</i> <i>Polycnemum sclerocarp.</i>	RED. <i>Asteroccephalus scules</i> <i>Linanthus dichotomus</i> <i>Matthiola annua</i> red, <i>græca</i> red <i>Gnœthema concinna</i> WHITE. <i>Gypsophila serotina</i> <i>Matthiola annua</i> white, <i>græca</i> white YELLOW. <i>Centaurea veruta</i> <i>Mimulus floribundus</i> <i>Nigella orientalis</i> <i>Picridium tingit.</i> , <i>valg.</i> <i>Platystemon californicus</i> <i>Rochia eschscholides</i> BLUE. <i>Matthiola annua</i> , var. <i>Nolana tenella</i> , <i>paradoxa</i> , <i>grandiflora</i> PURPLE. <i>Matthiola annua</i> , <i>græca</i> , <i>annua</i> , <i>græca</i> , <i>Gnœthema purpurea</i> , &c. VARIEGATED. <i>Salpiglossis picta</i> , <i>Barc.</i> GREEN. <i>Chenopodium Bistrys</i> , <i>radiatum</i> , <i>arbitum</i> <i>Corsipernum squarro.</i>	RED. <i>Bilam virgatum</i> <i>Echium crœcum</i> <i>Salvia Hornumum</i> b. rub. <i>Streptanthus obtusifol.</i> <i>Tetragonolobus purpur.</i> WHITE. <i>Aster annuus</i> <i>Nigella hispanica</i> <i>Gnœthema tetraphera</i> YELLOW. <i>Cladanthus arabicus</i> <i>Tagetes minima</i> , <i>patula</i> <i>Tetragonolobus purpureus</i> <i>fl. lateo</i> <i>Tropæolum majus</i> b. <i>natum</i> BLUE. <i>Commelina communis</i> f. <i>Didicua caruleus</i> <i>Salvia Hornumum</i> var. <i>bract. comul.</i> PURPLE. <i>Echium australe</i> <i>Matthiola annua</i> , <i>purpurea</i> <i>and other var.</i> VARIEGATED. <i>Silene picta</i> , <i>annuata</i> . GREEN. <i>Chenopodium rubrum</i> , <i>chrysom.</i> , <i>lanospermum</i> GREEN. <i>Ambrosia artemisiaefolia</i> . <i>Chenopod. alba</i> , <i>Atrip.</i> <i>Nicotiana glauca</i>	RED. <i>Amarantus caudatus</i> , <i>crœmus</i> <i>Lopside hispid</i> <i>Tropæolum majus</i> a. <i>astroangueum</i> WHITE. <i>Asteroccephalus stellatus</i> <i>Dracocoph. moldav.</i> album <i>Lathyrus sativus</i> b. albus YELLOW. <i>Gallinagoa trilobata</i> <i>Heterocarpum pinmit.</i> <i>Leontodon angustatus</i> , <i>tenerimus</i> <i>Nicotiana cerinthoides</i> BLUE. <i>Dracacoph. caudatus</i> <i>crœmus</i> , <i>moldavicum</i> <i>Nigella sativa</i> , <i>hispanica</i> PURPLE. <i>Gerardia purpurea</i> f. <i>Lathyrus tingitans</i> , <i>purpurea</i> <i>Salpiglossis atropurpurea</i> VARIEGATED. <i>Papaver Rhœo</i> as var. GREEN. <i>Ambrosia elatior</i> , <i>trifida</i> <i>Chenopodium Quisno</i> , <i>gigantum</i>	RED. <i>Amarantus caudatus</i> , <i>a. patulus</i> <i>Gadra triptela</i> <i>Papaver somniferum</i> , a. <i>rubro-pinnum</i> WHITE. <i>Datura stramonium</i> , <i>crœcosedum</i> <i>Xeranthemum annuum</i> YELLOW. <i>Acchyndromene hispid</i> <i>Nolana elegans</i> <i>Nicotiana Langsdorffii</i> <i>Rochia chalcidifolia</i> <i>Tagetes erecta</i> <i>Tropæolum majus</i> BLUE. <i>Datura Tabula</i> <i>Lathyrus sativus</i> <i>Lupinus pilosus</i> PURPLE. <i>Papaver somniferum</i> <i>a. purpureum</i> , <i>fl. pl.</i> <i>purpureum</i> VARIEGATED. <i>Papaver somnifer.</i> var.

5990. *Propagation and culture of hardy annual flowers.* They are all raised from seed, though occasionally some fine varieties of *Cheridanthus*, *Viola*, &c. are preserved by cuttings. The seed is generally sown in March or April, in patches or rings in the borders where the plants are to flower. The ground is previously stirred and made fine; the patch is sown of a circular form of six or eight inches' diameter, or a row only is sown in the circumference of the circle, the seeds covered according to their size, and the plants, when they are an inch high, thinned out to one, three, five, seven, or more, according to their kind. This, and occasionally stirring the soil, with staking, &c. as in perennial flowers, is all the culture they require. Sometimes the whole, or many of the sorts, are sown in the reserve garden, and transplanted where they are finally to remain. This answers well for sorts whose roots abound in fibres, as the sunflower, the *Senecio*, &c.; but is rather precarious with such early-flowering and short-lived sorts as annual stocks, candytuft, *Venus's looking-glass*, &c. A number of the more hardy sorts, such as *Callipalis*, *Gnœthema*, *Clarkia*, &c., flower stronger when sown in autumn where they are finally to remain; and many sorts which are not sufficiently hardy to stand the open air through the winter, may be sown in small pots, preserved in a frame, and turned out in spring. The common candytuft, treated in this manner, becomes a magnificent bush covered with flowers. (See *Gard. Mag.*, vol. vii. p. 570.)

5991. *Seed may be sown either from the top and first-expanded blossoms of plants in the borders, or from patches sown in the reserve garden.* For the sake of neatness and beauty, no more flowers on each plant ought to be allowed to ripen their seeds than are wanted for the supply; but unless for varieties difficult to procure from the seedsmen, the simplest, and indeed the most economical mode, is to procure supplies yearly from them.

5992. *Some very pleasing conceits for arranging annual flowers* are given by Swinton (*Essence of Flow.*, 1778), a Brentford nurseryman. He gives a copious list of annuals, arranged according to their heights and colours; and by affixing a number to each sort, he can readily indicate on his plans the kinds to be employed, and their relative position. Thus he has 80 sorts of common hardy annuals, arranged in six different classes, for six different ranges, in borders as follow:—

First range, which grow from 6 to 12 or 14 inches high.

1. Cape marigold; purple and white. (*Veruculatus*.)
2. Large caterpillar; yellow, and singular pod. (*Scorpiurus*)
3. *Venus's looking-glass*; light purple; (*Antiscorpius* Spc.)
4. *Ran's horns*; yellow; the pod is its beauty.
5. *Venus's nose-wort*; clear white. (*Omphalodes linifolia*.)
6. Round snail; yellow, and singular pod. (*Medicago lœva*?)
7. Dwarf variegated; yellow; crimson and white. (*Silene*)
8. Heartsease; purple and yellow. (*Quinquedentata*.)
9. Half-moons, or moon-trefoil; white, and singular pod.
10. Blue meadow lark; sky-blue.
11. Dwarf virgin's bower; purple. (*terrestris*?)
12. Small hedgehog; yellow, and singular pod. (*Medicago in-*
13. Woodroof; light blue. (*Asperula arvensis*.)
14. Red hawkweed; pale red. (*Boechota rubra*.) (*Picrid*?)
15. Large hedgehog; yellow and singular pod. (*Medicago nu-*

Second range, which grow from 12 to 18 or 20 inches high.

16. Oak of *Jew*; yellowish, with fragrant smell. (*Chen-*
17. Small white candytuft; clear white. (*Chenopodium Bistrys*.)
18. Long-horned devil in a bush; yellow, and singular pod.
19. Convolvulus minor; bright blue with yellow eye.
20. Large purple carnation; light purple. (*Fibris umbellata*.)
21. White Lobel's catchfly; reddish-white. (*Silene Arm. dth.*)
22. Annual marigold; purple and yellow. (*Linaria triphylla*?)
23. Scabier, or wing pea; dark and light red. (*Tetragonolobus*
24. Large white candytuft; clear white. (*purpureus*.)
25. Scabier convolvulus minor; blue and white.
26. Red Lobel's catchfly; bright red. (*Milene Arenaria*.)
27. Dwarf nasturtium; deep orange. (*Tropæolum minus*.)

28. Broad Spanish nigella with brown seed; deep blue.

29. Red fls Adonis; dark red. (*Adonis autumnalis*.)

Third range, which grow from 20 to 24 or 28 inches high.

30. Spanish nigella, with black seed; light blue. (*barbata*.)
31. Spanish hawkweed; pale yellow and purple eye. (*Tolpis*?)
32. White Moldavian balm; deep blue, and fine scent.
33. Annual red-harrow; pale red.
34. Double Roman nigella; white mixed with blue. (*minus*.)
35. Small running nasturtium; dark orange. (*Tropæolum*
36. Nettle-marjoram; yellowish, no smell but to the over-curious.
37. Rocket larkspur; pink and white. (*Delphinium Ajacis* var.)
38. Sweet-scented lupines; bright yellow. (*Lupinus lituus*.)
39. White Moldavian balm; fair white, and fragrant smell.
40. Dutch lupines; fine blue. (*Lupinus hirsutus*.)
41. Annual hare's ear; pale yellow. (*Ruphrum rotundifol.*)
42. Purple Jacobins; purplish-red and yellow eye. (*Senecio eleg.*)
43. Dutch ranunculus-margold; sulphur-colour. (*minus*.)
44. Red-topped clary; pale red, and pink leaves. (*Salvia Hor-*

Fourth range, which grow from 2 to 2 1/2 or 3 feet high.

45. Belvidere; yellowish, a handsome plant. (*Kochia scoparia*.)
46. Small variegated corn-poppy; various, red and white, &c.
47. Double upright larkspur; blue, black, and white.
48. Cyanus minor; blue, crimson, &c. (*Centaurea Cyanus*.)
49. Thorn-apple; white, and singular pod. (*Datura Stramon.*)
50. Prince's leather; dark crimson.
51. Crown-larkspur; pale pink, spotted, &c. (*draculus*.)
52. Honey scabious; pale blue, and globular pod.
53. Portugal larkspur; pale red.
54. Small blue lupines; bright blue. (*Lupinus varius*.)
55. Loves lies a-bleeding; light red. (*Amarantus caudatus*.)
56. Ranunculus margold; deep orange.
57. Honeywort; dark purple, and singular shape. (*Cerinth*
58. Strawberry spinach; bright-red fruit. (*Bilam virg cap.*)

Fifth range, which grow from 3 to 4 feet high.

59. Venetian small-flowered mallow; purplish-white.
60. Double crimson-jagged leaf poppy; dark crimson.
61. Tall narrow-leaf wallflower; bright yellow.
62. Arach; deep crimson. (*Atriplex hortensis rubra*.)
63. Double striped carnation poppy; red and white.
64. Blue sweet trefoil; lead-colour. (*Melilotus cœrulea*.)
65. Red lavatera; light changeable red. (*Lavatera trimestris*.)
66. Branching larkspur; blue and white, &c.
67. Tall white lupines; clear white. (*Lupinus albus*.)
68. Double black carnation poppy; rose-colour.
69. & 70. Small Peruvian nasturtium; dark orange.
71. Lord Anson's pea; fine blue. (*Lathyrus pratensis*.)
72. White lavatera; snow white. (*Lavatera trimestris*.)
73. Dwarf double and quilled white sunflower; deep yellow.
74. Bladder hestmia; pale-sulphur and purple eye, with singular pod. (*Silene Trilobum*.)

Sixth range, which grow from 5 to 7 or 10 feet high.

74. Tall double yellow sunflower, with black seed; deep yellow.
75. Painted lady sweet-scented pea; pale red, and white.
76. Arach; sulphur-coloured. (*Atriplex hortensis*.)
77. Purple sweet-scented pea; dark and light purple. (*entale*.)
78. Indian persicaria; bright crimson. (*Polygonum ori-*
79. Painted lady crown pea; black and white.
80. Convolvulus major; fine purple. (*latum corollâ alba*.)
81. White crown-pea; clear white. (*plum sativum ambe-*
82. Large Indian nasturtium; dark and light orange.
83. Tall double bristone sunflower; sulphur-coloured.
84. White sweet-scented pea; clear white.
85. Plain tanger pea; fine crimson. (*Lathyrus tingitans*.)
86. Tall oriental mallow; purple. (*Lavatera arborea*?)
87. Painted lady tanger pea; pale-red and white.
88. Scarlet beams; fine scarlet. (*Salvia crispâ*.)
89. Curled-leaved upright mallow; white tinged with purple

5993. In borders he sows in six rows, or rather at six different distances from the walk, according to the different ranges, thus:—

74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89
59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	
45	46	47	48	49	50	51	52	53	54	55	56	57	58		
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
16	17	18	19	20	21	22	23	24	25	26	27	28	29		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

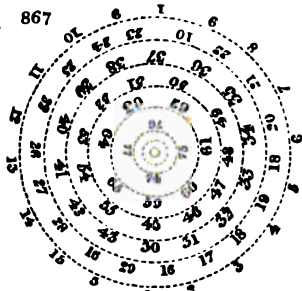
5994. For a circular clump, or cone of flowers, including all the eighty-nine different sorts, he arranges the six heights in six concentric circles (fig. 867.), placing a periwinkle and oriental mallow in the centre. The general appearance (fig.

866



866.), he says, is "the same on every side, rising gradually from the edge upwards, the highest plants meeting nearly in a point at the centre, and no two flowers of the same colour or shape being seen together." (*Essays of Flors*, &c., p. li.) To those who have but a limited space and means, or who have few perennial flowers; to persons in remote situations in the country; to residents in the colonies; and to female and infant gardeners, the above list and modes of arrangement afford a source of considerable show and amusement at a very small expense, and little trouble, and, being annuals, little loss of time. The adoption of botanical names into popular use has rendered some of those of Swinerton's list almost obsolete; we have, therefore, attempted to identify some of them, and would more of them had our space allowed. Since Swinerton's time, a great many new hardy annuals have been introduced into the country; and the following sorts may be substituted for those assigned to the corresponding numbers in the above list; or those, and whatever others might be enumerated, may be added to the kinds of Swinerton's list.

- | | | |
|---|---|--|
| 2 <i>Helianthemum gut-tatum</i> | 22 <i>Lupinus nanus</i> | 39 <i>Petals noctag-ni-flora</i> |
| 3 <i>Oenothera tenella</i> , &c. | 24 <i>Clartia pulchella</i> | 49 <i>Nicotiana perisca</i> , longiflora |
| 4 <i>Echacholitis califor-nica</i> , crocea | 28 <i>Razemaria hybrida</i> | 58 <i>Petals pharicaea</i> |
| 10 <i>Campnula Lövei</i> | 30 <i>Ollia capitata</i> | 59 <i>Lupinus mutabilis</i> |
| 13 <i>Ollia schillerae</i> | 33 <i>Clartia elegans</i> | 61 <i>Nicotiana glauca</i> |
| 18 <i>Callipolis bicolor</i> | 35 <i>Tropaeolum majus</i> var. <i>strosanguineum</i> | 88 <i>Georgina</i> |



SUBJECT. 5. Species and Varieties of Half-hardy Annual Border-Flowers.

5995. HALF-HARDY ANNUAL BORDER-FLOWERS, FLOWERING IN JULY, AUGUST, AND SEPTEMBER.

Height from 0 to $\frac{1}{2}$ ft.	From $\frac{1}{2}$ of a foot to 1 foot.	From 1 foot to $1\frac{1}{2}$ feet.	From $1\frac{1}{2}$ feet to 2 feet.	From 2 feet upwards.
RED. <i>Calandrinia speciosa</i> <i>Gynandropsis candeb.</i> <i>Spermacoce lanceolata</i> , tenuior <i>Verbena Antheia</i> , Lamberti, charandri-folia, pulchella WHITE. <i>Helianthemum noli-tum</i> <i>Heliphila pusilla</i> , pectinata <i>Pharacaceum bellidifolium</i> <i>Spermacoce didina</i> YELLOW. <i>Rhaphium sensitivum</i> <i>Cleome monophylla</i> <i>Glimia tofoides</i> <i>Trangaria bico</i> , madras <i>Heliphila pendula</i> , incana <i>Meenbranthemum semilobum</i> , pilosum, &c. <i>Mimulus moschatus</i> <i>Oxalis microphylla</i> <i>Pedicularis</i> <i>Asteria</i> <i>Spilanthus Acmel.</i> , cler.	RED. <i>Cichla coccinea</i> <i>Dianthus chinensis</i> <i>Lopside hirsuta</i> , racemosa <i>Nicotiana glutinosa</i> <i>Oenothera tenella</i> <i>Rhodanthus Manglesi</i> <i>Stavis pedata</i> , &c. WHITE. <i>Argemone albiflora</i> <i>Plumbago chinensis</i> <i>Cleome aculeata</i> , Houstoni, virgata <i>Meenbranthemum crystallinum</i> , semilobum, fl. alb. YELLOW. <i>Argemone ochroleuca</i> , perisca <i>Chamae proboscidea</i> f. <i>Latus indicus</i> <i>Millieria biflora</i> , quin-quefolia <i>Nycterium rostratum</i> <i>Pectis ciliaris</i> <i>Scrophanthus volubilis</i> <i>Lobelia gracilis</i> <i>L. nana</i> fl. pleno	RED. <i>Callistemma hortense</i> red, red bonnet, red quilled <i>Lopside racemosa</i> <i>Mirabilis Jalapa flore rubro</i> <i>Oenothera tenuifolia</i> , &c. WHITE. <i>Argemone grandiflora</i> <i>Callistemma hortense</i> white and quilled <i>Mirabilis Jalapa</i> fl. alb., longiflora <i>Lobelia alba</i> <i>Mocharia pinnatifida</i> <i>Ocymum</i> , several YELLOW. <i>Bidens heterophylla</i> <i>Calceolaria florib.</i> f., pin. <i>Clusia orientalis</i> <i>Cephalophora glauca</i> <i>Chrysanthemum carina-tum</i> yellow-rayed <i>Onopodium undulatum</i> <i>Helichrysum stridum</i> <i>Nycterium Fontanensis</i> <i>Trigonotis eculenta</i> <i>Zinnia pauciflora</i> BLUE. <i>Agrostis mexicana</i> <i>Callistemma hortense</i> blue and blue quilled <i>Sphaeranthus africanus</i> f. <i>Ficus (arabidensis)</i> <i>Tradescantia erecta</i>	RED. <i>Balsamina coccinea</i> , hortensis <i>Cleome cardinalis</i> <i>Zinnia elegans</i> a. coccinea, multiflora, revoluta, verticillata, hybrida WHITE. <i>Cleome heptophylla</i> <i>Datura caracalorum</i> <i>Ipomoea Quam.</i> cor. al. <i>Senecio dieg.</i> fl. al. and pl. <i>Trichosanthes anguina</i> <i>Zinnia dieg.</i> white-rayed <i>Xanthemum annuum</i> , white-rayed YELLOW. <i>Galinsoga parviflora</i> , trilobata <i>Hummelshia fumaris-folia</i> <i>Lobelia grandiflora</i> <i>Antida</i> , Placed <i>Nicotiana paniculata</i> <i>Tagetes erecta</i> , & fl. erecte, r. aurantiis, tenuiflora BLUE. <i>Evolvulus linifolius</i> <i>Malesherbia cernua</i> <i>Nemophila phaceloides</i> <i>Nycterium heterodoxum</i> <i>Tournefortia heliotropioides</i>	RED. <i>Ipomoea coccinea</i> , pur-purea fl. carnea <i>Milva minima</i> <i>Nicotiana macrophylla</i> , Tobaccum, and others <i>Xanthemum annuum</i> WHITE. <i>Chrysanthemum coran-rium</i> corolla alba <i>Cleome poligama</i> <i>Dianthus racemosa</i> <i>Nicotiana longiflora</i> , perisca <i>Petals syrtaginiflora</i> <i>Polygnum orient. alb.</i> YELLOW. <i>Chrysanthemum coran-rium</i> <i>Cleome arabica</i> <i>Helianthus indicus</i> tuberosus <i>Helichrysum bracteatum</i> <i>Nicotiana Langsdorfi</i> <i>Rudbeckia amplexicaulis</i> <i>Tagetes corymbosa</i> <i>Troxanthum pergrinum</i> <i>Wedelia perfoliata</i> <i>Ximenesia encoloides</i> BLUE. <i>Ipomoea purpurea</i> fl. cerulea <i>Lupinus mutabilis</i> , mutabilis var. <i>Crucianum pergrinum</i> <i>Malesherbia coronata</i>

SURSECT. 4. Flowers for ornamenting Pieces of Water, or planting Aquariums.

6002. *Flowers for water or watery-places* are of two kinds; *aquatics*, to plant in the water, and *marsh plants*, to plant round the margin of the pond, stream, or aquarium. The shape and size of the aquarium (fig. 868.) must depend on the extent and style of the flower-garden of which it forms a part. In all



cases the bottom, if not naturally retentive, must be rendered so by a stratum of tempered (or puddled) clay (a); the side should be formed in terraces, or steps descending towards the centre (b), to hold pots of plants which grow in shallow water, while those that require deep water, as the bulrush, typha, &c., may be planted in the ground, or in large tubs placed in deep water. The margin of the aquarium may either be finished with regular masonry or brickwork; or, what, in some situations, has a better effect, with rough stones, conglomerated vitrified bricks, or flints (c), in the interstices of which marsh plants will thrive exceedingly. The whole may be surrounded by a drain and gravel-walk (d), raised a few inches above the level of the water. Many of the aquatic plants, as *Nymphaea*, *Nuphar*, *Menyanthes*, *Villarsia*, *Bistorta*, *Hottentia*, &c., are highly beautiful; and, considering that some exotic species, as *Amaryllis*, *Lobelia*, *Crimm*, &c. (5923.), will thrive in water in our climate, the aquarium ought not to be wanting in any flower-garden. (See a section of an aquarium in *Gard. Mag.* vol. viii. p. 84. vol. x. p. 326., and a figure in the latter place of a very useful hook for suspending pots of aquatic plants in water.)

6003. *Propagation and culture.* They are propagated by seeds or dividing the root: the seeds being sown and placed under the water. In other respects they require the same general treatment as other herbaceous plants. Some useful remarks on the treatment of the more rare *nymphæas* and *nuphars*, by Kent, will be found in the *Horticultural Transactions*, vol. iii. p. 24. (See also Mr. Mallet's remarks on the subject of aquariums, and the culture of the plants contained in them, in *Gard. Mag.* vol. viii. p. 84.)

6004.

AQUATIC PLANTS WITH SHOWY FLOWERS.

MAY.	JUNE.	JULY.	AUGUST.
RED. <i>Equisetum fluviatile</i> <i>Hydrocotyle vulgaris</i>	RED. <i>Bistorta umbellatus</i> <i>Equisetum palustre</i> <i>Nyctophyllum spicatum</i>	RED. <i>Hippuris vulgaris</i> <i>Hottentia palustris</i> <i>Polygonum amphibium</i> , albid. <i>Veronica Anagallis</i> cord. rrb.	RED. <i>Alisma hexandra</i> <i>Hydropeltis purpurea</i> <i>Polygonum Hydropper</i>
WHITE. <i>Aponogeton distachyon</i> <i>Calla palustris</i> <i>Nasturtium officinale</i> <i>Ranunculus aquatilis</i> , fluviatilis <i>Richardia eriodaphna</i> f. <i>Oreocetes aquaticum</i>	WHITE. <i>Actinocarpus Damaeolium</i> <i>Calla</i> : <i>lutea</i> <i>Hydrocharis morsus ranae</i> <i>Nymphaea</i> : <i>alba</i> , odorata <i>Phellandrium aquaticum</i> <i>Ranunculus aederacosus</i> , fluviatilis <i>Stratiotes aloides</i> <i>Veronica scutellata</i> <i>Villarsia indica</i> , laciniosa	WHITE. <i>Alisma natans</i> , Plantago <i>Calluna palustre</i> , uliginosum <i>Hottentia palustris</i> cordata <i>alba</i> <i>Menyanthes trifoliata</i> , & <i>amarica</i> <i>Nymphaea</i> : <i>stictica</i> , minor, odorata <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i> , latifolia, & <i>flore pleno</i> <i>Stratiotes aloides</i>	WHITE. <i>Cicuta viridis</i> , bulbifera <i>Silene Hydropper</i> <i>Nymphaea</i> : <i>pygmaea</i> , <i>alba</i> , <i>nitida</i> <i>Phellandrium aquaticum</i> <i>Poa aquatica</i> <i>Sparganium angustifolium</i>
YELLOW. <i>Calla flabellifolia</i> , minor, palustris and pleno, radicans <i>Lymnchea thyrsiflora</i> , vulgaris	YELLOW. <i>Calla flabellifolia</i> , perennans <i>Nasturtium amphibium</i> , natans, elvacea <i>Ranunculus Lingua</i> , & <i>f. ple.</i> <i>Rumex aquaticus</i> <i>Utricularia media</i> , vulgaris <i>Villarsia cordata</i>	YELLOW. <i>Lys Perodacorus</i> , & <i>pallidiflora</i> <i>Jussiaea</i> <i>Nuphar advena</i> , <i>Kalmiana</i> , <i>lutea</i> , <i>pumila</i> , <i>sagittifolia</i> <i>Utricularia minor</i> <i>Villarsia nymphaeoides</i>	YELLOW. <i>Nuphar Kalmiana</i> , <i>pumila</i> , <i>sagittifolia</i> <i>Potamogeton natans</i> <i>Sperganium simplex</i> , <i>ramosum</i> , <i>natans</i> <i>Zizania aquatica</i>
BLUE. <i>Myosotis palustris</i> , cespitosa <i>Veronica Beccabunga</i>	BLUE. <i>Pontederia cordata</i> f., angustifolia f. <i>Veronica Anagallis</i>	BLUE. <i>Pontederia angustifolia</i> f. <i>Veronica Anagallis</i>	BLUE. <i>Lobelia Dortmanna</i>
PURPLE. <i>Peplo Pörtula</i>	PURPLE. <i>Alisma lanceolata</i> , Plantago	PURPLE. <i>Trapa natans</i>	PURPLE. <i>Alisma ranunculoides</i> , repens <i>Peplo Pörtula</i>
GREEN. <i>Triglochin maritimum</i> , palustre	GREEN. <i>Acorus Calamus</i> <i>Nyctophyllum verticillatum</i> <i>Potamogeton distans</i>	GREEN. <i>Ceratophyllum demersum</i> , submersum	GREEN.
BROWN. <i>Scheuchzeria palustris</i> <i>Potamogeton lucens</i>	BROWN. <i>Potamogeton luteus</i> , pect., lance. <i>Scirpus maritimus</i> , &c.	BROWN. <i>Potamogeton fluitans</i> , <i>natans</i> , <i>perfoliatum</i>	BROWN. <i>Scirpus fluitans</i> , <i>lacustris</i> , <i>triquet.</i> <i>Zypha latifolia</i> , <i>angustifolia</i>

6005. *Marsh plants.* Some of these have been given as border-flowers, and will grow in almost any situation; but others, as the *Acorus*, *Cómarum*, *Littorélla*, &c., will not grow vigorously and flower, unless their roots are in soil constantly saturated with water.

6006.

MARSH PLANTS WITH SHOWY FLOWERS. — MAY AND JUNE.

Height from 0 to 1/2 of a ft. From 1/2 of a foot to 1 foot.	From 1 foot to 1 1/2 feet.	From 1 1/2 feet to 2 feet.	From 2 feet upwards.
RED. <i>Pinguicula lusitanica</i> <i>Polygonum viviparum</i> <i>Primula farinosa</i>	RED. <i>Pedicularis incarnata</i> <i>Polygonum bistorta</i>	RED. <i>Lychnis Flœ-cucull.</i> , fl. pl. <i>Pedicularis atrorubens</i> <i>Polygonum mite</i>	RED. <i>Cómarum palustre</i>
WHITE. <i>Cordamine amara</i> , hirsuta <i>Pinguicula alpina</i> <i>Primula farinosa</i> white	WHITE. <i>Aldrovanda vesiculosa</i> <i>Cordamine granules</i> <i>Tofieldia pubea</i> <i>Saxifraga irrigua</i>	WHITE. <i>Oenanthe globifera</i> , perucedanifolia	WHITE. <i>Oenanthe fistulosa</i> , <i>pimpinellifolia</i>
			WHITE. <i>Epilobium angustifolium</i> , <i>hirsutum</i> <i>Lithrum Salicaria</i> <i>Scrophularia aquatica</i>

MARSH PLANTS WITH SHOWY FLOWERS.—MAY AND JUNE.—continued.

Height from 0 to 1/2 of a ft.	From 1/2 of a foot to 1 foot.	From 1 foot to 1 1/2 feet.	From 1 1/2 feet to 2 feet.	From 2 feet upwards.
YELLOW. <i>Chrysanthemum alternifolium</i> , oppositifolium <i>Pinguicula edent.</i> , lutea <i>Ranunculus repens</i> fl. pl. PURPLE. <i>Pedicularis recutita</i> BLUE. <i>Pinguicula grand.</i> , vulg. GREEN. <i>Carex dioica</i> , pauc. panic. <i>Tofieldia palustris</i> BROWN. <i>Carex dioica</i> <i>Scheuchzeria palustris</i>	YELLOW. <i>Pedicularis myriophylla</i> <i>Ranunculus Flammula</i> PURPLE. <i>Cardamine pratensis</i> , fl. pl. <i>Pedicularis resupinata</i> BLUE. GREEN. <i>Carex acris</i> , dista., pauc. <i>Tofieldia alpina</i> BROWN. <i>Carex digitata</i> <i>Scheuchzeria nigricans</i>	YELLOW. <i>Ranunculus Lingua</i> , fl. pl. <i>Lysimachia Nummularia</i> <i>Ranunculus luteus</i> and others PURPLE. <i>Comarum palustre</i> BLUE. GREEN. <i>Carex elongata</i> , muric., pauc. <i>Pseudo-Cyperus</i> BROWN. <i>Carex acuta</i> , paludosa, riparia	YELLOW. <i>Lysimachia</i> , & pallido-flava PURPLE. <i>Pedicularis palustris</i> BLUE. GREEN. <i>Carex pectinata</i> , vulpina, <i>Cyperus longus</i> , vagans BROWN. <i>Carex intermedia</i> , ovalis, vesicaria	YELLOW. <i>Lysimachia vulgaris</i> <i>Senecio paludosa</i> , aquatica PURPLE. BLUE. GREEN. <i>Carex pectinata</i> BROWN. <i>Juncus compressus</i> , effusus, glaucus
JULY AND AUGUST.				
RED. <i>Anagallis tenella</i> <i>Epithyme hexandra</i> <i>Tuberium Scordium</i> WHITE. <i>Corrigiola littoralis</i> <i>Dracopis ang.</i> , long., rot. <i>Epithyme Hydropiper</i> <i>Littorale lactaria</i> <i>Parnassia</i> , par. YELLOW. <i>Narthecium ossifragum</i> <i>Pedicularis canadensis</i> BLUE. PURPLE. <i>Tuberium Scordium</i> VARIEGATED. <i>Scutellaria minor</i> GREEN. <i>Triglochin maritima</i> , &c. BROWN. <i>Eleocharis acicularis</i> , &c. <i>Scheuchzeria compressa</i>	RED. <i>Pedicularis glycyflora</i> , rostrata <i>Polygonum Persicaria</i> WHITE. <i>Gallium palustre</i> , uliginosum <i>Pedicularis palustris</i> <i>Stimulus Valerandi</i> YELLOW. <i>Pedicularis tuberosa</i> , vertic. <i>Rubus idaeus</i> <i>Ranunculus maritimus</i> BLUE. <i>Sedum portensis</i> PURPLE. <i>Pedicularis sylvatica</i> VARIEGATED. <i>Pedicularis flammea</i> <i>Mimulus Smithii</i> , Youngii GREEN. <i>Saururus cernuus</i> , chinensis, luteus BROWN. <i>Juncus squarrosus</i> <i>Scheuchzeria nigricans</i>	RED. <i>Oxydocus palustris</i> , macrocarpus, & fol. varieg. WHITE. <i>Cerastium aquaticum</i> YELLOW. <i>Cladium Mariscus</i> <i>Hypericum quadrangulum</i> <i>Ranunculus palustris</i> BLUE. <i>Scutellaria palustris</i> PURPLE. <i>Aster Triphibium</i> VARIEGATED. <i>Pedicularis versicolor</i> GREEN. <i>Triglochin Dicksonii</i> , pal. BROWN. <i>Juncus maritimus</i> , sylvaticus <i>Scheuchzeria nigricans</i>	RED. <i>Mimulus alpinus</i> , rugosus <i>Justicia pedunculata</i> WHITE. <i>Cineraria gigantea</i> <i>Sedum palustre</i> YELLOW. <i>Acorus Calamus</i> <i>Cineraria palustris</i> <i>Silene alba</i> , speciosa BLUE. <i>Lobelia sylvatica</i> PURPLE. <i>Pedicularis palustris</i> VARIEGATED. <i>Stachys palustris</i> GREEN. <i>Juncus effusus</i> BROWN. <i>Ranunculus acris</i> , crispus <i>Scirpus Holcchii</i> , romæ.	RED. <i>Lobelia cardinalis</i> , spicata, fligens WHITE. YELLOW. <i>Pedicularis Scdp. Carol.</i> <i>Senecio speciosus</i> <i>Senecio palustris</i> <i>Thalictrum flavum</i> BLUE. PURPLE. <i>Lobelia speciosa</i> VARIEGATED. GREEN. <i>Ranunculus Hydrolyssum</i> BROWN. <i>Cyperus longus</i> <i>Typha latifolia</i> , angustifolia

6007. *Propagation and culture.* The same as for herbaceous plants, taking into consideration the difference in the soil and site. The following ingenious mode of cultivating most species, on a small scale, is extracted from an article on the subject by Mr. Jewitt in the *Floricultural Cabinet*, vol. i. p. 36. A stone trough of six inches to a foot deep, and of any convenient length and breadth, and with a hole for a tap at one corner, is treated as if it were a flower-pot, the bottom being covered with small stones, and the trough filled up with a compost of peat and light loam. The top is then mulched with any de-

scription of living moss that can be got. The top being closed, the mould is watered, till it is saturated to the brim. Planting may be performed in March or April, or whenever the plants can be obtained from their native stems. Those tried by Mr. Jewitt were the following:—*Pinguicula*, *Narthecium ossifragum*, *Oxydocus vulgaris* and *macrocarpus*, *Hyssopus alpinus*, *Dracopis rotundifolia*, *Parnassia palustris*, and *Orchis* several species.

SUBJECT. 5. Flowers for ornamenting Rocks, or Aggregations of Stones, Flints, Scoria, formed in imitation of Rocky Surfaces, &c.

6008. In strict propriety, *mountain, or rock plants* only should be introduced on artificial rockwork: but natural mountains and rocks are always moist and cool, and the plants which have their habitations there would not always thrive on dry ridges of earth and stones. On a small scale, therefore, choice is generally made of such plants as are not tall and rampant, and as grow naturally in a dry soil. In the following list, as in the others, the most ornamental of them are distinguished by a letter (s), and those which flower the greater part of the summer by a figure (5), &c.

Perennials. *Aschillea Cliviana* 3; *temperata* 5; *Ajuga alpina*, pyramidalis 3; *Achillea alpina*, pentaphylla 3; *Ajuga montana*, murice, saxatile; *Asterne pratensis*, apemina, baldensis, *Pulsatilla* 3; *Aconitum montanum*, *Aschillea alpina*, *A. fabris alpina* 3, *bellidifolia* 3, *albida*, *petraea* 3; *Arenaria montana* 3, saxatilis 3; *Arenaria montana* 3, *Arenaria repens*; *Astragalus campyloptus*, hypoglottis, *Fraxinella uranensis* 3; *Aureboria deltoidea*, purpurea, *Bartsia alpina* 3; *Betonica Anopetrum*, *Briza alpina*; *Campanula parviflora* 3, *camilla*, *collina* 3, *pallida*, *pumila*, and *h. alba* 3, *rotundifolia*, *saxatilis* 3; *Cardamine saxatilis* 3; *Cerastium latifolium*, *alpinum*; *Cherieria sedifolia*, *Chrysanthemum stratum*, *Chocleria saxatilis*. *Dianthus collinus*, *Asperifolius*, *plumarius*, *virginicus*; *Draba aizoides*, *azona*, *ciliaris*, *cuspidata*, *stellata*,

tomentosa; *Epilobium alpinum*, *Epilobium alpinum* 3, *Arythmum helveticum* 3, *Cerastium lanceolatum*; *Geranium coccineum*, *radiatum*; *Hedysarum obacrum*, *Helichrysum areolatum* 3, *Hypericum pilchrum* 3, *Illecebrum Parnassia* 3, *Linaris alpina* 3, *Petrocallia pyrenaica*; *Potentilla nepalensis*, *Ranunculus repens*, *Rubus arcticus* 3, *Chamaemorus* 3, *saxatilis* 3; *Saxifraga aizoides*, *nivalis*, *oppositifolia*, *petraea*, *ajugifolia*, *densa*, *retusa*, *elongata*; *Schizoclelea cordata*; *Sedum anglicum*, *Forsterianum*, *glacicum*, *hybridum*, *repens*, *seaxangulare*, *villanum*; *Silene alpestris*, *laccra*, *repens*, *saxatilis*, *Saxifraga cernua*, *Telephium Imperati*, *Tuberium montanum*, *Thlaspi alpestre*, *Thymus vulgaris*; *Trifolium alpestre*, *montanum*, *uniflorum*, *alpinum*; *Valeriana dioica*, *montana*; *Veronica saxatilis*, *taurica*;

Viola grandiflora, *lutea*, *pubescens*, *speciosa*.
Biennials. *Allium sibiricum*, *Fritillaria pyrenaica*, *Oenothera pyrenaica*; *Oxalis Acetosella*, *violacea* 3; *Bismilla*. *Adiantum edentata* 3, *Editha*, *pyrenaica*; *Campanula Cervicaria* 3, *thyridifolia* 3, *pergrina*; *Carula vulgaris*, *Cheranthus Cheri*, *Mastichis*; *Cochlearia anglica*, *densa*, *Pedicularis macrodonum*, *violacea*, *vulgare*; *Hedysarum coronarium*, *pilatum*; *Marrubium alpinum*, *Trichium montanum* 3; *Verbena Lamberti*.
Hardy annuals. *Alyssum calcitrum* 3, *lividum*; *Carpodina drabaefolia*, *Cypripedium*, *Poa Tridactylus*, *Epidium montanum*, *Linaris prostrata*, *Picris*, *unguiculatum*, *rupestris*, *silene*; *Silene alba*, *rubra*; *Trifolium montanum*; *Viola hederifolia*, *lutea*, *tricolor*; *Iberis Tenoreana*.

6009. The ground-plan and figure of the elevation of the rock-work must, as in the case of the aquarium, be made to harmonize with surrounding objects. Simple outlines and surfaces, not too much broken, show the plants to most advantage, and

are not so liable to ridicule as imitations of hills or mountains, or high narrow cones, or peaks of scoria in the Chinese manner, which are to be seen in some places. A ground-plan, in the form of a crescent, or of any wavy figure would towards the

middle part of its length, and with the surface not steeper than 45°, will be found well suited to the less durable materials, such as bricks, puddingstone, scoria, &c., which are found in flat countries. Sometimes one side of such rockworks may be nearly perpendicular, in which case, if facing the north, it affords an excellent situation for ferns and mosses.

6010. In countries abounding with stone, many and extensive pieces of rockwork may be formed, and shrubs introduced as well as plants, so as to produce a scene of considerable beauty and interest. Its base, and such parts as are near the eye, may be formed of masses of granite or basalt; selecting such for the

shady side as already covered with mosses and lichens, especially the Lichen *strobilifera*, *geographica*, *ventosus*, *stellaria*, &c. These vegetables will not grow on sandstone, and but seldom on limestone; therefore, stones of these earths should be kept as much as possible in the more distant parts, where they will be partially covered with shrubs and plants, rooted in proper soil introduced in the cracks. When works of this kind are finished, a steepling walk can then be led over them, and well, small streams of water introduced in some places for mountain plants, bog plants and aquatic, and for keeping the whole mass moist, and cool.

SUBJECT. 6. *Evergreen-leaved Plants, or such as are adapted for preserving an Appearance of Vegetation on Beds and Borders during the Winter Months.*

6011. A due proportion of *evergreen-leaved plants* is very necessary for enlivening borders in the winter time, and more especially in dug compartments on a surface of turf, which, without some evergreen plants, look dreary by contrast with the verdant surface.

Perennials. *Achillea Millefolium*, fl. rubro; *Alchemilla alpina*, pentactylla, vulgaris, pubescens; *Anthem. nobilis*, n. fl. pleno; *Bellis perennis hortensis*, var. variegata, alba, fistulosa, and proflera; *Campanula pizilla* 3; *Dianthus atrorubens*, barbatus, hortensis, fragrans, caesus, pinnatus; *Gentiana acaulis* 3, verna 3; *Antennaria dioica* 3; *Lynchn. Flos-cuculi*, var. fl. pl. and fl. albo; *Melissa officinalis*, *Primula acaulis*, *Auricula*, veris, elatior, var. polyantha, and flore pleno; *Saxi-*

fraga cespitosa, cordifolia, crassifolia, cuneifolia, geraniifolia, Geum, Aynoides, mutata, nivalis, oppositifolia, petraea, umbrina; Scuticæ scoparia, Armeria vulgaris fl. alba, Stipa pennata; Teuchium Chamaedrys, montanum; Thymus montanus s, Serpyllum s, citriodorus, vulgaris, Zygis s; Veronica hybrida; Viola grandiflora s, g. fl. luteo s, g. fl. maculato s, odorata car. s, var. fl. car. pleno s, fl. albo s, fl. albo pleno s, and fl. purp. s; Anchusa sempervirens, Sin-

seviens cārnea; *Lychnis Viscaria*, var. fl. pl. and fl. albo; *Vinca major*, minor. *Subs.* *Allium nutans*, *sedens*; *Lilium candidum*, *Eranthis hyemalis*, *Stembridgea lutea*. *Biennials.* *A. groenlandicum*, *coronarium*, c. fl. albo, c. fl. pleno rub.; *Anchusa italica*, paniculata 3; *Dianthus Armeria* 3, ferrugineus 3, pubescens 3 3; *Hesperis matronalis*, *Iberis amfollia* 3, *Lavatera arborea*, *Milene viscosa*, and many species of various genera.

SUBJECT. 7. Flowers for Edgings to Beds or Borders.

6012. *The principal plants for edgings*, next to the dwarf-box, are the *Arméria vulgaris*, *Bélla perénis*, *Gentiana acutilla*, *Saxifraga umbrosa*, *oppositifolia*, *Aynoides*, *Festica ovina*, and other low-growing evergreens; but all the following sorts may be used in extensive gardens requiring various edgings of flowers. The common and other herbs make very beautiful edgings in parterres of peat soil.

Perennials. *Achillea Millefolium*, var. fl. rubro; *Alchemilla alpina*, hybrida, vulgaris, and pubescens; *Anthemis nobilis*, var. fl. pleno; *Bellis perennis hortensis*, var. variegata, alba, flutabosa, and prolifera; *Campanula pumila* 5 c; *Dianthus barbatus*, b. strabusens, hortensis; *Festuca glauca*, *Gentiana scabra* 3; *Helichrysum amarum* 3, *Lychnis Flos-cuculi*, var. fl. ple., and fl. albo; *Viscaria*, var. fl. pleno, and fl. albo; *Meconopsis cambrica*, *Meissa officinalis*, *Melissa thymophyllum*; *Omphalodes*

vérna, *Primula acaulis*, *Auricula*, vérís, var. *elabor*, *polyanthos*, and *fló. pléno*; *Senecio* *var. cármes*, *Saxifraga cespitosa*, *cuneifolia*, *geranioides*, *Géum*, *Apyrbides*, *mutata*, *nivális*, *oppositifolia*, *cordifolia*, *umbrosa*; *Silene acaulis* 3; *Státice Armeria*, var. *fló. albo*; *Stipa pennata*; *Tucrium Chamædry*, *montanum*; *Thymus montanus* 3, *Serpillum* 3, *citriodorus*, *vulgaris*, *Zygis* 3; *Verónica hybrida*; *Viola calcarata*, *grandiflora* 3, var. *fló. lítéo* 3, *odorata* *corr.* 3, *fló. corr. pléno* 3, *fló.*

álbo 3, fls. álbo pleno 3, and fls. pl. purp. 3; *Viola minor*.

Massad. *Biza máxima*, *Calendula officinalis* fls. pleno, *Matthiola annua* rub., *Malcolmia maritima*, and fl. álbo; *Delphinium Ajacis*, *Dianthus chinensis* 3; *Iberis amara*, *odorata*, *umbellata*, var. *purpurea*, and *rubra*; *Nesodea odorata*; *Silene Armeria* and var. fl. álbo, *rubella*; *Viola tricolor*, and varieties.

Sarab. *Andromeda polifolia*, *axillaris*; *Hedera Helix*, *Polygala Chamæbuxus*.

SUBJECT. 8. *Highly odoriferous Flowers.*

6013. *Flowers with sweet smells* are no less desirable than those with fine forms or colours. So little has hitherto been done in the nomenclature and classification of vegetable odours, whether fixed or volatile, that we can hardly submit any thing satisfactory on the subject. No small part, however, of the pleasure derived from flowers depends on their odours; and that these are very different, every one must have remarked who has walked in a wood or a garden after a warm shower, or in a dewy summer's evening. Perhaps the best mode to arrange the odours of plants, in our present imperfect state of knowledge on the subject, would be to fix on some generally known smells, as those of the rose, lily, thyme, &c., and to group the others under these in the way of natural orders; and thus we should have Rosodoreæ, Liliodoreæ, Thymodoreæ, &c.; but in default of some such, or any, system, we shall here bring together a few names under commonly received distinctions.

The entire plant aromatic. Acorus Calamus, Agrimonia Eupatoria, Aloysia citriodora, Coleus aromaticus, Eymopus officinalis, Salvia numerous species, Tagetes lucida, Thymus vulgaris. The flower honey-scented. Certinthe minor, Hottotia palustris, Iris persica, Lilium candidum; Symphytum officinale, &c. Elder everywhere.

The flower aromatic and honey-smelling.
Artemisia Abrotanum, Balsamita vulgaris, Asteroccephalus atropurpureus
Liliaceous smells. *Convallaria majalis,*
Hyacinthus orientalis, Narcissus various species, *Roseda odorata, Viola odorata.*

Sweet aromatic smells. *Calendula officinalis*, *Cheiranthus Chetri*, *Melissa officinalis*, *Monarda didyma*, *Ocimum basilicum*, *Thymus citriodorus*; *Nertha citrata*, *sinerita*.

The flower smelling like hay. Anthoxanthum odoratum, Asperula odorata, taurina; Galium boreale, Heliotropium indicum, Stellaria - graminifera, Tussil.

lago fragrans, *Melilotus officinalis*
Anthriscus officinalis, *Anethum graveolens*, *Angelica archangelica*, *Myrrhis odorata*,
Primula veris, *Galium aparine*, *Scandellus*, *Doronicum caucasicum*, the rootstock.
Stemulatus officinalis, *Achillea ptarmica*,
Alpinia, *Dictamnus Fraxinella*.

Poisonous smells. *A'tropa Belladonna*, *Hæmulus Læpulus*, *Nicotiana Tabacum*.
Night-smelling flowers. *Cheranthus Cheiri*, *Matthiola annua*, *tristis*; *Crucianilla molluginoides*, *Hesperis matronalis*, *Rosella odorata*, *Clematis Flammula*.

Volatile smells which perfume the surrounding atmosphere. *Cheiranthus Cheiri*; *Hesperis matronalis*, *tristis*; *Lilium candidum*. *Rosa odorata*.

Fetid smells. *Allium* various species, *Anthrémis Côtula*, *Astrántia major*, *Cimicifuga foetida*, *Pérula Amala-*
tida, *Helléborus foetidus*, *Scrophula-*
ria aquática.

SUBSECT. 9. *Other Selections of Flowers.*

6014. *Other selections* will readily occur to the florist who is conversant with the ample store of plants at his command, doubtless, flowers, which continue in bloom the greater part of the year, flowers of great soils, &c., all which he may select from the indications in the tables already given. He may also select, according to the Linnean or natural orders, by referring to our *Horæus Bredianicus*, in which the genera are so arranged; or according to the native habitation, native country, year of introduction, or parity, which circumstances he will also find noted in the above catalogue.

SUBJECT. 10. *Botanical and other Assemblages of Plants. — Dial-Plants, Parasites, Ferns and Mosses, Alpines, and a Selection for a small Garden.*

6015. *Botanical collections*, as well as cabinets of shells and minerals, have been in vogue by the curious since Solomon's time. In many private families there is a taste for scientific botany; in which case all the hardy plants of the vegetable kingdom, as far as they are introduced into this country, are arranged in their order according to some system; and either in narrow beds, in which one species follows another; or in groups, on lawn or gravel, in which the species most nearly allied according to the system adopted are placed together, each group containing an order (*Ag.* 830.), and all the orders of a class forming a *subgroup*. Sometimes the groups, connected at one point with the principal axis, are arranged in a line, as follows. Sometimes the plants, instead of being adopted in all the plants that can be considered as ornamental are assembled in beds or borders, and all those that are merely curious, as the ferns, mosses, fungi

Bismia. *Acynon alpinus*, grandiflorus, passivus, Echinos, axillaris; *Campanula sibirica*, virgata; *Delphinium* *aconitifolium*, *Dianthus Armeria*, aggregatus; *Digitalis orientalis*, lanata, serrata; *Erigeron*; *Lepidium* *drum*, *Linum strictum*, *Monarda punctata*, *Phytolacca canadensis*, *Ranunculus repens*; *Asperula* *laetifolia*; *Sorbaria racemosa*, *Tetradlea campanulata*, *Thlaspi*

montanum, *Tragopogon crocifolius*, *Trichostema lachryans*.
Hardy annuals. *Arcobola florida*, virgata; *Bellis annua*, *Biscutella coronopifolia*; *Campanula* *serena*, *Sibbaldia* *maritima*; *Claytonia perfoliata* 33, *Erodium graminum*, *Gypsophila muralis*, *Helianthemum guttatum* & *Lycnia corymbosa*; *Malcolmia maritima*, m. flore albo; *Gnaphals*

rhoeo-alba, tenuiflora, viminalis, tridens, *Lindleyana*, quinqueridnera, *Romanzovia*, densata; *Silene* *Aetion*, *rubella*, *reticulata*, *picta*, *muscupula*, *vespertina*, *colorata*, *colica*; *Trigonella platycarpus*, *Viola tricolor*, *Viola tri-mac*, *maria*, *Viola tri-mac*, minor; *Sedum stellatum*, *Cepha*, *annuum*, *caeruleum*, *Myosotis minima*, *Gypsophila muralis*.

6022. *A collection of flowers for a small garden.* Having given a selection of the most rare plants, and such as in a state of cultivation are the most difficult to preserve; we shall conclude with a list of *flowers*, the most common, *hardy*, and *showy*, which flower great part of the year, will thrive in almost any soil and situation, and are recommended as fit for the commonest description of flower-borders, shrubberies, or parterres.

Flowering from February to May.

Red. *Anemone hortensis*, *Aurantiaca deltoidea*, *Bellis perennis*, *Corydalis bellidifolia*, *Erinus alpinus*, *Erythronium dens canis*; *Fritillaria imperialis*, *meleagris*; *Hepatica triloba*, *Hyacinthus orientalis*, *Orobancha verus*; *Phlox subulata*, *serotina*; *Primula vulgaris*, *villosa*, *grandiflora*, *farcinosa*; *Cardamine pratensis*.
Blue. *Anemone pulsatilla*, *spennina*; *Orobancha verus*, *Hepatica triloba*, *iris*

pinnata; *Muscari botryoides*, *comosum*; *Omphalodes verna*, *Primula marginata*; *Pulmonaria dahurica*, *virginica*; *Scilla precox*, *bifolia*, *verna*.
Yellow. *Adonis vernalis*, *Ajacium murale*, *saxatile*; *Orobancha verus*, *sulcatus*; *Erythronium lanceolatum*, *Fritillaria imperialis*, *Erantalis*, *hyemalis*; *Narcissus incomparabilis*, *minor*, *Bulbocodium*, *triandrus*, *Jon-*

quilla, *Pseudo-Narcissus*, *Mecon*, *Tussilago*; *Primula vulgaris*, *veris*.
White. *Anemone nemorosa*, *Hepatica triloba* fl. albo, *A'rabis alpina*, *Bellis perennis* alb. *Cardamine maritima*, *Orobancha biflora*; *Erythronium longifolium* albo, *Galanthus nivalis*, *Helianthus alger*, *Leucophaea verna*, *Mitella diphylla*; *Primula nivalis*, *vulgaris* alb.; *Manduculus amplexicaulis*, *Sanguinaria canadensis*, *Thalictrum corniculatum*.

Flowering from May to August.

Red. *Antirrhinum majus*, *Anemone hortensis*, *Astrantia helioborifolia*; *Aquilegia vulgaris*, *canadensis*; *Bellis perennis*; *Chelone barbata*, *obliqua*; *Dianthus barbatus*, *superbus*, *caeruleus*; *Dianthus Franzii*, *Dieris form*, *Dodecatheon Meadia*, *Epilobium angustifolium*; *Geranium angustifolium*, *macrorrhizum*, *sanguineum*, *lanceolatum*; *Gladiolus communis*, *Helianthus roseum*, *iris verticillata*, *Lithyris laevis*, *Lilium chalcidonicum*; *Lychnis viscaria*, *Flas-cuculi*, *chalcidonicus*; *Lysichiton scutellaria*, *virgatum*; *Matthiola annua*, *glabrata*, *incana*; *Monarda didyma*, *Orobancha verus*, *Orcis maculata*; *Peonias officinalis*, *tenuifolia*; *Papaver bracteatum*; *Phlox glaberrima*, *stolonifera*, *ovata*, *amoenula*, *intermedia*, *plena*, *maculata*, *Wheeleriana*, and most kinds; *Scilla nutans*, *Thalictrum aquilegifolium*; *Twilpe Gesneriana*, *suaveolens*, *suav. flore pleno*; *Valeriana pyramidalis*, *Fernoxia*

carnea, and many species; *Lupinus*, *several*.
Blue. *Anemone pratensis*, *Aster alpinus*, *Aconitum Napellus*, *Baptisia australis*; *Campanula persicifolia*, *pinnata*, *carpatia*; *Catananche carnea*; *Centaurea Cyanus*, *montana*, and var.; *Delphinium grandiflorum*, *elatum*, *arvense*; *Funkia ovata*; *Gentiana Saponaria septentrionalis*, *occidentalis*, *acaulis*; *Geranium sylvaticum*; *Tris cristata*, *permanica*, *pallida*, *Xiphium*, *siphoides*; *Linum austriacum*, *perenne*; *Lupinus* *polyphyllus*, *Polemonium caeruleum*, *Phytolacca arborescens*, *Silvia angustifolia*; *Scilla campanulata*, *nutans*; *Fernoxia Chamaedryas*, *prostrata*, *incana*, *spicata*, *gentiana*, and many others; *Finesa major*, *minor*, *herbacea*.
Yellow. *Allium Moly*, *Caltha palustris*, *Chelidonium*, *Chelidonium*, *Coronilla tenuifolia*, *aurea*, *vericillata*; *Helianthemum vulgare*; *Hebea ciliata*, *flava*, *alba*; *Lilium canadense*, *bulbosum*,

virgatum; *Linaria vulgaris*, *b. Pebraria*; *Meconopsis cambrica*; *Gnaphals* *pinnata*, *frutescens*, *glabra*; *Twilpe verticillata*, *Gesneriana*; *Trollius europaeus*, *asiaticus*; *Viola grandiflora*, *lutea*, *Walsteinii* *geranioides*.
White. *Aster* *racemosus*, *Anemone dichotoma*, *Antirrhinum majus*, *Bellis perennis* alb.; *Campanula persicifolia*, *pinnata*; *Crataegus Liliifolia*, *Dianthus albus*, *Hesperis matronalis*, *iris siphoides*, *Lilium candidum*; *Matthiola incana*, *annua*; *Narcissus poeticus*, *Onobrychium pyramidalis*, *Phlox suaveolens*, *Pancratium maritimum*, *Polianthus Liliago*, *Polygonum viviparum*, *Polygonatum viviparum*, *Ranunculus acris*, *Saxifraga granulata*; *Scilla campanulata*, *nutans*; *Stipa pennata*; *Spiraea Aruncifolia*, *Polygonatum*, *Umaria*; *Gilia triflora*, *Thalictrum corniculatum*, *Thalictrum Gesneriana*; *Fernoxia spicata*, *maritima*; *Vinca minor*.

CHAP. IX.

Catalogue of Hardy Trees, with showy Flowers.

6023. *All trees may be considered as ornamental* by adding to the beauty of landscape; but we mean here to confine ourselves to such as are ornamental, by the conspicuousness of their flowers. These are not numerous; they are all of the deciduous kind, and their time of inflorescence is limited to two or three months. The principal are the horsechestnut, acacia, the fruit trees in their wild state, some species of *Mespilus*, *Sorbus*, *Cytisus*, *Robinia*, &c.: these, with some others, we have arranged according to their height and time of flowering, in order to admit of a selection for the back rows of the shrubbery. None of the few evergreen trees which we possess have showy flowers, but we have added the names of these, with their heights, to facilitate a selection for mixing with the deciduous sorts in the mingled or grouped shrubbery. We have omitted all those showy-flowering and evergreen trees which do not usually attain the height of twenty feet, deeming it more suitable for our purpose to include them among the shrubs of that size. All the useful and curious species of trees will be found in our *Hort. Brit.*, with their heights, time of flowering, soil, mode of propagation, and other circumstances. In the Arboreal Catalogue the most useful timber trees are described; and the shapes of trees, and their colours, and characteristic expression, are treated of both under Arboreal and Landscape Gardening. Much less attention has of late been paid to the introduction of new sorts of trees into this country, than to the introduction of fruits and flowers. The French and Germans seem to excel us in this respect. A considerable number of new sorts of ornamental trees have lately been added to the British arboretum, by Messrs. Loddiges; and specimens of them are conspicuously arranged in the Hackney Nursery, to show their forms and characters. (See also the account of Donald's Arboretum, *Gard. Mag.*, vol. vii. p. 360.; of Buchanan's Arboretum, *Ibid.*, vol. vii. p. 695.; and of the Milford Arboretum, *Ibid.*, vol. ix. p. 480.)

SECT. I. *Deciduous Trees with showy Flowers.*

6024.

DECIDUOUS TREES. — MARCH AND APRIL.

Height from 15 ft. to 20 ft.	From 20 feet to 30 feet.	From 30 feet to 40 feet.	From 40 feet to 50 feet.	From 50 feet upwards.
RED. <i>Acer rubrum</i> <i>Amegdalius communis</i>, and var. <i>Pyrus angustifolia</i> WHITE. <i>Amelanchier dasycarpa</i>, vulgaris <i>Cerasus nigra</i> <i>Cerasus</i> <i>Oxyacantha</i> var. <i>præcox</i> <i>Magnolia pyramidalis</i>, <i>tomentosa</i> f. <i>Prunus cándicans</i>, <i>Coccinifolia</i>, <i>domestica</i> and var., <i>insulata</i>, <i>spinosa</i> <i>Pyrus coronaria</i> YELLOW. <i>Cercopithecus arborea</i> <i>Hippophae rhamnoides</i> GREEN. <i>Celtis crassifolia</i>, <i>laevigata</i>, <i>occidentalis</i> <i>Quercus</i>, several BROWN. <i>Ainus glutinosa</i>, & <i>laciniosa</i>, <i>serotina</i> <i>Platanus reticulata</i> <i>Pópulus heterophylla</i>, <i>péndula</i>, <i>tristis</i>	RED. <i>Magnolia obovata</i> f., <i>Soulangesii</i> f. <i>Pavica laevis</i>, <i>vulgaris</i>, f. <i>pl.</i> WHITE. <i>Cerasus caproniana</i> and varieties, <i>duracina</i> and varieties, <i>Willana</i> and varieties, <i>semperferens</i> <i>Magnolia conspicua</i> <i>Prunus virginiana</i> f. <i>alba</i> <i>Pyrus Polivaria</i>, <i>granifolia</i>; <i>communis</i>, var. <i>fl. pleno</i>, and var. <i>fol. variegata</i>; and many other species YELLOW. <i>Acer dasycarpum</i> <i>Aesculus ohiensis</i> <i>Salix amygdalina</i>, <i>caprea</i>, <i>triandra</i>, &c. GREEN. <i>Acer montanum</i> <i>Carya alba</i>, <i>amara</i>, <i>ciliata</i>, <i>compressa</i>, <i>sulcata</i> BROWN. <i>Broussonetia papyrifera</i>, <i>assulata</i> <i>Fraxinus occidentalis</i> <i>Terebinthus</i> <i>Populus laevigata</i>, <i>nigra</i>	RED. <i>Pyrus Aria</i>, <i>dentata</i> WHITE. <i>Cerasus Avium</i>, & <i>multiplex</i>, <i>canadensis</i>, <i>Malus</i>, <i>Phadus virginiana</i> YELLOW. <i>Acer saccharinum</i> <i>Salix bairdii</i> <i>adantifolia</i> GREEN. <i>Acer nigrum</i> <i>Carya glabra</i>, <i>obcordata</i> <i>Fraxinus pumosa</i>, and many others <i>Negundo fraxinifolia</i> <i>Quercus rubra</i>, <i>montana</i>, <i>sessilifolia</i>, <i>tincta</i>. BROWN. <i>Betula alba</i>, <i>péndula</i> <i>Pópulus græca</i> <i>Ulmus carpinifolia</i>, <i>montana</i>, <i>memoralis</i>, <i>stricta</i>, <i>rubra</i>	RED. <i>Magnolia surculata</i> YELLOW. <i>Ulmus americana</i>, <i>alba</i>, <i>campestria</i>, <i>major</i>, <i>péndula</i> GREEN. <i>Fraxinus</i>, several <i>Quercus fastigiata</i>, and several others BROWN. <i>Pópulus alba</i>, <i>balsamifera</i>, <i>betulaefolia</i>, <i>candicans</i>, <i>canadensis</i>, <i>tremula</i>	WHITE. <i>Cerasus Avium</i>, and var. YELLOW. <i>Platanus occidentalis</i>, <i>orientalis</i> <i>Ulmus campestris</i> GREEN. <i>Fraxinus excelsior</i> and varieties, <i>verrucosa</i> <i>Liquidambar styraciflua</i> <i>Quercus alba</i>, <i>occidentalis</i> BROWN. <i>Pópulus alba</i>, <i>occidentalis</i>, <i>argentea</i>, <i>dissecta</i>, <i>græca</i>, <i>heterophylla</i>, <i>monifera</i>, <i>tremula</i>, <i>macrophylla</i>
MAY.				
RED. <i>Acer tartaricum</i> <i>Cerasus</i> <i>Oxyacantha</i> <i>rosea</i>, <i>Oxya. rosea</i> <i>supra</i> <i>Cytisus Laburnum</i> & <i>purpurascens</i> <i>Pyrus prunifolia</i>, <i>specabilis</i> WHITE. <i>Cerasus canadensis</i> <i>Cercis Siliquastrum</i> & <i>fl. albo</i> <i>Cerasus</i> <i>Arborea</i>, <i>Oxyacantha</i>, <i>fl. pleno</i>, <i>oxyacanthoides</i>, <i>tancetifolia</i>, <i>crus-galli</i> and varieties, <i>elliptica</i>, <i>cordata</i>, <i>nigra</i> <i>Malus germanica</i> and varieties, <i>Smithii</i> <i>Pyrus floribunda</i>, <i>malicifolia</i>, <i>sinica</i>, <i>crenata</i>, &c. <i>Robinia pseudo-acacia</i> & <i>umbraculifera</i> YELLOW. <i>Acer dasycarpum</i>, <i>hybridum</i>, <i>lobatum</i>, <i>montanum</i>, <i>pennsylvanicum</i> <i>Cercopithecus arborea</i> <i>Carpinus americana</i> <i>Betula</i>, <i>orientalis</i> <i>Hamamelis virginica</i>, <i>macrophylla</i> <i>Pavia neglecta</i> GREEN. <i>Acer serotinum</i>, <i>campestre</i>, & <i>foliis variegata</i>, <i>monspæu</i>. <i>Nymf. all.</i> <i>Quercus illopo</i>, <i>Catesbeii</i> BROWN. <i>Ainus cordifolia</i>, <i>oblongata</i>, & <i>elliptica</i> <i>Maciara aurantiaca</i>	RED. <i>Cercis Siliquastrum</i> <i>Robinia dubia</i>, <i>macrophylla</i>, <i>viscosa</i> WHITE. <i>Cerasus Chamaecerasus</i>, <i>nigra</i>, <i>pennsylvanica</i>, <i>virginiana</i> <i>Chionanthus virginica</i> <i>Cerasus</i> <i>gustafsonii</i>, <i>Aseria</i>, <i>cordifolia</i>, <i>coccinea</i>, <i>cordata</i>, <i>crus-galli</i> and varieties <i>flava</i>, <i>flavida</i>, <i>floribunda</i>, <i>laevifolia</i>, <i>parvifolia</i>, <i>punctata</i>, and many others <i>Cydonia vulgaris</i>, and varieties <i>Magnolia tripetala</i> YELLOW. <i>Aesculus flava</i> <i>Cytisus Laburnum</i> <i>Fagus sylvatica</i>, <i>fol. alba</i>, <i>fol. argentea</i>, <i>f. strabus</i>, <i>ferruginea</i> <i>Fraxinus pubescens</i>, <i>rufa</i> <i>Ornus americana</i> <i>Schubertia disticha</i> GREEN. <i>Acer tartaricum</i> <i>Ostrya virginica</i>, <i>vulgaris</i> <i>Quercus Aesculus</i>, <i>aurantiaca</i>, <i>triloba</i> BROWN. <i>Ainus glutinosa</i>, & <i>guercifolia</i>, <i>c. cypripetala</i>, <i>undulata</i>, <i>Oxyacantha</i> <i>folia</i>	RED. <i>Cercis canadensis</i> <i>Platanus Gmelini</i>, <i>Richardii</i> WHITE. <i>Aesculus glabra</i> <i>Betula dubia</i> <i>Carya angustifolia</i>, <i>clavata</i>, <i>compressa</i>, <i>ovata</i>, <i>serotina</i> <i>Celtis australis</i> <i>Celtis occidentalis</i>, <i>tetrapetala</i> <i>Ornus europæa</i> <i>Robinia dubia</i>, <i>monstruosa</i>, <i>prostrata</i>, <i>Pseudo-Achillea</i>, and varieties YELLOW. <i>Fraxinus heterophylla</i>, and others <i>Negundo fraxinifolia</i> <i>Quercus ambigua</i>, <i>argentea</i>, <i>heterophylla</i>, <i>nigra</i>, &c. GREEN. <i>Fraxinus platycarpa</i> and many others <i>Quercus coccinea</i>, <i>heterophylla</i>, <i>rubra</i>, and others BROWN. <i>Pópulus monifera</i>	RED. <i>Magnolia acuminata</i> <i>Ornus americana</i>, <i>floribunda</i>, <i>retundifolia</i>, <i>stricta</i> <i>Platanus cuneata</i>, <i>orientalis</i> <i>Pyrus torminalis</i> WHITE. <i>Aesculus acuminata</i>, <i>foliis argenteis</i>, <i>foliis adpressis</i> <i>Betula excelsa</i> <i>Fraxinus nigra</i>, <i>rigida</i> <i>Larix communis</i> & <i>altissima</i> YELLOW. <i>Castanea vesica</i> <i>Fagus sylvatica</i> <i>Fraxinus excelsior</i>, & <i>altissima</i>, <i>c. pándula</i>, and others <i>Quercus</i>, several	RED. <i>Larix communis</i>, <i>microcarpa</i>, <i>péndula</i> <i>Pópulus nigra</i> WHITE. <i>Aesculus hippocastanum</i>, <i>foliis argenteis</i>, <i>foliis adpressis</i> <i>Betula excelsa</i> <i>Fraxinus nigra</i>, <i>rigida</i> <i>Larix communis</i> & <i>altissima</i> YELLOW. <i>Castanea vesica</i> <i>Fagus sylvatica</i> <i>Fraxinus excelsior</i>, & <i>altissima</i>, <i>c. pándula</i>, and others <i>Quercus</i>, several
JUNE.				
RED. <i>Acer rubrum</i> <i>Cerasus</i> <i>Oxyacantha</i> & <i>rosea</i>, <i>c. rosea</i> <i>supra</i> <i>Pavia rubra</i> <i>Faccidium diffusum</i>	RED. <i>Aesculus rubicunda</i> <i>Robinia pándula</i>	RED. <i>Acer saccharinum</i>	RED.	RED.

DECIDUOUS TREES. — JUNE — *continued.*

Height from 13 ft. to 30 ft.	From 30 feet to 30 feet.	From 30 feet to 40 feet.	From 40 feet to 50 feet.	From 50 feet upwards.
WHITE. <i>Catalpa bignonioides</i> <i>Cornus odoratissima</i> , <i>tanacetifolia</i> <i>Gymnocladus canadensis</i> <i>Magnolia glauca</i> var. <i>Burchardii</i> , var. Gordon. var. Thompson. <i>Pavia macrostachya</i> YELLOW. <i>Alnus incana</i> <i>Diopatra pubescens</i> , <i>virginiana</i> <i>Pavia flava</i> , <i>neglecta</i> GREEN. <i>Rhus coriaria</i> , <i>typhina</i> , <i>vernix</i> , <i>viridiflora</i> BROWN. <i>Alnus incana</i> <i>Rhus typhina</i>	WHITE. <i>Cornus serotina</i> <i>Magnolia macrophylla</i> , <i>makima</i> , <i>tripetala</i> YELLOW. <i>Cytisus alpinus</i> , <i>Laburnum</i> <i>Diopatra pubescens</i> , <i>virginiana</i> <i>Pavia flava</i> , <i>neglecta</i> GREEN. <i>Magnolia acuminata</i> BROWN. <i>Morus alba</i> , <i>nigra</i> , <i>neglecta</i>	WHITE. <i>Cornus hybrida</i> <i>Magnolia cordata</i> YELLOW. <i>Acer platanoides</i> , pl. b. <i>lacinatum</i> , <i>Pseudoplatanus</i> , <i>fol. argenteo variegatis</i> , <i>fol. aureo variegatis</i> GREEN. <i>Gleditsia brachycarpa</i> , <i>inferna</i> , <i>macracantha</i> , <i>monosperma</i> BROWN. 	WHITE. <i>Castanea vesca</i> YELLOW. <i>Acer platanoides</i> , <i>Pseudo-Platanus</i> , <i>Castanea vesca</i> , <i>fol. alba</i> , <i>fol. argentea</i> GREEN. <i>Tilia alba</i> , <i>heterophylla</i> BROWN. <i>Betula papyracea</i> , <i>Juglans regia</i>	WHITE. <i>Prunus domestica</i> YELLOW. <i>Tilia americana</i> , <i>pubescens</i> , <i>europæa</i> , <i>lanceolata</i> , <i>intermedia</i> , <i>rubra</i> , <i>grandifolia</i> , <i>parvifolia</i> GREEN. <i>Gleditsia horrida</i> , <i>Quercus fusiformis</i> BROWN. <i>Betula nigra</i>
JULY.				
RED. WHITE. <i>Bumelia laevis</i> YELLOW. <i>Castanea pumila</i> <i>Coultersonia paniculata</i>	RED. <i>Robinia viscosa</i> WHITE. <i>Acacia julibrissina</i> YELLOW. <i>Tilia alba</i> , <i>americana</i> , <i>pubescens</i> , & <i>leptophylla</i>	RED. <i>Gleditsia triacanthos</i> WHITE. <i>Sophora chinensis</i> , <i>japonica</i> YELLOW. <i>Alnus glandulosa</i> , <i>Betula alba</i> , <i>populifolia</i>	RED. WHITE. YELLOW. 	RED. VARIEGATED. <i>Liriodendron tulipifera</i> , & <i>integrifolia</i> YELLOW. <i>Betula lanulosa</i> , <i>lenta</i> , <i>nigra</i>

SECT. II. *Evergreen Trees.*

EVERGREEN TREES.

All of these flower in March, April, and May.

Height from 15 ft. to 30 ft.	From 30 feet to 40 feet.	From 40 feet to 50 feet.	From 50 feet to 60 feet.	From 60 feet upwards.
<i>Argemone Sideroxylon</i> <i>Cunninghamia lanceolata</i> <i>Cupressus sempervirens</i> , <i>diversa</i> <i>Olea europæa</i> <i>Pinus palustris</i> , <i>pumilio</i> <i>Rhododendron mixtum</i> var. <i>flora alba</i> <i>Taxus baccata</i>	<i>Abies nigra</i> , <i>rubra</i> <i>Andromeda arbutifolia</i> <i>Cereus caroliniana</i> <i>Juniperus virginiana</i> , <i>laetifolia</i> <i>Magnolia grandiflora</i> , varieties <i>Pinus halepensis</i> <i>Thuja occidentalis</i> , <i>orientalis</i>	<i>Abies canadensis</i> , <i>Picea</i> <i>Juniperus excelsa</i> <i>Pinus canariensis</i> , <i>mari-</i> <i>tima</i> , <i>pyramidalis</i> , <i>Twe-</i> <i>variabilis</i> <i>Quercus granatensis</i> , <i>rubra</i> , <i>virens</i> , <i>Taxus</i>	<i>Abies balsamifera</i> <i>Pinus Cembra</i> , <i>inops</i> , <i>ponderosa</i> , <i>resinosa</i> , <i>uncinata</i> <i>Quercus Ballota</i> , <i>Cerris</i> , <i>b. sempervirens</i> , <i>Phed-</i> <i>los</i> , <i>Lucombeana</i> , and <i>Lucombe's variety of it</i> , <i>Gard. Mag.</i> vol. x. p. 185. 196.	<i>Abies Douglasii</i> , <i>faxifolia</i> , <i>speciosa</i> , <i>excelsa</i> <i>Arceuthobium</i> <i>Cedrus Libani</i> , <i>Deodora</i> <i>Pinus Lambertiana</i> , <i>Strob-</i> <i>bus</i> , <i>Laricio</i> , <i>rigida</i> <i>Quercus flexilis</i> , & <i>integrifolia</i> , & <i>serotina</i> , & <i>ob-</i> <i>longa</i>

6025. *Propagation and culture.* See ARBORESCULES. Most of the trees enumerated in both the foregoing sections are highly ornamental as single objects on a lawn; and, when dwarfed and potted in the Chinese manner, form curious chamber plants. (*Hort. Trans.*, vol. iv. p. 289.); but this practice is almost exclusively confined to China and Japan, and does not appear at all suitable to European ideas.

CHAP. X.

Ornamental Shrubs.

6027. *The ornamental shrubs* are a much more numerous tribe than the trees: we shall first notice the more select sorts, as the rose, rhododendron, azalea, kalmia, andromeda, vaccinium, althæa frutex, &c., and afterwards, in succession, the deciduous kinds, evergreens, creepers, and sorts for particular purposes.

SECT. I. *Select Shrubs.*

6028. The term *select shrubs* we apply to such shrubs as have been much cultivated, and of which numerous varieties are recognised, both by gardeners and general observers, as beautiful.

SUBSECT. 1. *Rose.* — *Rosa* L.; *Icos. Polyg.* L. and *Rosacea* J. *Rosier*, Fr.; *Rosenstock*, Ger.; *Roozeboom*, Dutch; *Rosajo*, Ital.; *Rosal*, Span.; and *Roseira*, Port.

6029. *The rose* is known by everybody at first sight, and has been a favourite flower from time immemorial among the civilised nations of Europe and Asia. The shrub varies in size in different species, from one foot to six or eight, and in the climbing species to twenty or thirty. The colours are red, white, yellow, purple, dark, striped; simple, or in almost numberless shades and mixtures: the flowers single, semi-double, and double. It is cultivated in every garden, from that of the most humble cottager upwards; some species, as *R. centifolia*, *damascena*, &c., are also cultivated by commercial gardeners on a large scale for distilling rose-water, and for making attar, or essential oil of roses. Six pounds of rose-leaves will impregnate by distillation a gallon of water strongly with their odour; but a hundred pounds afford scarcely half an ounce of attar. The rose is also used in medicine. Botanists are not agreed as to the number of original species of this genus: some regard all the European species as originated from one source; others, and especially the moderns, divide them into species, subspecies, and varieties. The most scientific work which has appeared on the roses in England, is the *Rosarum Monographia* of Lindley, 1819, in which above a hundred species or subspecies are described, and some of them figured; and Miss Lawrence has published ninety plates of *A Collection of Roses from Nature*, 1810. In France, Guillemeau has published *Histoire Naturelle de la Rose*, 1800; and Redouté and Thory are the authors of a splendid

work, in folio, entitled *Les Roses*, containing plates of all the known species and varieties of this flower. Thory has published a separate tract on their culture, entitled *Prodrome de la Monographie de la Rose Rosier*, &c., 1830; Fromville, a *Nomenclature Raisonnée*, in 1818; and Vibert, *Observations*, &c., in 1820. A copious and intelligent account of the Scotch roses has been given by Sabine (*Hort. Trans.*, vol. iv. p. 281.), and some hundreds of new varieties have flowered from seedling plants, in different British nurseries, more especially in those of Perth, Glasgow, and Hammersmith.

6030. *Species and varieties.* The lists of the London and Paris nurseries contain upwards of 1000 names; but very little dependence is to be placed upon them, unless accompanied by descriptions. A good deal of description of roses is a desideratum amongst British nurserymen; but there is an excellent select catalogue by Mr. Rivers of Sawbridgeworth, which may be said to contain all the species and varieties worth cultivating at the time (1833) the catalogue was published. The roses here are classed as *Select Hardy Roses* with distinct characters, of which above two hundred sorts are briefly described; *Négligée Roses*, of which there are twenty-five sorts described; *China roses*, forty sorts; *Low-wooded China roses*, sixteen sorts;

climbing China roses, seventeen sorts; *hardy climbing roses*, thirteen sorts; *select double Scotch roses*, thirty sorts; independently of upwards of sixty miscellaneous roses, including the yellow rose, the double sweetbriar, &c. For the details of this excellent catalogue, see the *Gard. Mag.*, vol. ix. p. 458; for a scientific classification of roses, see our *Art. Brit.*; and for a general descriptive catalogue of French roses, see *Prodrome de la Monographie du Genre Rosier*, of which a full account will be found in the *Gard. Mag.*, vol. v. p. 455. For further information on the subject of roses, see *Gard. Mag.*, vol. i. pp. 56, 121, 170, 467; ii. p. 191, 216; iii. p. 376; iv. p. 351; v. p. 142; vi. p. 427; vii. p. 189, 679; and ix. p. 501.

6031.

ROSES.—MAY.

Under 2 feet.	From 2 feet to 5 feet.	From 5 feet to 4 feet.	From 4 feet to 5 feet.	From 5 feet upwards.
RED. <i>Rosa indica</i> , <i>b. odorata</i> , Lawrenceana, revera, spinosissima, damas- cena, & quatre saisons	RED. <i>Rosa indica</i> , <i>b. odorata</i> , malais, spinosa, <i>b.</i> sangusorbaef, Woodii	RED. <i>Rosa Doniana</i> , hybrida, Lyon, <i>b. spicifera</i> , micro- phylla, pyrenaica	RED. <i>Rosa alpina</i> , <i>b. pendula</i> , dahurica, <i>b. spicifera</i> , sylvatica, <i>b. Monstrie</i>	RED. <i>Rosa damasceana</i> , <i>b.</i> R. indica, Grevillei, indica and var., <i>sylvatica</i>
WHITE. <i>Rosa spinosissima</i> , small double white, Whitely's dble white, myrican.	WHITE. <i>Rosa spinosissima</i> , large double white, large semidouble white, and other white varieties	WHITE. <i>Rosa floribunda</i> , Nie- bersteinii, grandiflora	WHITE. <i>Rosa arvensis</i> , capro- lata, indica var., Noiset- tea's alba	WHITE. <i>Rosa cinerea</i> , Ror- burghii, Salma, Bru- nensis, Banksii corolla alba
PURPLE. <i>Rosa spinosissima</i> <i>b.</i> double purple	PURPLE. <i>Rosa spinosissima</i> <i>c.</i> light double purple	PURPLE. <i>Rosa rubrifolia</i> , <i>b. Re- douta</i>	PURPLE. <i>Rosa alpina</i> , <i>c. pendulina</i>	PURPLE. <i>Rosa cinnamomea</i> Sire pleine
VARIEGATED. <i>Rosa spinosissima</i> var- coloured, small double	VARIEGATED. <i>Rosa spinosissima</i> mar- bled double crimson	VARIEGATED. <i>Rosa damasceana</i> var. York and Lancaster	VARIEGATED. <i>Rosa Noisettea</i> var. striped flowered	YELLOW. <i>R. Banksii</i> corolla lutea
JUNE.				
RED. <i>Rosa gallica</i> , and numer- ous splendid varieties of it: Lawrenceana, ni- tida, parviflora, and flora pl. pinnata, ru- bella, spinosissima, Lady's dble bluish, dble pink bluish, dble Prov. bluish, Prince's bluish, &c.; parviflora, sem- peridorea	RED. <i>Rosa alpina</i> , <i>b. pyrenaica</i> , centifolia and red var., damasceana and numer- ous vars., ferax, gallica and red var., <i>b. mus- cosa</i> , <i>c. bipinnata</i> , lucida, palchella, pygmaea	RED. <i>Rosa alpina</i> , <i>b. pendulina</i> , <i>c. speciosa</i> , baltica, bracteata, carolina, <i>b.</i> florida, hibernica, micrantha, laxa, penn- sylvanica, centifolia, <i>b.</i> provincialis, and many subvarieties of this variety; centifolia, <i>c.</i> muscosa and sub- varieties centifolia <i>d.</i> pomphilia and sub- varieties; saxatilis, vasa	RED. <i>Rosa acicularis</i> <i>b. punci- flora</i> , carolina, stricta, fraxinifolia, margi- nata, polverulenta, rubiginosa, and varie- ties; glutinosa, She- ridani, turrita, <i>b.</i> orbiculata	RED. <i>Rosa canina</i> , caudex, cucullata, cuspidata, Dicksonii, griseola, heterophylla, macro- phylla, olympica, ru- bicunda, tomentosa, Rosa mollis; &c. &c. several varieties of; ruga
WHITE. <i>Rosa alba</i> involuta, ma- nus, and white var., spinosissima and white var.	WHITE. <i>Rosa alba</i> , centifolia and white var., damas- cena and white var., melanocarpa, oxyac.	WHITE. <i>Rosa alba</i> and white var. arguta, belle Aurea, blanche de Belgii, bon- quet blanche, revera	WHITE. <i>Rosa indica</i> , alba, capro- lata, microcarpa, <i>c.</i> Noiset., mosch. <i>b. niv.</i> , <i>c. ceratosa</i> , Rorburghii	WHITE. <i>Rosa arvensis</i> , Banksii, alba, floribunda, indica var. alba, leucantha, mosch., <i>b. plena</i> , &c. arvensis, sempervirens
YELLOW. <i>Lewia herbertii</i> <i>Rosa spinosissima</i> dble yellow, small dble yellow, flava	YELLOW. <i>Rosa lutea</i> , <i>b. punicea</i> , spinosissima large dble yellow, pale dble yellow	YELLOW. <i>Rosa Eglanteria</i> , <i>b. lu- teola</i> , flava, flavescens, lutescens	YELLOW. <i>Rosa americana</i> , lutea, <i>b. bicolor</i>	YELLOW. <i>Rosa Banksii</i> <i>b. fl. pl.</i> luteo-indica var. Sensitiva
JULY.				
RED. <i>Rosa plum.</i> , spinosa, dble light red, dble dark red, true dble red, gemma	RED. <i>Rosa indica</i> , <i>b. salicifolia</i> , <i>c. diversifolia</i> , kamshatka, laxa, microphylla	RED. <i>Rosa alpina</i> , speciosa, damasceana, Lyonii, rubiginosa and varie- ties	RED. <i>Rosa villosa</i> , cinnamomea, indica, rubrifolia, turbinate, Bouraillii	RED. <i>Rosa indica</i> and var., moschata var. <i>ceratosa</i> , multiflora, Grevillei
WHITE. <i>Rosa spinosissima</i>	WHITE. <i>Rosa sinica</i>	WHITE. <i>Rosa moschata</i> , <i>b. fl. pl.</i> <i>c. nivea</i>	WHITE. <i>Rosa involuta</i> , bracteata alba plena	WHITE. <i>Rosa alba</i> and more than twenty varieties, multi- flora alba
PURPLE. <i>Rosa parviflora</i>	PURPLE. <i>Rosa sulcata</i>	PURPLE. <i>Rosa rubrifolia</i> , <i>b. Redout.</i>	PURPLE. <i>Rosa rubrifolia</i>	PURPLE. <i>Rosa purpurea</i>
VARIEGATED. <i>Rosa gallica</i> , <i>b. versicolor</i> , and certain varieties with marbled and mottled corolla. The Village Maid rose	YELLOW. <i>Rosa lutea</i> , odorata <i>b. flavescens</i>	YELLOW. <i>Rosa sulphurea</i>	YELLOW. <i>Rosa americana</i> , lutea	YELLOW. <i>Rosa flava</i> , lutea, <i>b. pu- nica</i>
AUGUST.				
WHITE. <i>Rosa bracteata</i> , <i>b. acabrifolia</i>	WHITE. <i>Rosa moschata</i> , <i>c. nepal.</i>	RED. <i>Rosa pennsylvanica</i>	BLUSH. <i>Rosa rubifolia</i> , <i>b. fenestralis</i>	BLUSH. <i>Rosa rubifolia</i>

6032. *New varieties of rose* are to be obtained only from seeds. Ripen hips, containing the seeds are obtained from semidouble and single flowers; and, to increase the chance of new varieties, these should be taken from plants that have been planted among, or near to, the sorts of which a cross is desired. We are not aware that Knight's mode of extracting the stamina from the one parent, and dusting the stigma with the anthers of the other, has been applied to the rose; but there can be no doubt it might be done in many instances. In France and Italy, the usual mode is, to form a plantation of double and semidouble sorts mixed indiscriminately, and take the result of promiscuous impregnation. Guillemeau has given lists of such as are adapted for this purpose; and Villaret raised them of his beautiful varieties of the *Rosa indica* by planting them among as many varieties of the European roses as he could procure. Austen, nurseryman at Glasgow, and Lee of Hammersmith, have raised many of the Scotch roses together in the same manner, mix all the sorts of Scotch roses together in the same plantation. The former mode may be compared to cross-breeding at random. By layers, chiefly. They are also multiplied by budding, cuttings, suckers, and seeds.

6034. *Process.* Few of the hips are ripe before October; but most of the sorts that come to maturity in this country will be fit to gather by November. The seeds of the rose require to be one year in the soil before they vegetate; they may either be immediately rubbed or washed out, and preserved among sand or cinder-dust; or the seeds may be so preserved for a full year, when the husks will be perfectly rotted, and the seed, being separated and sown in February, will come up in the May or June following. The best place to lay up the hips is the floor of a cellar, such as that used for storing of roots; but in whatever way they are preserved, care must be taken that they are not laid together in such masses as to produce fermentation; and that the heap be turned over frequently in course of the twelve months, to promote decay. The seeds should be sown in a soft moist soil, such as that composed of equal parts of sand and vegetable mould, in a shady situation; it may be covered from a fourth to half an inch, according to the size of the seeds, and the surface should be kept moist by watering in the evenings till the plants have come up and attained a few inches in height. Early in the second spring, they may be transplanted in rows a foot apart every way, and a year afterwards again transplanted

to a distance greater or less, according to the sorts. Here they are to remain till they flower, which varies, in different sorts, from the third to the fifth year, but most commonly they flower the fourth summer.

6035. *By layers.* The common mode is to lay down the young shoots of the preceding summer late in autumn, or early in the succeeding spring; and then, with the exception of the moss-rose, and one or two others, they form rooted plants by the next autumn. But it is now found, that if the same shoots are laid down when the plant is beginning to flower in July, they will, with a few exceptions, produce roots and be fit to remove the same autumn, or the winter year is gained. It is even found that the tip of the fixed layer itself may, in some kinds of rose, be again layered, and this secondary layer will have roots formed to it in the autumn. Such sorts as do not root in one year must be left on the stools till the second autumn; but layers made when the shoots are in a growing state, and furnished with healthy leaves, root much more freely than shoots with ripe wood. After the plants are removed from the stools, they are planted in nursery rows; and in a year, the blossom-buds having been carefully pinched off from the first laying down, they will be fit for removal to their final destination. The stools are then to be pruned, and the soil stirred and enriched. An improved mode of laying roses, consists in entering the knife up the centre of the initial portion of the wood of the layer, and keeping the slit so formed open, by a small bit of stone or wood. (*See Gard. Mag.*, vol. ix. p. 301.)

6036. *By suckers and dividing the roots.* Many of the common sorts admit of being multiplied in this manner, and the plants obtained may be planted in their final destination at once.

6037. *By cuttings.* Most of the sorts might, no doubt, be propagated from cuttings of the same manner, but at a late season it is beginning to ripen, and planted in sand and vegetable mould under a hand-glass. But this mode is only adopted with such sorts as strike easily, as the *R. indica*, and other Eastern species.

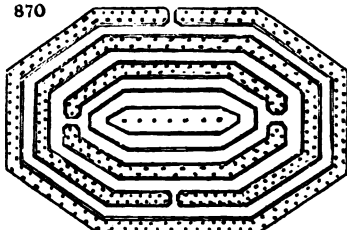
6038. *By budding.* This mode of propagating roses is adopted chiefly with the rare sorts, and such as are difficult to propagate by layers; for it is found that plants so originated, even though on stocks of the hardier sorts, are less durable than such as are raised by any of the other modes. But the chief use of budding in the culture of the rose is to produce standard roses, or to produce several sorts from the same stock. Standard roses are a modern invention, it is generally supposed of the Dutch, first carried to Paris, and about the year 1803 brought to England. They are highly artificial objects, of great beauty, and form magnificent ornaments to gardens and borders. The stocks are either of the tree-rose (*R. villosa* W.), or of any species of tall-stemmed rose, as *R. canina*, *tomensis*, *rubiginosa*, &c. They are budded at different heights from three to seven feet, but commonly between five and six feet from the ground. A stock in the Paris garden, which carries several sorts, has a naked stem of nearly fifteen feet; and there are others at Malmesbury and the Grand Trianon of equal height. These stocks are, both in France and England, procured from woods and copes; and, after being planted in nursery lines, are often budded in the same manner, sometimes in spring by the scapole mode of budding (1873), first proposed of the French; and never later than the succeeding spring, or summer by the common mode, *tail down*, &c. Generally two buds are inserted on opposite sides of the stock, but often three or four, or a dozen, in alternate positions on the upper six or twelve inches of the stem. Every stock is supported by a rod, which should reach a foot or eighteen inches higher than the situation of the bud; to this rod the stem is tied, and after several shoots from the inserted buds, which are otherwise liable to be blown out by high winds. The Paris nurserymen, being supplied with stronger stocks, can readily be procured in England, and having a better climate, and more experience in the culture of roses, excel us in this department of rose propagation, and their standards are an article of commerce with other countries. Their commerce is carried on by layers, and is of extensive demand, but in these we equal, if not surpass, them. Collections of standard roses from Paris are imported every season by British nurserymen, or brought over by French grocers, and sold at remarkably low prices. They are also extensively propagated in all the principal British nurseries.

6039. *Final situation.* No species of rose, wild or cultivated, thrives well in or very near large towns, on account of the smoke and confined air. The yellow and Austrian roses (*R. lutea* and *lutea h. pomica*) are difficult to flower in any situation, but seldom or never show in the suburbs of London: even the monthly rose does not thrive so well there as at some midler distance in the country. Roses are generally planted in the front of shrubberies, and in borders; they are also planted by themselves in rose-gardens or roseries (q. 869, 870.), in

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groups on lawn or gravel, either with common box or other designs, or with edgings of wire, in imitation of basket-work. These last are called *baskets of roses*; the ground enclosed in the basket-margin is made convex, so as to present a greater surface to the eye, and increase the illusion; the shoots of the stronger sorts are layered or kept down by pegs till they strike roots into the ground, so that the points of the shoots furnished with buds appear only above the soil, which is sometimes covered with moss or small shells. Under this treatment, the

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whole surface of the basket becomes, in two or three years covered with rosebuds and leaves of one or two various sorts. Wire one of the larger free-growing sorts is employed at the base, or any of the *Provins* (*rose de cremona*, Fr.) varieties, one plant may be trained so as to cover a surface of many square yards. Where different sorts are introduced in the same basket, they should be as much as possible assimilated in size of leaves and flowers, and habits of growth, and as different as possible in the colours of their flowers. By mixing small-flowered with large showy sorts, the beauty of the former is lost without adding to the effect of the latter.

6040. In *roseries* commonly but one plant of a sort is introduced, and the varieties which most resemble each other are placed together, by which their distinctions are better seen. Particular compartments are often devoted to one species, as the Scotch, Chinese, yellow, burnt-leaved, &c., which has an elegant effect: sometimes a piece of rockwork in the centre is covered with the creeping roses, and on other occasions they are trained to trelliswork, which forms a fence or hedge of roses round the whole. In this hedge, standard roses are sometimes introduced at regular distances. A grove of standard is also frequently formed in the centre of the rosary, and sometimes they are introduced here and there in the beds.

6041. Standard roses, however, have certainly the best effect in flower-borders, or when completely detached on a lawn: their sameness of form, and that form being compact and lumpish, prevents them from grouping well, either among themselves or with other objects. Their sameness of form, and their singularity as rose-plants, and in their flowers; and, therefore, to display these beauties to the best advantage, they require to be seen singly, or in succession. This is the case where they occur as single objects on a lawn, or in the centre, and here and there among groups of flowers; or in lines or avenues, along flower-walks. In the gardens of the Grand Trianon, they are planted profusely in large masses, like plantations of trees and shrubs, and there much of their individual beauty is lost, and no good general effect produced. Most standard roses require to be supported by stakes, and these are generally formed of cast or wrought iron. A grove of standard roses of this description will be found figured and described in the *Gardener's Magazine*, more especially in vol. vi. p. 224, and vol. viii. pp. 555, 557, 679, and 680; and the principal of these will be found described, and figured on a smaller scale, s. 2572, and s. 2573. Some of the more luxuriant-growing climbing roses will grow thirty or forty feet high; and these are sometimes planted at the base of a narrow cone of poles of that height, or of a height which may be employed according to the situation and object in view. (*See Gard. Mag.*, vol. ix. p. 482; vol. x. p. 132.)

6042. Soil. Most species of the rose in their wild state grow in sandy and rather poor soil, except such as are natives of woods, where the soil is richer, and comparatively moist. But all the cultivated roses, and especially the double-flowering kinds, require a rich loamy soil, inclining to the sandy, and they require, also, like most double flowers, plenty of moisture when in a growing state.

6043. *General culture.* To produce strong flowers, roses require some attention to pruning: old wood should be yearly cut out, and the young shoots thinned and shortened according to their strength, and whether number or magnitude of flowers be wanted. Those sorts which throw up numerous suckers should be taken up every three or four years, reduced and the offspring replanted; and most sorts except the standards, will be improved by the practice, provided attention be paid to remove a part of the old soil, and replace it by new. The points of the shoots of the more delicate sorts of roses are very apt to die when pruning is performed in winter or spring; to avoid the consequences of this evil, many give a second pruning in June, or do not prune the stems at all till the beginning of August. A very good time for performing the operation is immediately after the bloom is over; cutting out old exhausted wood, shortening shoots which have flowered to a good bud, and cutting out the healthy leaf, but leaving such shoots as are still in a growing state untouched till October. Where very large roses are wanted, all the buds but one on the extreme point of each shoot should be pinched off as soon as they make their appearance, and the plant liberally supplied with water. To lessen evaporation, and keep up a constant moisture at the roots of these roses, the Paris gardeners generally mulch them with half-rotten stable-dung, or partially rotten leaves.

6044. *Forwarding and retarding roses.* The earliest flowering rose is the monthly, which, in mild seasons, and planted against a wall, will sometimes flower in the beginning of April: in the roses next in succession are the cinnamon, which flowers in May; the damask, in the end of May or beginning of June; the bluish, York and Lancaster, *Provins*, and Dutch muspaleaved, in June, July, and August. The Virginia and musk roses are the later blooming sorts; they flower in September, and in shaded situations will sometimes continue in bloom till the middle of October; but the earliest rose (the monthly) is also the latest, and generally continues flowering till interrupted by frost. The earliest sorts may be materially forwarded by being planted against a south wall; and if portable sashes are placed before them, and the wall is either further assisted by fire, or a lining of dung placed behind, the plants may be brought to flower in February or March. The monthly rose being protected by glass in autumn, or aided by artificial heat

may be continued in bloom till Christmas. A very common mode of obtaining late roses, and one of the greatest antiseptics, is by cutting all the flower-stems at the buds before they begin to appear, or by rubbing off all the rudiments of buds of every kind, early in spring; a second crop is in consequence produced, which will not be in a state to bloom before the summer.

6045. Forcing the rose. The best sorts for this purpose are the common and moss Provinces; the Indian sorts force well, or rather, in snow, continue in bloom all the year; but the commonest varieties of these not being fragrant, they have less repute than the European roses. Rose-plants should be a year in pots previously to the autumn when it is intended to force them; they should be planted in pots of six or eight inches diameter, in rich loam, and placed in an open dry situation; their flower-buds pinched off as they appear; and the plants put early into a state of rest, by excluding the sun and rain, but not a free circulation of air. A workman says, "There is no certainty of attaining a fine blow of roses in the depth of winter by the most expensive artifices of forcing; and yet fine flowers may be produced early in the spring by any ordinary stove put in operation in December. When the plants are first introduced, keep the air of the house at about 50°, never letting it fluctuate to more than two or three degrees below or above. In the second week, aim at 60° as the standard; in the third week, at 65°. When a month has nearly elapsed, begin to increase the heat gradually to 70°; having brought it to this standard, let it afterwards exceed it from three to five degrees, rather than sink below it. The plants may be kept up by introducing some pots every eight or ten days."

6046. Insects. The rose tree, above all the other ornaments of our garden, is most subject to the attacks of plant-lice (*Aphis*). (See *Systema*, &c.) It is generally believed, yet, notwithstanding all that has been written on the subject, no method has yet been discovered for its effectual destruction. Towards the beginning of February, or as soon as the buds of the rose tree swell and appear green, these insects are found upon them. This first brood is produced from small black eggs deposited, at the close of the preceding autumn, on the shoots of that year. If, during the winter, the weather be unusually cold, many are killed, and the injury for that year is considerably lessened. Those that remain seldom arrive at their full growth before April, when, after twice casting their skins, they usually begin to breed. According to Richardson, the first brood consists entirely of females, and each of these produces a numerous progeny without the assistance of the other sex. These, though themselves produced from eggs, are viviparous; a third generation appears in May, and the month of June and July each supply two more. In the autumn, the eighth, ninth, and tenth generations are produced; two of them in August, and the last about the middle of September. From the females of this latter race the eggs are produced which are intended to perpetuate the species for the following year. The parent insects deposit their eggs as near as possible to the branch buds, that the future young may be the more easily supplied with nourishment; and some continue to lay until the beginning of November. The eggs at first are green, but soon become perfectly black; they adhere to the branches by a viscidous matter that surrounds them, and remain unharmed by the frost of winter. (*Phil. Trans.*, vol. lxi. p. 182.) Now it is abundantly evident that the degree of success that will attend the various operations of watering with lime water, or water, and afterwards dusting with powdered tobacco leaves or Scotch snuff, pruning, smoking, hand-picking, &c., will be in proportion to the judicious discrimination of the time fixed upon for such purposes. Among all the remedies which have been proposed, we do not recollect one which is applicable to the destruction of the egg; although, could this be effected, either in the autumn or winter, the injury would be completely checked for a whole year. Watering, either with lime-water or lime-water, would be of no use so far as regards the egg; but there is no doubt these would be destroyed by hot

water; and we have elsewhere observed that this may be applied, when the leaves have fallen, at a temperature of 100°, without any injury to the plant. Prudent management, or a strong shower of rain, would be efficacious, but there will be found much too expensive. In the next stage of the insect, or when it has just emerged from the egg, and begun to congregate upon the opening buds, it is easy to destroy it in large proportions might be derived, by rubbing them with acid or lather, by the application of lime or tobacco water. The use of hot water at this period would be dangerous and expensive. Still May or June, they will be attended with no or little harm, as the evil will then have spread too wide for its remedy. Choice roses may, however, always be freed from aphids by going over the whole plant with a soft brush, being the same buds or shoots in the palm of one hand, and brushing of the insects with the other. Pruning is of little use, as the aphids generally single out all the buds, before they plant roots on the shoots; and this is usually evident, should be so as the buds are very green, and the number of them is very numerous.

The great number of aphids which are annually produced in the garden of a species of the *Tumescens*, which on one the very young and tender buds, and causes the destruction of them. (*See Gard. Mag.*, vol. x. p. 214. note 4.)

6047. Beneficial insects. are not wanting to assist the gardener in the destruction of the aphids. The foremost of these is the lady-bird (*Coccinella*), which is generally known as the *Coccinella* (*Coccinella*), whose sole nourishment is derived from the bodies of these flies. It is short and thick, of a blackish purple speckled with yellow or black, and is very active. Considerable little insects are found on the leaves of the rose tree, and are seen to be very destructive, as it eats into the leaf, and forms it to an adjoining leaf, thus preventing the blossom from ever arriving at maturity. The leaves of the rose tree are often marked in autumn, on their upper surfaces, in various directions, with broad brown lines, leaving a narrow black one running down the middle. This curious appearance is produced by the small caterpillar of a minute moth, by Haverhill, *C. rosae*, which feeds inside the leaf. The caterpillar, when full grown, is nearly two lines long, and of a yellow orange color, with a brown mark down the back. It lives upon the thickness of the pulp under the epidermis, and the brown mark is caused by the epidermis drying, in consequence of the insect having eaten the substance of the leaf beneath. The black mark is produced by its appetite, or excrement. The caterpillar is full-grown about the 24th of October, when it cuts its way out of the leaf for the first time, and crawls down the branches and stem, until it has found a convenient place to fix its cocoon. The perfect insect is a small, round, red-brown beetle, with black spots on its back, and the expansion of its wings measures only two lines and three quarters. (*Ent. Mag.*, vol. i. p. 422.) With insects so small it is difficult to say what to do. Against the larva caterpillar we have no remedy, but against the perfect insect may be performed by poor women, who are incapable of more severe labours.

SUBJECT. 2. Select American and other Peat-Earth Shrubs, viz., of Magnoliaceae, Magnolia; of Rhododendraceae, Rhododendron, Azalea, Kalmia; of the genera Cistus, Arbutus, Vaccinium, Andromeda, Erica, Daphne, and various others.

6049. Of select American shrubs there are numerous species and varieties, both deciduous and evergreen, which will be found arranged according to their heights and colours in the two succeeding tables, and those requiring a peat soil distinguished by a letter (p). They are all highly valued for their flowers, which are large and magnificent in *Magnolia* and *Rhododendron*; odoriferous, in *Azalea* and *Daphne*; and beautiful, in *Andromeda*, *Vaccinium*, and *Erica*; *A. rubrus* is valued for the beauty of both its flowers and fruit. They are mostly natives of America, and introduced within the latter half of the last century.

6050. Propagation. They are all propagated by seed or by layer; though grafting or inarching is resorted to in some cases as more expeditious. The seed is either procured from America, or saved in this country; it is sown very small, is sown as early as possible in pans of peat-earth, and placed in the shade. In winter it is placed under a cold frame, or otherwise protected from the frost; in the spring it comes up in May or June. In the following autumn, or succeeding spring, they are pricked out into other pots, or into beds of peat-earth in a shady situation. Here they are protected by hoops and mats during winter, and in two years are again transplanted into similar soil and situation, and at distances corresponding to the size of the leaves, or habits of the plants: here they remain till they flower, or till wanted to be removed to their final destination. They commonly flower from the fourth to the seventh year.

6051. By layers. The young shoots only are used for this purpose, either laid down in June and July, when in full growth, or in the following autumn; by the former plan a year is gained, as the shoots will be rooted, and may be removed by the succeeding winter or spring. Some sorts of *Magnolia*, *Rhododendron*, &c. require two years to form a sufficient number of roots. The plants, when removed, may be planted in nursery lines, in proper soil, and kept well watered during summer, and protected from the frost by mats; or they may be planted in pots, and receive, during winter, the protection of a frame.

6052. By suckers, and by dividing at the root. Both these modes may be occasional, though but rarely resorted to. Some species of *Azalea* and *Andromeda* throw up numerous suckers, and the heads may often be increased by dividing at the root.

6053. By cuttings. Some of the *Azalea*, *heaths*, &c. are multiplied by cuttings of the young shoots, when in a growing

state, taken off where the wood is beginning to ripen, and planted in sand and peat, and covered with a hand glass. If this operation is performed in the end of June, they will be ready to remove into prepared beds, or to plant in small pots by the middle of September.

6054. By grafting, budding, or inarching. This is practised in some sorts of *Magnolia*, *Andromeda*, &c., which are placed on stocks of harder species of the same sort, as *M. purpurea*, *A. Canoe*, *D. Laureola*, &c. The stocks are planted in pots a year before wanted, which admits of their being placed in a position with most advantage, but best suited to the *Magnolia* and *Arbutus Andromeda* are generally grafted with detached scions.

6055. Culture. The culture requisite for American plants mainly consists in placing them in a soil which is naturally moderately shaded and damp, in providing them with that particular soil, commonly called peat, in which every soil flourish, and which, J. D. has suggested, in the *Gard. Mag.* vol. viii. p. 285., should therefore, rather be termed *peat-mould*: his remarks are:—"In writings and conversations on gardening, I have usually found the synonymous terms *peat*, *peat-gerb*, and *hog-earth*, employed to designate that particular kind of soil in which the British species of *Heath*, the *Cage heath*, and the North American plants, thrive so perfectly. That this kind of soil, which, till taught better by some consequence, I shall call *peat-mould*, is distinct from, but bears a striking resemblance to, the characters of each will evince. *Heath-mould* is the soil which occurs on heaths; it is not extremely wet and low, as bogs are, but usually elevated, and is composed of peat of various degrees, well drained, and exposed to the action of the sun, and the withering blasts of winter. The stratum or layer of soil is usually less than twelve inches in thickness, lying on a

stone subsoil, and both the soil and subsoil of so sterile a quality as to forbid tillage; yielding usually a tough, thickly woven turf, and heath, or ling, and furze in abundance, with occasional brambles, and low stunted specimens of other species of shrubs or trees. This stratum, taken off so as to leave the stones bare, forms, when partially decomposed and comminuted, the invaluable and indispensable soil for innumerable plants of the garden; and is composed of the decaying turf with its spongy interwoven roots, a highly friable black soil, and a plentiful admixture of small-grained white sand. The blackness of the soil is, doubtless, partly owing to the perpetual progressive rotting of the exuvie continually supplied by the growing turf, and which decaying exuvie, besides the blackness, gives to the soil also, in no small degree, the properties of leaf or vegetable mould. From, then, the spongy masses of vegetable fibres, the friable nature of the soil in itself, the decomposed vegetable matter, and the large proportion of white sand which heath-mould contains, arises its peculiar eligibility for all plants with delicate hairlike roots, and consequently for the *Ericaceæ*, where the *Rhododendron*, &c., whose roots have, more spongy than elegantly, been compared to bag-bacca. Peat-earth, or bog-earth, on the contrary, is the soil yielded by ferns, turbaries, bogs, and morasses. It constitutes almost the entire soil of the usually cultivated lands of Cambridgehire, and is, in fact, the soil forming the turf, of which so many millions are annually dug, sold, and burnt, as an article of domestic fuel, in those countries. Peat, instead of being in a thin stratum, forms a stratum always of considerable, sometimes of great depth; instead of occupying high sites, occupies the lowest; instead of being well drained, is usually saturated with water to the very roots of the herbage it bears; instead of a draining stony subsoil, stones are almost totally absent from it, and the subsoil is a water-holding clay. Although, like heath-mould, the surface soil exhibits spongy masses of fibres, it lacks the sand which prevails in heath-mould; and, when wet, is not friable, but oozy and soupy. Heath-mould, by means of its dry nature, its vegetable fibres, and its sand, is disposed to continue light, open, and porous; peat, from its muddy spongy nature, the great rapidity with which vegetable fibres decay in it, its lack of sand, or from other causes, speedily subsides into a dense, inert, conglomerate mass. While heath-mould is most important to the gardener, peat, from its muddy spongy nature, the great rapidity with which vegetable fibres decay in it, its lack of sand, or from other causes, speedily subsides into a dense, inert, conglomerate mass. While heath-mould is most important to the gardener, peat, from its muddy spongy nature, the great rapidity with which vegetable fibres decay in it, its lack of sand, or from other causes, speedily subsides into a dense, inert, conglomerate mass. While heath-mould is most important to the gardener, peat, from its muddy spongy nature, the great rapidity with which vegetable fibres decay in it, its lack of sand, or from other causes, speedily subsides into a dense, inert, conglomerate mass.

mould) whatever, provided the ground has been properly prepared by trenching and breaking of the surface, so that all the grass and vegetable matter be properly mixed. I deprecate," says he, "the too general practice of pitting and planting without the ground being previously well trenched."

6056. *Fiscal situation.* American and peat-earth shrubs, requiring large masses of their peculiar soil, and frequent artificial waterings, cannot conveniently be introduced in mingled borders or shrubberies. They are, therefore, generally planted by themselves in beds or compartments of peat-earth; or entire gardens or shrubberies are devoted exclusively to them. This last mode appears decidedly the best, as the general habits and appearance of American peat-earth plants, independently of their culture, do not harmonize remarkably well with European species. An American garden may have a northern or eastern exposure; and, if it slopes considerably, will be still less affected by the warm dry weather of summer. It may be laid out in any of the different styles of flower-garden (*figs.* 805. to 826.), herbaceous plants introduced as well as shrubs, and the whole surrounded by a sloping phalanx of American trees. The sorts may either be arranged in the mingled manner (*s.* 5559.), or grouped or classed according to some system (*s.* 5579. to *s.* 5580.) Many and indeed most of the American shrubs thrive under the partial shade of lofty deciduous trees, and the leaves which fall from these protect their roots both from the frosts of winter and the drought of summer, while they constantly decay into vegetable mould, and at the same time afford a supply of nourishment. Hence, in some cases, the hardier sorts of *Rhododendron*, *Azalea*, *Andromeda*, &c., may be introduced as undergrowths in the margins of thin woods, placing under each plant a cube yard or more of its proper soil. This mode of planting, it would appear (*Mason on Design*, art. *Pitt*), was first adopted by the great Earl of Chatham; but it has been carried to the greatest extent not only with American plants, but with rose and other tender shrubs, in the extensive woods of Fonthill, Highclere, Bagshot Park, Dropmore, &c., at which places, and also at King's Weston near Bristol, Kenwood at Hampstead, &c., many of the plants shed their seeds, and young *Rhododendron* and *Azalea* spring up in abundance. In the nurseries, it is a general practice to keep American and other peat-earth plants in pots, and to protect them during winter in frames and pits for convenience of transportation. The *Magnolia grandiflora* in most parts of England is planted against a wall, and the finest trees in England so treated are at White Knights, near Reading. (See *Gard. Mag.*, vol. ix. p. 664.) All the American and peat-earth shrubs may be selected from the three first tables in next section, by observing the indication of peat-soil (letter p); and the herbaceous peat-soil plants may be selected from the tables of Border-Flowers in a similar manner. (See *Gard. Mag.*, vol. i. p. 154. 451.; ii. p. 370.; v. p. 142.; vi. p. 425.; vii. p. 305.)

SECT. II. General Catalogue of Shrubs.

6057. In our general catalogue of shrubs we have included several species, which, from their growing with single naked stems, and forming a spreading head at some height from the ground, are correctly denominated low trees. *Amgdalus communis*, and various species of *Crataegus* L., *Armenica*, *Pyrus*, and *Sambucus*, may be referred to as examples. As our object is to form such arrangements as will afford most facility to the gardener in adjusting his plants, as to height, colour of the flower, and time of flowering, we have included all woody plants which do not exceed twenty feet in height under shrubs; and all those that exceed that height (except the climbers and twiners) we have allowed to retain their places in the tables of trees. Here, as before, the most ornamental species and those which continue longest in bloom are distinguished by appropriate marks (*s* and *3*).

SUBSECT. 1. Deciduous Shrubs, arranged as their Time of Flowering, Height, and Colour of the Flower.

6058.

DECIDUOUS SHRUBS.—MARCH.

Height from 0 to 2 feet.	From 2 feet to 3 feet.	From 3 feet to 4½ feet.	From 4½ feet to 6½ feet.	From 6½ feet to 10 feet.
RED. <i>Amgdalus incana</i> , nana, and varieties <i>Rhododendron albicum</i> , & <i>alticum</i>	RED. <i>Amgdalus incana</i> , nana, and varieties <i>Rhododendron albicum</i> , & <i>alticum</i>	RED. <i>Cerasus japonica</i> & multi-plex <i>Cydonia japonica</i> <i>Daphne Mezereum</i>	RED. <i>Armenica brigitolica</i>	RED. <i>Amgdalus orientalis</i> <i>Cydonia sinensis</i>
WHITE.	WHITE.	WHITE. <i>Cydonia japonica</i> flore albo <i>Daphne Mezereum</i> flore albo	WHITE.	WHITE. <i>Magnolia conspicua</i> <i>Prunus sibirica</i> inofficinalis and varieties
YELLOW.	YELLOW. <i>Lonicera nigra</i>	YELLOW. <i>Corylus humilis</i> , & <i>rostrata</i>	YELLOW. <i>Chimonanthus fragrans</i> , & <i>grandiflorus</i> , & <i>diversus</i>	YELLOW. <i>Corylus avellana</i> , var., <i>colurna</i> , <i>tubulosa</i> <i>Hamamelis virginica</i>
GREEN.	GREEN. <i>Comptonia asplenifolia</i> <i>Ribes boricum</i>	GREEN. <i>Ribes Grossularia</i> , <i>Uva-crispa</i>	GREEN. <i>Daphne Laureola</i>	GREEN. <i>Xanthoxylum fraxineum</i> , <i>trickarpum</i>

APRIL.

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
RED. <i>Paeonia uliginosa</i> <i>Xanthoxylum officinale</i>	RED. <i>Coronilla Emerici</i> <i>Ribes speciosum</i> , <i>sambucinum</i> <i>Paeonia Moutan</i> Banksiae	RED. <i>Cotoneaster acuminata</i> , <i>complanata</i> <i>Lonicera ciliosa</i> <i>Rhodora canadensis</i>	RED. <i>Armenica brigitolica</i> , <i>sibirica</i> <i>Cotoneaster affinis</i> , <i>vulgaris</i> , <i>melanocarpa</i>	RED. <i>Lonicera tatarica</i> & <i>rubra</i>
WHITE. 1 <i>Cerasus pinnata</i> <i>Daphne alata</i> <i>Spiraea crenata</i> , <i>alpina</i>	WHITE. <i>Artemisia vulgaris</i> <i>Cerasus coccinea</i> , <i>serotina</i> <i>Lonicera ciliosa</i> , & <i>alba</i> <i>Spiraea latifolia</i> , <i>crenata</i> , <i>tristis</i>	WHITE. <i>Artemisia grandiflora</i> <i>Cerasus chrysantha</i> <i>Paeonia Moutan</i> papav. <i>Ribes coccineum</i> , <i>rubrum</i> , <i>bractea</i> (David), <i>niveum</i> <i>Spiraea laevigata</i> , <i>var.</i>	WHITE. <i>Amelanchier ovalis</i> , <i>vulgaris</i> <i>Cydonia japonica</i> & <i>alba</i> <i>Staphylea trifolia</i>	WHITE. <i>Amelanchier Botryophorum</i> , <i>sanguinea</i> <i>Cerasus pubescens</i> <i>Cotoneaster integrifolia</i> <i>Crataegus Oxycantha</i> var. <i>prunifolia</i>

DECIDUOUS SHRUBS. — APRIL — continued.

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
YELLOW. <i>Adenocarpus frankensis</i> <i>Cercocarpus mollis</i> , <i>pygmaea</i>	YELLOW. <i>Cercocarpus Altagina</i> , pubescent <i>Mahonia repens</i> , and others	YELLOW. <i>Cercocarpus spinosa</i> <i>Lonicera caerulea</i> , villous	YELLOW. <i>Kerria japonica</i> fl. pl. <i>Ribes aureum</i> , flavum, tenuiflorum <i>Salix nigricans</i> mas, violacea mas	YELLOW. <i>Chimonanthus fragrans</i> , and varieties <i>Cornus edulis</i> <i>Shepherdia canadensis</i>
GREEN. <i>Ribes alpinum</i> var. <i>acutulum</i> , decumbens	GREEN. <i>Daphne pontica</i> <i>Ribes</i> , many species <i>Salix sibirica</i>	GREEN. <i>Salix arenaria</i> , argentea	GREEN. <i>Ribes tomentosum</i> and others	GREEN. <i>Rhamnus Fraxinea</i> <i>Salix acuticarpa</i> , and the female sex of many species of <i>Salix</i>
VARIEGATED. <i>Paeonia Moutan corolla</i> variegata	VARIEGATED. <i>Azalea pontica</i> var. versicolor, and other of the <i>Higuchi</i> hybrid kind		VARIEGATED. <i>Magnolia obovata</i> & discolor, Soulangiana	PURPLE. <i>Magnolia obovata</i>
MAY.				
RED. <i>Oxydendrum erythrocarpum</i> <i>Facchinum angustifolium</i> , glabrum, ligustrinum, venustum, virgatum	RED. <i>Amigdalus nana</i> , pumila plena <i>Cytisus albus</i> & incarnatus <i>Paeonia Moutan</i> Banksiae, c. rosea <i>Pavia hirsuta</i> <i>Ribes lacustre</i> <i>Syringa persica</i> & incisa <i>Facchinum parviflorum</i> , racemum	RED. <i>Colutea halepica</i> , cruenta <i>Cotoneaster affinis</i> , vulgaris <i>Lonicera alpeana</i> <i>Pavia rubra</i> , & arguta <i>Ribes petraeum</i> , sanguineum, speciosum <i>Spiraea bella</i> <i>Facchinum arboreum</i>	RED. <i>Amigdalus communis</i> flore pleno, orientalis, alba <i>Cydonia sinensis</i> <i>Cydonia hirsuta</i> <i>Persea vulgaris</i> , flore pleno <i>Pyrus angustifolia</i> <i>Robinia hispida</i> , & rosea <i>Tamarix gallica</i>	RED. <i>Amigdalus communis</i> , & amara <i>Cercis canadensis</i> <i>Pavia carnea</i> , rubra <i>Persea lewisii</i> , vulgaris <i>Pyrus speciosa</i> <i>Facchinum diffusum</i>
WHITE. <i>Cornus depressa</i> , prostrata, pumila <i>Facchinum album</i> , elongatum, fuscum <i>Gaultheria grandiflora</i> , glabrum, latifolium, marianum, pallidum, stamineum	WHITE. <i>Cornus pygmaea</i> <i>Cornus florida</i> <i>Fothergilla ciliolata</i> , major, Gardeni <i>Lonicera oblongifolia</i> <i>Prunus maritima</i> <i>Prunus serotina</i> , intermedia, depressa, grandifolia, pubes <i>Spiraea oblongifolia</i> , obovata, thalictroides, trilobata, arifolia <i>Syringa persica</i> & alba <i>Facchinum amatum</i> , dumosum, mucronatum	WHITE. <i>Amelanchier vulgaris</i> , sanguinea, florida <i>Azalea pontica</i> & albiflora, and others <i>Cornus chioica</i> , pendula <i>Pseudocerasus</i> <i>Cotoneaster microphylla</i> <i>Lonicera pyrenica</i> <i>Magnolia conspicua</i> <i>Paeonia Moutan</i> papaveracea <i>Philadelphus coronarius</i> , laxus, Lewisii <i>Prunus americana</i> , arbutifolia, melanocarpa, nivalis <i>Spiraea hypericifolia</i> <i>Facchinum corymbosum</i> <i>Fibrium pyrifolium</i>	WHITE. <i>Cornus Chamæcerasus</i> , nigra, pernaefolia <i>Cytisus albus</i> <i>Halesia parviflora</i> <i>Philadelphus coronarius</i> & flore pleno, c. fol. variegatus, floribundus, grandiflorus, hirsutus, inodorus, nepalensis, speciosus <i>Prunus candeliana</i> <i>Pyrus angustifolia</i> , Chamæmepilus, grandifolia <i>Sambucus nigra</i> & lacinata <i>Syringa vulgaris</i> , & inodora, c. variegata <i>Fibrium prunifolium</i>	WHITE. <i>Artemisia vulgaris</i> <i>Cotoneaster fragilis</i> <i>Cornus heterophylla</i> , pyrifolia, spinulosa, spinosissima, splendens, tancefolia <i>Eudonymus europæus</i> , & fil. alba, c. leucocarpus <i>Helleborus diptera</i> , tetra- <i>Pteris vulgaris</i> fl. alba <i>Philadelphus coronarius</i> , latifolius, Zeisleri <i>Prunus spinosa</i> , media <i>Pyrus baccata</i> , Pollardii, pubens, arifolia <i>Sambucus nigra</i> , & fil. alba <i>Fibrium corymbosum</i>
YELLOW. <i>Calophaca vulgaris</i> <i>Cercocarpus jubata</i> , ferax genista anglica, decumbens, pilosa	YELLOW. <i>Berberis sibirica</i> <i>Cercocarpus Chamaedaphne</i> , macroantha, fragran- tissima <i>Cytisus multiflorus</i> , leucanthus <i>Genista angulata</i> <i>Myrica cerifera</i> , & latifolia	YELLOW. <i>Azalea pontica</i> , & pallida, c. plena <i>Berberis asiatica</i> , cretica, heterophylla, Wallichiana <i>Colutea halepica</i> <i>Cytisus sessilifolius</i> <i>Genista Scirpus</i> <i>Lonicera involucrata</i>	YELLOW. <i>Adenocarpus foliolus</i> <i>Rhamnus sinifolia</i> , hybridus <i>Rhus aromatica</i> , suaveolens <i>Shepherdia canadensis</i> , argentea <i>Xanthoxylum fraxineum</i>	YELLOW. <i>Berberis americana</i> , chinensis, vulgaris <i>Buddleia globosa</i> <i>Cercocarpus arborescens</i> <i>Ostrya americana</i> <i>Pyrus baccata</i> , Pollardii, pubens, arifolia <i>Sambucus nigra</i> , & fil. alba <i>Fibrium corymbosum</i>
PURPLE. <i>Betula pumila</i> <i>Cytisus purpureus</i>	PURPLE. <i>Rhodora canadensis</i>	PURPLE. <i>Syringa persica</i> , & lacinata	PURPLE. <i>Magnolia purpurea</i> f. <i>Syringa chinensis</i> , Josephine	PURPLE. <i>Syringa vulgaris</i> , & carulea, c. rothomagensis
GREEN. <i>Rhamnus alpinus</i> , pumilus <i>Ribes carpatum</i> , and others	GREEN. <i>Acer creticum</i> <i>Arctostaphylos uva-ursi</i> , fol. variegata <i>Hippophae sibirica</i> <i>Quercus prinoides</i>	GREEN. <i>Celtis pumila</i> <i>Liquidambar imbricaria</i> <i>Rhamnus rupatris</i> , tinctoria, valentina <i>Rhus aromatica</i> , suaveolens	GREEN. <i>Acer obtusatum</i> <i>Broussonetia papyrifera</i> <i>Celtis Tournefortii</i> <i>Eudonymus verrucosus</i> <i>Quercus Banisteri</i> <i>Ribes petraeum</i>	GREEN. <i>Acer opulifolium</i> <i>Caryocarpus betulae</i> , incisa, orientalis <i>Flagra cylindrica</i> , incisa <i>Hippophae rhamnoides</i> <i>Rhamnus cathartica</i> , dahurica, lanceolata
BROWN. <i>Facchinum parviflorum</i> , tenellum <i>Xanthoxylum apifolia</i>	BROWN. <i>Chalcanthus leucogatus</i> <i>Myrica laevis</i>	BROWN. <i>Calycanthus fertilis</i> , oblongifolius, pennsylvanicus	BROWN. <i>Calycanthus floridus</i>	BROWN.
JUNE.				
RED. <i>Cornus paniculata</i> <i>Hydrangea Hortensis</i> <i>Ostrya fruticosa</i> , rotund <i>Spiraea betulifolia</i> <i>Facchinum fuscum</i> , nitidum	RED. <i>Azalea nudiflora</i> var. blanda, rosea, rubrorima, rubra, rub. pleno, rufa, and many others <i>Facchinum sinuatum</i>	RED. <i>Azalea nudiflora</i> var. carnea, chinensis, incarnata, &c. <i>Colutea cruenta</i> <i>Rhus speciosa</i> , odorata <i>Spiraea salicifolia</i> , bella, grandiflora	RED. <i>Azalea</i> , several <i>Pyrus Chamæmepilus</i>	RED. <i>Punica Granatum</i> , flore pleno <i>Pyrus spectabilis</i>
WHITE. <i>Azalea nudiflora</i> , & dealbata, and others <i>Daphne alpeana</i> <i>Potentilla glabra</i> , Salestii <i>Spiraea cæna</i> , resantheifolia, thalictroides <i>Philadelphus discolor</i> , nitidum	WHITE. <i>Azalea nudiflora</i> var. alba, fastigiata, and many others <i>Cornus pumila</i> <i>Prunus pennsylvanica</i> , purgans <i>Nitraria Schobertii</i> , capilla <i>Notefla figurata</i> <i>Rubus cæsius</i> , corylifolius, laciniatus, and many others <i>Spiraea carpinifolia</i> , flexuosa, lobata <i>Styrax latifolia</i> <i>Facchinum frondosum</i> , album <i>Fibrium acerifolium</i> , pubescent	WHITE. <i>Azalea nudiflora</i> var. florida, odorata, staminea, and many others <i>Cornus sericea</i> <i>Cydonia japonica</i> fl. albo <i>Genista monosperma</i> <i>Hydrangea quercifolia</i> <i>Magnolia pyramidalis</i> <i>Rubus multiflorus</i> , and several others <i>Spiraea opulifolia</i> , salicifolia, fl. albo, alimifolia, arifolia	WHITE. <i>Chimonanthus latifolia</i> , virginica <i>Cornus alternifolia</i> , fastigiata, sanguinea, stricta, & fol. variegata <i>Laurus laetitia</i> <i>Pavia macrostachya</i> <i>Philadelphus coronarius</i> , & flore pleno, c. multiflorus, floribundus, grandiflorus, inodorus, Lewisii, nepalensis, verrucosus <i>Sambucus canadensis</i> , pubens <i>Tamarix germanica</i> <i>Fibrium Lantana</i> and var. <i>O. pulchra</i> , & rosea, c. variegata	WHITE. <i>Acacia acantholoba</i> <i>Aralia hispida</i> , spinosa <i>Cornus alba</i> , paniculata <i>Gymnocladus canadensis</i> <i>Hamamelis auriculata</i> , glauca <i>Ostrya rotundifolia</i> , stricta <i>Punica Granatum</i> flore pleno <i>Pyrus americana</i> , laetitia <i>Sambucus racemosa</i> <i>Staphylea trifolia</i> <i>Staphylea trifolia</i> <i>Styrax officinalis</i>

DECIDUOUS SHRUBS.—JUNE—continued.

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
YELLOW. <i>Cercophora arbutifolia</i>, <i>grandiflora</i> <i>Cytisus lanigerus</i> <i>Hypericum calycinum</i>, <i>denticulatum</i>, <i>Kalmianum</i>, <i>oblongifolium</i>, <i>olympticum</i>, <i>patrium</i>, <i>viridum</i> <i>Rhamnus saxatilis</i> PURPLE. <i>Drypis spinosa</i> VARIEGATED. <i>Rhus Toxicodendron</i>, <i>radicans</i> BROWN.	YELLOW. <i>Azalea speciosa</i> & <i>aurantia</i>, &c. <i>Coccoloba Evansii</i>, <i>flava</i> <i>Cytisus biflorus</i>, <i>capitata</i> <i>Gentiana triquetra</i>, <i>ovata</i> <i>Potentilla discolorata</i>, <i>fruticosa</i> <i>Rhamnus lycioides</i> PURPLE. <i>Amorpha microphylla</i> <i>Halmimodendron argenteum</i> & <i>nigrum</i> VARIEGATED. <i>Azalea pontica</i> var., <i>tricolor</i> GREEN. <i>Neris paniculata</i> BROWN. <i>Calycanthus floridus</i> <i>Eudonymus angustifolius</i>	YELLOW. <i>Adonocarpus hispidulus</i>, <i>intermedius</i>, <i>seminatus</i> <i>Azalea</i>, many <i>Cytisus elongatus</i>, <i>triflorus</i>, <i>semitriflorus</i> <i>Leucis acutifolia</i> <i>Palustris aculeatus</i> <i>Rhamnus infectior</i> PURPLE. <i>Amorpha fruticosa</i>, & <i>emmar</i> <i>Halmimodendron argenteum</i> and varieties VARIEGATED. <i>Azalea violacea</i> GREEN. <i>Madhura aurantiaca</i> mas. and fem. <i>Neris rubra</i>, <i>latifolia</i> BROWN. <i>Calycanthus pennsylvanicus</i> <i>Corsaria myrtifolia</i>	YELLOW. <i>Adonocarpus foliolosus</i> <i>Dierville filius</i> <i>Gentia florida</i> <i>Lonicera Xylodermum</i> <i>Palustris virgatus</i> <i>Rhamnus infectior</i> PURPLE. <i>Eudonymus atropurpureus</i>, <i>latifolius</i> VARIEGATED. GREEN. <i>Diospyros Lorus</i> <i>Hippophae rhamnoides</i> BROWN. <i>Calycanthus oblongifolius</i>	YELLOW. <i>Cobitis arbutacea</i>, <i>media</i>, <i>repulenta</i> <i>Pratinus laetifolia</i> <i>Lonicera orientalis</i> <i>Palustris aculeatus</i> <i>Sorbus Terebinthus</i> <i>Prunus Gracilima</i> & <i>lutea</i> <i>Rhus Coccinea</i> PURPLE. <i>Azalea triloba</i> <i>Lycium aduncum</i>, <i>rigidum</i> GREEN. <i>Eudonymus latifolius</i> <i>Gleditsia sinensis</i> BROWN. <i>Neris paniculata</i>
JULY.				
RED. <i>Spiraea latifolia</i> <i>Tragopyrum hexifolium</i>, <i>lancoletum</i>, <i>polygamum</i> <i>Facellium tandem</i> WHITE. <i>Salix scaberrima</i> <i>Spiraea alpinum</i>, <i>corymbosum</i>, <i>racemifolium</i> <i>Facellium frondosum</i> <i>Viburnum albidum</i> YELLOW. <i>Calophaca vulgaris</i> <i>Cytisus supinus</i> <i>Hypericum glaucum</i>, <i>olympticum</i>, <i>romanticum</i> <i>Rhamnus ripens</i> <i>Rhus radicans</i> PURPLE. <i>Cytisus purpureus</i> GREEN. <i>Rhamnus paniculata</i> <i>Rhus paniculata</i> BROWN. <i>Menziesia ferruginea</i> p., <i>globularis</i> p.	RED. <i>Azalea multiflora</i>, var. <i>corolla plena</i>, and others <i>Fuchsia gracilis</i>, <i>globosa</i>, <i>coccinea</i> WHITE. <i>Arhila hispida</i>, <i>spinosa</i> <i>Azalea multiflora</i> var. <i>paniculata</i> <i>Hydrangea cordata</i>, <i>radicata</i> <i>Prinos umbellatus</i>, <i>glaberrima</i>, <i>lancoletum</i>, <i>verticillatum</i> <i>Pilea trifoliata</i> <i>Viburnum nudum</i> YELLOW. <i>Azalea speciosa</i> var. <i>aurantia</i> <i>Cytisus argenteus</i>, <i>montanus</i>, <i>nigricans</i>, <i>calycinus</i> <i>Hypericum hircinum</i>, <i>prolificum</i> PURPLE. <i>Rhododendron azaleoides</i> GREEN. <i>Rhamnus obtusiuscula</i>, <i>axatilis</i>, <i>Wulfenii</i> BROWN. <i>Azalea pontica</i> var., <i>caprea</i>, <i>palida</i>	RED. <i>Azalea multiflora</i> var. <i>sepioides</i>, <i>rubra crispata</i>, <i>rubra plena</i>, <i>flammea</i> <i>Spiraea grandiflora</i> WHITE. <i>Hydrangea nivea</i>, <i>arbutacea</i> <i>Prinos prunifolius</i> <i>Syrinx grandifolium</i>, <i>pulverulentum</i> <i>Viburnum acerifolium</i>, <i>laetiusculum</i>, <i>quadratum</i> YELLOW. <i>Azalea calendulacea</i> <i>Berberis ilicifolia</i>, <i>dolichocarpa</i> <i>Hypericum aureum</i>, <i>obovatum</i> & <i>frondosum</i> & <i>Rhamnus erythroxylon</i>, <i>latifolius</i> <i>Rhus Toxicodendron</i>, <i>venosa</i> PURPLE. <i>Azalea multiflora</i> var. <i>purpurea</i> <i>Begonia nana</i> GREEN. <i>Colostyrax bulbosus</i> <i>Rhamnus infectior</i> <i>Rhus glabra</i> BROWN.	RED. <i>Symphoricarpos paniculatus</i>, <i>racemoides</i>, <i>monstrosa</i>, <i>glomerata</i>, <i>glomerata</i> fol. var. WHITE. <i>Ligustrum vulgare</i> f. fol. <i>variegata</i>, c. <i>xanthocarpum</i>, c. <i>leucocarpum</i>, <i>repulenta</i> <i>Sambucus canadensis</i> <i>Viburnum lentago</i> YELLOW. <i>Simagrus angustifolia</i> <i>Rhus Coccinea</i>, <i>degenae</i>, <i>glabra</i>, <i>typhina</i> PURPLE. <i>Cytisus purpureus</i> <i>infractus</i> GREEN. <i>Berberis purpurea</i>, <i>agrostoides</i>, <i>acuminata</i> <i>Rhamnus lycioides</i> <i>Rhus copallina</i>, <i>Coccinea</i>, <i>degenae</i> BROWN. <i>Azalea triloba</i>	RED. WHITE. <i>Sumach laetifolius</i>, <i>oblongifolius</i> <i>Malachodendron ovatum</i> <i>Sorbus japonica</i> <i>pendula</i>, and <i>j. pendula</i> fol. <i>variegata</i> <i>Syrinx officinalis</i> <i>Viburnum edule</i>, <i>laetigatum</i>, <i>Oxyococcus</i>, <i>orientalis</i> YELLOW. <i>Koeleria paniculata</i> <i>Virgilia lutea</i> PURPLE. <i>Cytisus purpureus</i> <i>infractus</i>, <i>Laburnum</i> & <i>purpureus</i> GREEN. <i>Cassia americana</i>, <i>paniculata</i> <i>Gleditsia sinensis</i> BROWN.
AUGUST.				
RED. WHITE. <i>Comodora americana</i>, <i>intermedius</i>, <i>ovatus</i> <i>Hydrangea glabra</i>, <i>heterophylla</i> YELLOW. PURPLE. VARIEGATED.	RED. <i>Daphne Mezereum</i> b. <i>autumnalis</i> <i>Symphoricarpos glomerata</i>, <i>racemoides</i>, <i>paniculata</i> WHITE. <i>Cephalanthus occidentalis</i>, <i>clavata</i>, <i>paniculata</i>, <i>strobilata</i>, <i>pubescens</i>, <i>scabra</i> <i>Magnolia glabra</i>, var. <i>Thompsoniana</i> <i>Spiraea cordifolia</i>, & <i>alpinum</i> YELLOW. <i>Andromeda officinalis</i> <i>Cytisus hirsutus</i> <i>Sisyrinchia Spina Christi</i> PURPLE. VARIEGATED.	RED. <i>Hibiscus syriacus</i> & <i>rubra</i>, c. <i>plena</i>, d. fol. <i>variegata</i> <i>Spiraea tomentosa</i> WHITE. <i>Cydonia tomentosa</i> <i>Hibiscus syriacus</i> f. <i>albus</i> <i>Hydrangea arbutacea</i> <i>Prinos virginica</i> <i>Spiraea cordifolia</i> YELLOW. <i>Cobitis repulenta</i> <i>Sisyrinchia vulgaris</i> PURPLE. <i>Hibiscus syriacus</i> f. <i>purpureus</i> VARIEGATED. <i>Hibiscus syriacus</i> f. <i>variegatus</i>	RED. WHITE. <i>Æsculus macrostachya</i> YELLOW. <i>Gordonia Lasianthus</i> <i>Palustris virgatus</i> PURPLE. VARIEGATED.	RED. WHITE. <i>Acacia salicifolia</i> <i>Sumach lycioides</i> YELLOW. <i>Fontanella phyllanthoides</i> PURPLE. VARIEGATED.

DECIDUOUS SHRUBS. — SEPTEMBER.

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
RED. <i>Daphne Mezereum</i> c. <i>aurantiaca</i>	RED. <i>Vibex Agrus</i> Cistus	RED. <i>Vibex Agrus</i> Cistus, A. latifolia	RED.	RED.
WHITE.	WHITE.	WHITE. <i>Gordonia pubescens</i>	WHITE. <i>Arbutus spinosa</i>	WHITE.
YELLOW.	YELLOW. <i>Podanthus Hibernicus</i>	YELLOW.	YELLOW.	YELLOW.
VARIEGATED.	VARIEGATED.	VARIEGATED. <i>Ashlea nudiflora</i> var. <i>variegata</i>	VARIEGATED.	VARIEGATED.

SUBJECT. 2. Evergreen Shrubs.

EVERGREEN SHRUBS. — MARCH.

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
RED. <i>Erica carnea</i> , A. herbacea	RED. <i>Daphne odora</i> <i>Rhododend. disticum</i>	RED. <i>Daphne hybrida</i> <i>Rhododend. distar.</i> A. atrov.	RED.	RED.
WHITE. <i>Platanus minor</i> alba	WHITE. <i>Viburnum hirtum</i> , <i>lucidum</i>	WHITE. <i>Viburnum arct.</i> Thunb. <i>Rhododend. lat. arct.</i>	WHITE. <i>Dryas palustris</i> <i>Viburnum Thunb.</i>	WHITE.
YELLOW. <i>Daphne Thymalifolia</i> <i>C. ex alba</i>	YELLOW. <i>Daphne ponicia</i> <i>C. ex europæa</i> , A. p. pl.	YELLOW. <i>Gaultheria hibernica</i> <i>C. ex europæa</i> , provincialis, hibernica	YELLOW.	YELLOW.
PURPLE. <i>Platanus major</i> and var., minor and var.	GREEN. <i>Daphne Laureola</i> fol. var.	GREEN. <i>Taxus baccata</i> fol. var.	GREEN.	GREEN. <i>Taxus baccata</i> hibernica
APRIL.				
RED. <i>Andromeda glaucophylla</i> , <i>poliifolia</i> , A. latifolia, c. erecta, d. media, A. minor, and others <i>Arctostaphylos alba</i> <i>Chamaelirion procumb.</i> <i>Empetrum nigrum</i> <i>Faccinium Vitis idæa</i> , and var. <i>flava coccinea</i>	RED. <i>Daphne Cneorum</i> , A. fol. var., hybrida, neapolitana, ponicia A. rubra <i>Faccinium virgatum</i>	RED.	RED. <i>Erica mediterranea</i> , stricta	RED. <i>Erica coccinea</i>
WHITE. <i>Andromeda angustifolia</i> , calyculata, A. nana <i>Arctostaphylos Uva-ursi</i> <i>Cornus alba</i>	WHITE. <i>Andromeda calyculata</i> , A. latifolia, c. ventricosa, crispata <i>Cotoneaster rotundifolia</i> , sextifolia	WHITE. <i>Cotoneaster microphylla</i>	WHITE. <i>Romanechis officinalis</i> and varieties	WHITE. <i>Lyonia rigida</i>
YELLOW. <i>Mahonia repens</i> , glaucosa	YELLOW. <i>Gaultheria ciliolata</i> <i>Jasminum frutescens</i> , revolutum <i>Vitis pseudo-Cytisus</i>	YELLOW. <i>Jasminum puberulum</i> <i>Laurus nobilis</i> , A. calyculata, c. undulata	YELLOW. <i>Cytisus scoparius</i> <i>Laurus Ruscus</i> , <i>gaultheria</i>	YELLOW. <i>Laurus alba</i> , <i>Ruscus</i> , <i>gaultheria</i> <i>Mahonia diversifolia</i>
GREEN. <i>Betula nana</i> and subvarieties <i>Ruscus hypoglossum</i>	GREEN. <i>Daphne Laureola</i> , ponicia <i>Ribes punctatum</i>	GREEN. <i>A. nana</i> pumila <i>Cupressus thyoides</i>	GREEN. <i>Betula nana</i> and subvarieties <i>Myrica asperifolia</i> , and other varieties	GREEN. <i>Rhamnus alaternus</i> and var., <i>Clusia</i> , <i>hybrida</i>
MAY.				
RED. <i>Ammygdalus Lybani</i> <i>Andromeda cuneata</i> <i>Erica fusca</i> <i>Helianthemum cuneatum</i> , ciliatum, rhodanthum, variegatum <i>Kalmia cuneata</i> , glabra, romarinifolia <i>Ocoba frutescens</i> , rotundifolia <i>Oxydendron erythrorhizon</i> , macrocarpum, palustris, tenuifolium <i>Thymus vulgaris</i> <i>Faccinium Myrtillus</i> , nitidum, luxifolium	RED. <i>Cistus purpureus</i> , variegatus, and many others <i>Erica australis</i> <i>Kalmia angustifolia</i> and varieties	RED. <i>Andromeda ciliolata</i> <i>Flex Aquifolium</i> , cuneifolium <i>Rhododendron Catahebe</i> , maximum <i>Alseodendron</i> , <i>Ruscus</i> , <i>Faccinium ligustrinum</i>	RED. <i>Flex Debilis</i> <i>Rhododendron myrtifolium</i> , obtusum <i>Faccinium amaranthum</i>	RED.
WHITE. <i>Andromeda densifolia</i> <i>Arbutus platanus</i> <i>Daphne oleoides</i> , sericea <i>Gaultheria Scilla</i> <i>Helianthemum apiculatum</i> , papyraceum, pilosum, poliifolium, racematum, virgatum, and many others <i>Ledum angustifolium</i> , decumbens <i>Olea angustifolia</i> , A. nana <i>Oxydendron hirsutum</i> <i>Polypodium Chamaedorea</i> , <i>Ruscus hypoglossum</i> <i>Faccinium myrtifolium</i> , <i>Myrica</i>	WHITE. <i>Ammygdalus luxifolia</i> <i>Andromeda axillaris</i> , <i>Catahebe</i> <i>Cistus corboreus</i> , monspeliensis, populi- folius, and many others <i>Ledum canadense</i> , granulatum, latifolium, palustre <i>Faccinium danubium</i> , A. hibernicum, frondosum, <i>gaultheria</i>	WHITE. <i>Arbutus tomentosa</i> <i>Cistus acutifolius</i> <i>Lyonia paniculata</i> <i>Rhododendron maximum</i> A. folio, campanulatum <i>Faccinium danubium</i>	WHITE. <i>Arbutus Andrichne</i> , lucida, serratifolia, andromedaefolia, hy- brida, luxifolia <i>Aristida Myrica</i> , and fol. variegata <i>Cytisus albus</i>	WHITE. <i>Cistus Lactuca</i> , and varieties <i>Cistus Pyramidalis</i> <i>Flex Aquifolium fructu- sæ</i> , A. heterophyllum, c. cuneifolium, d. re- curvum, c. flexu, f. fracta flavo, g. albe- marginatum, h. atro- marginatum, i. medice- pictum. Some of these attain a greater height than that of 10 feet

EVERGREEN SHRUBS. — MAY — continued

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
YELLOW. <i>Genista anglica</i>, decid. <i>Helianthemum berbati-</i> <i>tum</i>, <i>lycopodium</i>, fl. <i>pl.</i>, <i>varifolium</i>, obscu- <i>rum</i>, <i>pulchellum</i>, <i>ser-</i> <i>pyllifolium</i>, <i>sarcebi-</i> <i>num</i>, <i>vulgare</i>, fl. pleno, and many others GREEN. <i>Juniperus nana</i>, prostrata <i>Laurus nobilis</i>, <i>nana</i> <i>Ruscus hypophyllum</i>	YELLOW. <i>Adonia Londonia</i> t. <i>Daphne genkwa</i> <i>Genista diffusa</i>, <i>parvi-</i> <i>flora</i>, <i>pilosa</i>, <i>sericea</i>, <i>triquetra</i> <i>Ulex nana</i> GREEN. <i>Juniperus sericea</i> <i>Quercus sericea</i> <i>Thuja siliiformis</i>	YELLOW. <i>Cytisus scoparius</i>, and others <i>Ulex europæa</i>, and var. fl. pl., var. <i>hiber-</i> <i>nica</i> GREEN. <i>Acer crticum</i> <i>Ajunus fruticosus</i> <i>Juniperus communis</i>, <i>sericea</i> <i>Laurus nobilis</i> b. <i>angus-</i> <i>tifolia</i> <i>Myrica carolinensis</i>, <i>b. pennsylvanica</i>	YELLOW. <i>Genista</i>, several <i>Mahonia fascicularis</i> GREEN. <i>Juniperus lycia</i>, <i>Oxyce-</i> <i>drus</i>, <i>phoenicea</i>, <i>fama-</i> <i>riscifolia</i>, <i>thurifera</i> <i>Thuja plicata</i>, <i>taxatica</i>	YELLOW. <i>Laurus Catesbaiana</i>, <i>nobilis</i> <i>Ulex europæa</i>, var. <i>hibernica</i> GREEN. <i>Acer crticum</i>, obtusa- <i>tum</i>, <i>epulifolium</i> <i>Quercus maritima</i>
JUNE.				
RED. <i>Andromeda hypnoides</i>, <i>corticata</i>, <i>b. rubra</i> <i>Dorycnium rectum</i> <i>Erica cinerea</i>, <i>vulgaria</i>, and varieties <i>Helianthemum cō-</i> <i>preum</i>, <i>mutabile</i>, <i>roseum</i>, <i>b. multiflorum</i>, <i>venustum</i>, <i>b. fl. pleno</i>, <i>versicolor</i> <i>Kalmia cuneata</i> <i>Linnaea borealis</i>, <i>b. am-</i> <i>ericana</i> <i>Vaccinium hexifolium</i>, <i>crassifolium</i>, <i>nidulum</i> WHITE. <i>Andromeda calyculata</i>, <i>apicata</i> <i>Daphne Genkwa</i>, <i>Tor-</i> <i>torifera</i> <i>Erica cinerea</i> fl. albo, <i>vulgaria</i> fl. albo <i>Helianthemum polifol-</i> <i>ium</i>, <i>pulverulentum</i>, <i>semperflorentum</i>, and others <i>Lorbeer sempervirens</i> <i>Lyonia paniculata</i>, <i>racemosa</i>	RED. <i>Andromeda speciosa</i> var. <i>glauca</i> <i>Cistus canadensis</i>, <i>canescens</i>, <i>craticus</i>, <i>parviflorus</i>, <i>platysep-</i> <i>tus</i>, <i>sericeus</i> <i>Rhododendron azale-</i> <i>oides</i>, <i>b. odoratum</i>, <i>catawbiense</i> WHITE. <i>Andromeda Catesbae</i> a. <i>speciosa</i>, and varieties <i>Cistus</i> <i>Climis</i>, <i>cyrius</i>, <i>ladaniferus</i>, <i>b. macu-</i> <i>latus</i>, <i>latifolius</i>, <i>lauri-</i> <i>folius</i>, <i>Ledum</i>, <i>populi-</i> <i>folius</i>, <i>b. major</i>, <i>salvi-</i> <i>folius</i> <i>Daphne alba</i> <i>Dorycnium hirsutum</i>, <i>tomentosum</i> <i>Lyonia frondosa</i> <i>Ruscus racemosus</i> <i>Fibrium coccineifolius</i>	RED. <i>Cytisus albus</i> b. <i>incor-</i> <i>natus</i> <i>Escallonia rubra</i> t. <i>Rhododendron puncta-</i> <i>tum</i>, <i>b. majus</i> <i>Rosa indica</i> and var. WHITE. <i>Andromeda salicifolia</i>, <i>ovatifolia</i> <i>Cistus asperifolius</i>, <i>Co-</i> <i>panianus</i>, <i>oblongifolius</i> <i>Escallonia floribunda</i> t. <i>Ulex opaca</i>, <i>Pteris</i> <i>Ligustrum vulgare</i> <i>sem-</i> <i>pervirens</i> <i>Lupinus tomentosus</i> <i>Lyonia rigida</i> <i>Notela's ligustrina</i> <i>Olea angustifolia</i>, <i>rosm.</i> <i>Rhododendron ponti-</i> <i>cum</i> alb.	RED. <i>Cytisus Pyracantha</i> <i>Pernettia mucronata</i> <i>Phillyrea angustifolia</i>, <i>hexifolia</i>, <i>latifolia</i>, <i>media</i>, <i>obliqua</i>, <i>pen-</i> <i>dula</i> <i>Rhamnus Alaternus</i>, <i>b. laciniata</i>, c. <i>lac. fol.</i> var.	RED. <i>Cercas lustrica</i> <i>Ulex cracca</i> <i>Rhamnus Alaternus</i>, <i>b.</i> <i>latifolia</i>, <i>fol. mac.</i>, and many other varieties
YELLOW. <i>Astragalus Tragicantha</i> <i>Genista procumbens</i>, <i>sagittalis</i>, <i>triangularis</i> <i>Helianthemum acumi-</i> <i>natum</i>, <i>alpestre</i>, <i>lavan-</i> <i>dulaefolia</i>, <i>leptophyl-</i> <i>lum</i>, <i>oleandricum</i>, <i>sur-</i> <i>rejanum</i>, <i>tomentosum</i>, and many others <i>Erythronium calycium</i> <i>Rhododendron chrysan-</i> <i>thum</i> PURPLE. <i>Astragalus aristatus</i>, <i>Daboecia polifolia</i>, <i>b.</i> <i>latifolia</i>, c. <i>longifolia</i>, d. <i>villosa</i> <i>Rhododendron Chamæ-</i> <i>cistus</i>, <i>ponticum</i> var. <i>pumilum</i> GREEN. <i>Ephedra distachya</i>, <i>monochæya</i> <i>Juniperus rigida</i> <i>Ostrya maritima</i> <i>Ruscus aculeatus</i>	YELLOW. <i>Adonia Londonia</i> <i>Andromeda officinale</i> <i>Cytisus spinosus</i> <i>Genista clavata</i>, <i>ger-</i> <i>mánica</i>, <i>mánica</i>, <i>athénensis</i>, <i>ovata</i>, <i>sib-</i> <i>rica</i>, <i>sylvestris</i> <i>Philonis craticus</i>, <i>fruti-</i> <i>cus</i>, <i>virens</i> <i>Rosa graveolens</i>, <i>chale-</i> <i>pensis</i>, and others PURPLE. <i>Cistus albidus</i>, <i>crispus</i>, <i>heterophyllus</i>, <i>pervi-</i> <i>florus</i>, and many others <i>Philonis italica</i>, <i>pur-</i> <i>purea</i> GREEN. <i>Juniperus Sabina</i> fol. <i>virgata</i>, <i>albertica</i>, <i>ta-</i> <i>maricifolia</i>	YELLOW. <i>Genista cinerea</i>, <i>pátens</i>, <i>plicata</i>, <i>pürgans</i> <i>Medicago arborea</i> PURPLE. <i>Aucuba japonica</i> fem. <i>Cistus rotundifolius</i> <i>Lupinus cassicifolius</i> <i>Rhododendron ponticum</i> and numerous varieties GREEN. <i>Artemisia camphorata</i> <i>Ruscus racemosus</i>	YELLOW. <i>Artemisia arborescens</i> <i>Buddleia globosa</i> <i>Genista sericea</i>, <i>serotina</i> PURPLE. <i>Lycium Atrium</i>	YELLOW. <i>Benthamea fragifera</i>: its large involucre leaves are of a pale yellow
JULY.				
RED. <i>Erica ciliaris</i>, <i>multiflora</i>, <i>Tetralix</i>, <i>vagans</i> <i>Gaultheria procumbens</i> <i>Pteris maculata</i> <i>Rhododendron ferrugine-</i> <i>um</i>, <i>hirsutum</i>, <i>b. fol.</i> <i>variegata</i> WHITE. <i>Andromeda maritima</i>, and varieties <i>Atriplex portulacoides</i> <i>Engelm. ripens</i> <i>Erica Tetralix</i> fl. albo, <i>vagans</i> fl. albo <i>Pteris umbellata</i> <i>Rhododendron ferrugine-</i> <i>um</i>, <i>corolla</i> albo YELLOW. <i>Genista radiata</i> <i>Santolina Chama-Cy-</i> <i>pariensis</i>, <i>rosmari-</i> <i>olia</i>, <i>squarrosa</i>, <i>viridis</i> <i>Tetralix flavum</i>	RED. <i>Andromeda acuminata</i>, <i>maritima</i>, <i>speciosa</i>, <i>floribunda</i> <i>Cistus monspeliensis</i> <i>Decumbria barbara</i> <i>Eucodrus americanus</i> <i>Lavandula Spica</i> a. <i>alba</i> <i>Lyonia multiflora</i> WHITE. <i>Andromeda racemosa</i>, <i>b. latifolia</i>, c. <i>cracca</i> <i>Atriplex Halimifolia</i> <i>Kalmia latifolia</i> <i>alba</i> <i>Lyonia coccineifolia</i> <i>Lavandula Spica</i> a. <i>alba</i> <i>Lyonia multiflora</i> YELLOW. <i>Apocynum androsaemum</i> <i>Genista tinctoria</i>, fl. pleno <i>Lyonia multiflora</i> <i>Rosa graveolens</i> <i>Potentilla dahurica</i>	RED. <i>Andromeda racemosa</i>, <i>b. latifolia</i>, c. <i>cracca</i> <i>Atriplex Halimifolia</i> <i>Kalmia latifolia</i> <i>alba</i> <i>Lyonia coccineifolia</i> <i>Lavandula Spica</i> a. <i>alba</i> <i>Lyonia multiflora</i> WHITE. <i>Andromeda racemosa</i>, <i>b. latifolia</i>, c. <i>cracca</i> <i>Atriplex Halimifolia</i> <i>Kalmia latifolia</i> <i>alba</i> <i>Lyonia coccineifolia</i> <i>Lavandula Spica</i> a. <i>alba</i> <i>Lyonia multiflora</i> YELLOW. <i>Apocynum androsaemum</i> <i>Genista tinctoria</i>, fl. pleno <i>Lyonia multiflora</i> <i>Rosa graveolens</i> <i>Potentilla dahurica</i>	RED. <i>Kalmia latifolia</i> b. <i>rubra</i> <i>Luchilla gratissima</i>, t. WHITE. <i>Brya Agastria</i> <i>Escallonia monteverdensis</i> <i>Solanum marcescens</i> <i>Yucca glauca</i>, <i>recurva</i> YELLOW. <i>Davalia ovata</i> t., <i>lati-</i> <i>folia</i> t. <i>Hemid. corymbosa</i> t. <i>salicifolia</i> t.	RED. <i>Kalmia latifolia</i> b. <i>rubra</i> <i>Luchilla gratissima</i>, t. WHITE. <i>Brya Agastria</i> <i>Escallonia monteverdensis</i> <i>Solanum marcescens</i> <i>Yucca glauca</i>, <i>recurva</i> YELLOW. <i>Davalia ovata</i> t., <i>lati-</i> <i>folia</i> t. <i>Hemid. corymbosa</i> t. <i>salicifolia</i> t.

EVERGREEN SHRUBS — JULY — *continued.*

Height from 0 to 2 feet.	From 2 feet to 4 feet.	From 4 feet to 6 feet.	From 6 feet to 8 feet.	From 8 feet to 10 feet.
PURPLE. <i>Andropogon nana</i> <i>Lavandula stoechas</i> <i>Salvia grandiflora</i> bi <i>Stachys lavandulifolia</i> GREEN.	PURPLE. <i>Andropogon canescens</i> bi <i>Lavandula latifolia</i> , <i>Syca</i> GREEN. <i>Atriplex portulacoides</i>	PURPLE. <i>Andropogon coccineus</i> bi <i>Lupinus tomentosus</i> GREEN. <i>Atriplex latifolia</i>	PURPLE. <i>Rhododendron punctatum</i> GREEN. <i>Artemisia procera</i>	PURPLE. GREEN. <i>Juniperus decaisne</i>
AUGUST.				
RED. <i>Rhododendron canadense</i> WHITE. <i>Yucca angustifolia</i> , <i>di-</i> <i>antemna</i> , <i>gloriosa</i> , and others YELLOW. <i>Artemisia canescens</i> <i>Rhus montana</i> GREEN. <i>Artemisia tridentata</i>	RED. <i>Eryon stricta</i> <i>Rhus sempervirens</i> and varieties WHITE. <i>Calligonum pallidum</i> <i>Poa trisetum</i> <i>Myrica asarifolia</i> YELLOW. <i>Cimicifuga maritima</i> <i>Jasminum humile</i> GREEN. <i>Artemisia abrotanum</i>	RED. WHITE. <i>Yucca coccinea</i> <i>Ligustrum lucidum</i> YELLOW. <i>Jasminum frutescens</i> GREEN. <i>Artemisia abrotanum</i>	RED. WHITE. <i>Baccharis floribunda</i> <i>Yucca repens</i> YELLOW. <i>Scaphium frutescens</i> GREEN.	RED. WHITE. <i>Artemisia tridentata</i> <i>Magnolia grandifolia</i> and varieties YELLOW. <i>Adiantum villosum</i> GREEN.
SEPTEMBER.				
RED. <i>Kalmia angustifolia</i> <i>A. serotina</i> PURPLE. <i>Salvia officinalis</i> , <i>A. an-</i> <i>gustifolia</i> , <i>triloba</i> GREEN. <i>Nelumbo frutescens</i>	RED. PURPLE. GREEN. <i>Ephedra monostachya</i>	RED. PURPLE. GREEN. <i>Garrya elliptica</i>	RED. PURPLE. <i>Baccharis latifolia</i> GREEN.	RED. <i>Artemisia tridentata</i> , <i>c. ser-</i> <i>otina</i> , <i>A. rubra</i> PURPLE. GREEN.

SUBJECT. 3. Climbing and Twining Shrubs.

5060.

HARDY CLIMBING SHRUBS. — APRIL.

BLUE.	BLUE.	BLUE.	BLUE.	BLUE.
				<i>Atragene americana</i> <i>Wistaria Conspicua</i>
MAY.				
WHITE. PURPLE. <i>Vicia major</i> ex. and varieties SCARLET. <i>Caprifolium Pericly-</i> <i>menum</i> fr. YELLOW.	WHITE. PURPLE. <i>Vicia major</i> ex. and varieties SCARLET. YELLOW.	WHITE. <i>Rosa bracteata</i> , <i>A. fl. pl.</i> <i>Rosa blanda</i> PURPLE. SCARLET. YELLOW.	WHITE. <i>Caprifolium italicum</i> fr., <i>Periclymenum</i> , var. <i>balsicum</i> PURPLE. <i>Lycium europaeum</i> , <i>rufidulum</i> SCARLET. <i>Calampelis scabra</i> YELLOW. <i>Caprifolium etrusc.</i> fr.	WHITE. <i>Atragene ochroleuca</i> <i>Glomastis ciliolata</i> ex., <i>paniculata</i> ex. <i>foliata</i> , <i>Rosa</i> <i>A. pluma</i> PURPLE. SCARLET. <i>Caprifolium semperv-</i> <i>rens</i> ex., <i>griseum</i> ex. YELLOW. <i>Glomastis balsatica</i> 12, ex.
JUNE.				
RED. <i>Vicia major</i> , <i>A. rosea</i> ex. WHITE. <i>Atragene alba</i> BLUE. <i>Soliva (Billardiera) he-</i> <i>terophylla</i> ex. YELLOW. <i>Caprifolium flavum</i> fr., <i>italicum</i> fr., <i>diolcum</i> fr. GREEN. PURPLE. <i>Glomastis campaniflora</i> <i>Lycium barbarum</i>	RED. <i>Glomastis Viticella</i> <i>A.</i> <i>rubra</i> <i>Rosa Rosalindae</i> WHITE. <i>Colostera scandens</i> <i>Rosa Banksiae</i> , <i>caprea-</i> <i>lata</i> ex., <i>sempervirens</i> ex. BLUE. <i>Panicum caribaeum</i> YELLOW. <i>Glomastis artemisia</i> <i>Jasminum revolutum</i> ex. <i>Rosa Banksiae</i> <i>A. lutea</i> ex. GREEN. PURPLE. <i>Glomastis Strain</i> , <i>Vidua</i> , <i>Viticella</i> and <i>C. fl. piteo</i>	RED. <i>Rosa Bournevillei</i> , <i>Gra-</i> <i>villii</i> , <i>multiflora</i> semp. and <i>plena</i> , <i>Noblesse</i> , <i>Bengal elegans</i> WHITE. <i>Rosa arvensis</i> , <i>Bengal</i> <i>florida</i> ex. BLUE. <i>Panicum caribaeum</i> YELLOW. <i>Aristolochia tomentosa</i> , <i>alpa</i> <i>Caprifolium ciliatum</i> , <i>Periclymenum</i> , <i>A.</i> <i>quercif.</i> fr., <i>Pericly.</i> <i>A.</i> <i>varieg.</i> fr. <i>Glomastis girardinii</i> , <i>orienta-</i> GREEN. <i>Ampelepis cordata</i> , <i>Aedonaea</i> , <i>hirsuta</i> , <i>bipinnata</i> PURPLE. <i>Glomastis reticulata</i> , <i>Vidua</i>	RED. <i>Caprifolium diolcum</i> ex., <i>griseum</i> ex., <i>italicum</i> <i>A.</i> <i>rubrum</i> fr., <i>Pericly-</i> <i>menum</i> <i>artemisia</i> , <i>rufidulum</i> WHITE. <i>Billardiera scandens</i> ex. BLUE. <i>Wistaria floribunda</i> <i>A.</i> YELLOW. <i>Caprifolium hirsutum</i> GREEN. <i>Berberis vulgaris</i> <i>Glomastis virginiana</i> <i>Smilax blanda</i> , <i>ex-</i> <i>calca</i> , <i>quadrangulata</i> , <i>Vitis Labrusca</i> , <i>tiparia</i> PURPLE.	RED. <i>Glomastis Vidua</i> ex. <i>Panicum caribaeum</i> <i>rubra</i> WHITE. <i>Panicum caribaeum</i> <i>Glomastis Viticella</i> , <i>mon-</i> <i>stachya</i> BLUE. <i>Glomastis cylindrica</i> <i>Wistaria frutescens</i> YELLOW. <i>Glomastis sempervirens</i> GREEN. <i>Smilax glauca</i> , <i>lan-</i> <i>ceolata</i> , <i>panicu-</i> <i>lata</i> ex., <i>piper</i> <i>Vitis vitifera</i> , <i>ex-</i> <i>calca</i> , <i>laciniosa</i> , <i>neuro-</i> <i>palma</i> , <i>cordata</i> , <i>deutera</i> , <i>Wistaria</i> PURPLE. <i>Atragene americana</i>

HARDY CLIMBING SHRUBS.—JULY.

RED. <i>Caprifolium sempervirens, oblongifolium Swt. (sempervirens var. minus)</i> <i>Tecoma radicans, & major, & minor</i>	RED. <i>Caprifolium sempervirens, oblongifolium Swt. (sempervirens var. minus)</i> <i>Tecoma radicans, & major, & minor</i>	RED. <i>Caprifolium implexum Sw.</i>	RED. <i>Rubus fruticosus</i>	RED. <i>Rhus rigida, multiflora var. platyphylla</i>
YELLOW.	YELLOW.	YELLOW. <i>Clematis glabra, orientalis</i> <i>Jasminum revolutum</i> <i>Periploca graeca Sw., longiflorum Sw.</i> <i>Lavigata Sw.</i>	YELLOW. <i>Caprifolium chinensis Sw.</i> <i>Douglasii Sw., flavum Sw., longiflorum Sw.</i> <i>Menispermum canadense max., virginianum max.</i>	YELLOW. <i>Jasminum pulcherrimum</i>
PURPLE.	PURPLE. <i>Solanum Dulcamara</i>	PURPLE. <i>Solanum Dulcamara fol. varieg.</i>	PURPLE. <i>Clematis crispa, Virgata, & rubra, & f. pil. Lycium chinense</i>	PURPLE. <i>Pamellia cerasulacea-racemosa</i>
BLUE.	BLUE.	BLUE.	BLUE.	BLUE. <i>Clematis cylindrica, Viticida</i>
WHITE. <i>Decandella bicolor, & sermentosa</i> <i>Rubus coryfolius, laciniatus, & f. piano, and many others</i>	WHITE. <i>Caprifolium Periclymenum f. albo Sw.</i> <i>Clematis florida, f. piano</i> <i>Rosa moschata, and f. piano, multiflora, f. albo, nigra, repanda</i>	WHITE. <i>Stragale ochroleuca, sibirica</i> <i>Celastrus bullatus</i> <i>Clematis Flammula and var. paniculata, Vitid.</i> <i>Jasminum officinale, fol. arg. and aur.</i>	WHITE. <i>Clematis parviflora</i>	WHITE. <i>Asclepias tuberosa</i>
GREEN.	GREEN.	GREEN.	GREEN. <i>Pamellia racemata f. Smilax laurifolia, rotundifolia, rubra</i>	GREEN. <i>Ampelopsis cordata, heterophylla, bipinnata</i> <i>Rhus rigida, & rotundifolia, Toxicodendron Flida blanda</i>
AUGUST.				
RED. <i>Caprifolium Grevium ex. Rosa multiflora, var. platyphylla, ruga, Noisetiana, and numerous varieties of it</i>	WHITE. <i>Clematis parviflora, Flammula, & rotundifolia, & maritima</i>	YELLOW. <i>Aristolochia alphitocena</i> <i>Clematis deltoidea, orientalis</i>	GREEN. <i>Clematis virginiana</i> <i>Smilax canadensis Sw., Helix and varieties ex. Smilax aspera, auriculata, & asperifolia, and many others</i>	ORANGE. <i>Colaptes auratus</i> <i>Tecoma capensis f. radicans, & major</i>

6061. *The propagation and culture of shrubs being the same as that for trees, we combine both subjects in the catalogue of arboriculture in the succeeding book.*

SECT. III. *Selections of Shrubs for particular Purposes.*

6062. *The particular purposes* to which shrubs, like flowers, may be applied, are the concealment of deformities or imperfections, and the production of particular beauty or desirable effects. We shall here select the names of a few for concealing vertical and horizontal deformity; for producing an immediate effect as to bulk; for producing vegetation under the shade and drip of trees; for ornamenting water and rocks; for forming edges and hedges; for diffusing agreeable odours; as being ornamental in their fruit; and for economical or botanical purposes.

SUBJECT. 1. *Shrubs for concealing vertical and horizontal Deformities.*

6063. *Vertical deformities* may either be concealed by the rapid and tall growing sorts (Subsect. 2.), or by the climbers or twiners, either deciduous or evergreen. The climbers may be nailed to a wall or fence, or tied to a trellis, or allowed to climb on branches and spray; for the twiners, tall sticks or poles are necessary.

6064. *Horizontal deformities* may be concealed by rapid-growing bushy plants, by allowing climbers and trailers to spread over them, or by the proper trailers and creepers of the hardest kinds, a few of which are these :—

Deciduous. *Ampelopsis heterocarpa*; *Rosa arvensis*; *Cornus canadensis*; *Cytisus canadensis*; *Opuntia* *reus*, *supinus*, *decumbens*, *erectus*; *Rubus fruticosus*, *argenteus*; *Rhus glabra*, *Rhus typhina*, *Rhus copallina*; *Hamamelis virginica*; *Swampy.* *Hedera canadensis*, *Rosa carolinaensis*, *Flora rubra* and *minor*.

SUBJECT. 2. *Shrubs of rapid and bulky Growth.*

0065. Shrubs of rapid and bulky growth are often desirable to produce immediate effect in laying out pleasure-grounds, as well as for producing shelter, and concealing objects.

Dicladia. Cocties arborescens and hampica; Cornus alba, florida, and sanguinea; Cytisus nigricans, affinis; Ligustrum vulgare, Philadelphus coronarius, Rosa villosa, turbinata; Alnus serrulata, Ribes rubra necrose,

Sambucus nigra, Spiraea opulifolia, Syringa vulgaris, Viburnum Opulus, Urtica dioica, Caragana, Cytisus latifolius; Cupressus sempervirens, Pinus aquitana, Juniperus virginiana, Ligustrum vulgare var. sempervirens.

Crategeus Pyracantha, Pinus sylvestris; Potentilla granatensis, Ceris var. serotima; Rubus; Alnus; Malus; Glazoum, Quercum ilex, Prunus bacata, Thalictrum, orient.; Ulex europae var. alb.; Viburnum Tinnus.

SUBJECT. 3. *Shrubs which thrive under the Shade and Drip of Trees.*

6066. *Shrubs which grow under the shade of trees* are found in practice to be a most valuable class for filling up blanks in old shrubberies, or screen plantations; and thus producing greenness, variety, and healthy aspect, instead of emptiness, haggard stems of trees, or mere ghosts of plants.

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SUBJECT. 4. Shrubs for planting by the Sides of Pieces of Water, or in Marshy Grounds, and among Rocks.

6067. *Besides aquatic shrubs*, most of the peat-earth species are also suitable for marshy situations.

<i>Deciduous.</i> <i>A. nana</i> ; <i>Betula nana</i> , <i>pumila</i> , and <i>silvatica</i> ; <i>Myrica cerifera</i> and <i>Gale</i> ; <i>Populus</i>	<i>halimifera</i> ; <i>Salix</i> , most of the species.	<i>Evergreen.</i> <i>A. rotundifolia</i> , <i>A. triplex</i> , <i>B. alba</i> , <i>Ledum palustre</i> , <i>Pinus palustris</i> , <i>Andromeda polifolia</i> .
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6068. *Of mountain or rock shrubs* the following are some of the most hardy:—

<i>Deciduous.</i> <i>Betula nana</i> , <i>Daphne alba</i> ; <i>Genista angulata</i> , <i>decumbens</i> ; <i>Lonicera alpigena</i> , <i>Onobrychis fruticosa</i> , <i>Penstemon frutescens</i> , <i>Primula saxatilis</i> , <i>Rhododendron dauricum</i> , <i>Ribes al-</i>	<i>pinum</i> ; <i>Rosa alpina</i> , <i>spinosissima</i> ; <i>Rubus c. n. s.</i> , <i>corylifolius</i> , <i>hispidus</i> . <i>Evergreen.</i> <i>Arctostaphylos alpina</i> , <i>Chamaedaphne ciliolata</i> , <i>Daphne genkwa</i> , <i>Empetrum nigrum</i> ; <i>Erica</i> , all the	<i>hardy species</i> ; <i>Helianthemum</i> , all the species and varieties; <i>Gaultheria procumbens</i> , <i>Juniperus communis</i> , <i>Rosmarinus officinalis</i> ; <i>Ulex europæa</i> , <i>europ. fl. pl.</i> , <i>nana</i> , <i>hibernica</i> .
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SUBJECT. 5. Shrubs for forming Edgings and Hedges in Gardens.

6069. *Of shrubs for edgings* few are comparable to the box (*Buxus sempervirens* var. *nana*); but some others may be occasionally used, as the

<i>Amygdalineae</i> <i>buxifolia</i> , <i>Lyoni</i> ; <i>Andromeda polifolia</i> , <i>axillaris</i> ; <i>Arctostaphylos</i> <i>Uva-ursi</i> , <i>Empetrum nigrum</i> ; <i>Erica</i>	<i>herbacea</i> , <i>Tetralix</i> , <i>dilatata</i> , <i>vagans</i> <i>corollata</i> , <i>rubra</i> , <i>vag. corollata</i> ; <i>Calluna vulgaris</i> , <i>Hebea helix</i> , <i>Lavandula</i>	<i>Spice</i> , <i>Polygala Chamædaphne</i> , <i>Daphne laureola</i> , and even <i>Ulex nana</i> , <i>Vincetoxicum</i> , <i>minor</i> .
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6070. *Hedge shrubs.* The following are a few of the numerous shrubs which may be used as hedges for shelter in gardens; almost all the free-growing sorts may be planted in rows, and cut in the hedge form; but the following sorts will form compact evergreen shelters:—

<i>Buxus sempervirens</i> , <i>Ceanothus laurifolius</i> , <i>Pinus</i> , <i>Juniperus communis</i> , <i>Laurus nobilis</i> ; <i>Ligustrum</i>	<i>vulgare</i> , <i>sempervirens</i> ; <i>Philadelphus</i> <i>latifolia</i> , <i>latifolia</i> , and <i>media</i> ; <i>Rhamnus Alaternus</i> , <i>Rosmarinus officinalis</i> ,	<i>Taxus baccata</i> , <i>Thuya occidentalis</i> and <i>orient.</i> , <i>Ulex europæa</i> var. <i>hills</i> , <i>Picea</i> <i>maria</i> ; <i>Lavand. Spica</i> , <i>latif.</i>
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The creeping shrubs may be formed into hedges by training on framework.

6071. *Flowering hedges* may be formed of the following deciduous sorts:—

<i>Coronilla flammula</i> , <i>Cydonia japonica</i> , <i>Cytisus albus</i> , <i>Daphne Mezereum</i> , <i>Hibiscus syriacus</i> , <i>Philadelphus coron-</i>	<i>alus</i> , <i>Rubus hispida</i> ; <i>Rosa</i> , various species; <i>Spiræa hypericifolia</i> , <i>Syringa</i>	<i>præcox</i> var. <i>laciniata</i> , <i>vulgaris</i> , <i>chinensis</i> , &c.; <i>Cytisus scoparius</i> .
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SUBJECT. 6. Shrubs whose Flowers or Leaves have volatile Odours, and diffuse them in the surrounding Air.

6072. *Of shrubs whose odours are volatile* only a few have this quality in the leaf as well as the flower; these are marked leaf:—

<i>Deciduous.</i> <i>Azalea</i> , most of the species; <i>Betula pendula</i> , <i>Corydalis</i> ; <i>Myrica</i> <i>Uva-ursi</i> , <i>Rosa rugifolia</i> , leaf; <i>Salix</i> , most of the species, but es-	<i>pecially</i> <i>S. viminalis</i> , <i>alba</i> ; <i>Syringa</i> <i>alba</i> , <i>latifolia</i> , <i>coriata</i> ; <i>Evergreen.</i> <i>Lavandula Spica</i> , leaf; <i>Rosmarinus officinalis</i> , leaf.	<i>Climbers.</i> <i>Clematis flammula</i> ; <i>Cepi-</i> <i>folium latifolium</i> , <i>gibbum</i> and <i>latifolium</i> , <i>num</i> , and every species; <i>Yucca</i> <i>officinalis</i> , and every species.
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SUBJECT. 7. Shrubs ornamental in their Fruit as well as Flowers.

6073. *Ornamental fruit-bearing shrubs* are also serviceable in alluring singing-birds to the shrubbery.

<i>Deciduous.</i> <i>Berberis vulgaris</i> , <i>Ligustrum vulgare</i> ; <i>Betula pumila</i> , <i>Corydalis</i> ; <i>Rosa spinosissima</i> and <i>villosa</i> , <i>Sorbus americana</i> and <i>lanceolata</i> ; most of the species of <i>Lonicera</i> , <i>Vaccinium</i> , <i>Viburnum</i> , and all the species of <i>Cornus</i> , <i>Budonis</i> , <i>Crataegus</i> , <i>Prunus</i> , <i>Pyrus</i> , and <i>Sambucus</i> . Few shrubs	are more ornamental than the above (<i>Prunus spinosa</i> <i>Lat.</i>): It is profusely covered with odoriferous white flowers early in April, and with dark purple fruit with a fine bloom, from September to February; <i>Symphoricarpos racemosa</i> . <i>Evergreen.</i> <i>A. rotundifolia</i> , <i>Arctostaphylos alpina</i> , and <i>Uva-ursi</i> ; <i>Coræa</i>	<i>alba</i> , <i>Empetrum nigrum</i> , <i>Budonis americana</i> , <i>latifolia</i> ; <i>Picea Aquiliformis</i> , <i>Juniperus communis</i> and <i>securica</i> ; <i>Crataegus Pyracantha</i> ; <i>Prunus</i> , all the evergreen species; <i>Taxus baccata</i> , <i>Vaccinium</i> , all the species; <i>Hedera Helix</i> . <i>Climbers and Creepers.</i> <i>Caprifolium</i> , all; <i>Rosa</i> <i>art.</i> var. <i>Ayrshire</i> , <i>Vitis vulpina</i> .
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SUBJECT. 8. Selections of Shrubs for botanical or economical Purposes, parasitic Trees, and Shrubs for a small Shrubbery.

6074. *Selections of shrubs* may be arranged in innumerable modes, as well as of herbaceous plants; as according to soil, climate, habitation, country, rarity, order in botanical systems, uses in agriculture or in the arts, &c. No gardener can make any selection who does not know by inspection the actual plants, and their habits, culture, and history; to him it is needless to repeat the sources to which he may have recourse for forming any classification whatever.

6075. *A selection for botanical purposes* will necessarily include parasitic plants, of which the only hardy genus is *Piscum*. This is propagated by seeds, mainly, if not only; but Professor Henslow has observed some facts, published in *Mag. Nat. Hist.* vol. vi. p. 506, on which he has, there, suggested that the mistletoe is also "propagated somewhat in the manner of those terrestrial plants which, like the potato, possess rhizomata, or underground stems, from whose surface young plants are developed at intervals;" through the bark of the tree inhabited by the mistletoe, in its case, as through the soil in the case of terrestrial plants. To multiply plants of the mistletoe, procure berries of it when these are ripe, which is about Christmas; immerse them with the finger and thumb into the chinks of the bark of congenial trees in such a manner as to rupture the skin of the berry, and squeeze out the single seed in each, and the very tenacious gum which surrounds it. The comparatively younger parts of the bark are fitter than the older and drier. The gum will affix the seed persistently enough to prevent the frosts and rains dissolving it, until it germinates in the ensuing spring or summer, when its intrusion of roots into the bark and albumen will secure it from such casualty afterwards. Some, as Professor Walker (*Essays on Nat. Hist.*), on the supposition that the seeds will not vegetate till they have passed through the stomach of a bird, recommend causing fowls to eat the seeds, and then sowing them. But this is found not to

answer; for though the digestive powers of the stomach do not destroy the vegetative power of seeds which pass rapidly through it, yet if otherwise it does. The mistletoe is propagated in nature by the mistletoe-thrush (*Turdus viscivorus*), but not, as is generally supposed, by means of its excrement. This bird feeds on the berries of the mistletoe in winter. These, from their viscosity, often stick to the outer part of the bird's beak, and to disengage them he strikes it against the branch of the tree on which he alights, and leaves the seeds sticking to the bark; if this should chance to be a smooth part, the seed will adhere to it, and in the succeeding spring will grow, the radicle piercing the bark, and the unfolding itself in the air. The *Piscum* grows best on the *Pomaceæ*, but it will also grow on the *sub. pep.*, *lime*, *oak*, *pine*, &c., on which trees we have observed it in abundance in Germany. In the pine forests near Magdeburg, it is most abundant on *Pinus sylvestris*. Mr. DeCandolle has stated, in the *Mag. Nat. Hist.*, vol. v. p. 503, that seeds of the mistletoe sown by him upon different sorts of trees, vegetated upon twenty-four sorts; he has added, "but on most of them it soon died, particularly on the gummy and resinous; and only thrives well on its usual habitats, the apple and hawthorn." Besides the stocks for the mistletoe which we have already named, we learn from Ray's *Synops.* p. 53, that it has been found upon the hazel, upon maple, willow, and elm. It has been established upon *Ceanothus laurifolius*.

6076. *A selection of trees and shrubs of great beauty and easy culture*, proper for introduction into shrubberies of limited extent:—

<i>Deciduous trees.</i> <i>Acer pennsylvanicum</i> , <i>Amelanchier canadensis</i> , <i>Arctostaphylos</i> <i>Fraxinus americana</i> , <i>Fraxinus sylvatica</i> b. <i>arbutifolia</i> ; <i>Pistacia occidentalis</i> , <i>Quercus coccinea</i> , <i>Pyrus chloranthus</i> , <i>Rosa blanda</i> , <i>Pseud-Achillea</i> , <i>Schubertia disticha</i> , <i>Vitis europæa</i> , <i>parvifolia</i> , <i>grandifolia</i> . <i>Evergreen trees.</i> <i>Cedrus Libani</i> , <i>Cupressus sempervirens</i> ; <i>Juniperus Virgi-</i>	<i>niana</i> ; <i>Pinus Lambertiana</i> , <i>Pinus</i> ; <i>Quercus græca</i> and <i>Siberica</i> . <i>Deciduous shrubs.</i> <i>Amelanchier nana</i> , <i>Amelanchier canadensis</i> , <i>Ceanothus</i> <i>laurifolia</i> , <i>Chionodoxa</i> , <i>Colibea cruenta</i> , <i>Cornus florida</i> , <i>Coronilla flammula</i> , <i>Cydonia japonica</i> ; <i>Cytisus albus</i> , <i>purpureus</i> ; and <i>Semilivifolia</i> ; <i>Daphne Mezereum</i> , <i>Genista</i>	<i>florida</i> , <i>Falestis tetraepera</i> , <i>Hibiscus syriacus</i> and varieties; <i>Ligustrum vulgare</i> , <i>Lyonia paniculata</i> , <i>Magnolia obovata</i> , <i>Philadelphus coronarius</i> ; <i>Pyrus</i> <i>Chamaemephus</i> , <i>lanceolata</i> ; <i>Rubus hispida</i> ; <i>Rosa alba</i> , <i>centifolia</i> , <i>cinnaomêna</i> , <i>darmasica</i> , <i>indica</i> , <i>lutea</i> , <i>moschata</i> , <i>mucronata</i> , <i>rubiginosa</i> , <i>spinosissima</i> , <i>villosa</i> ; <i>Spiræa</i> <i>Aspe-</i>
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ricifolia, opulifolia, hella, ericifolia; *Syringa pernice*, sinensis, vulgaris; *Viburnum Opulus* *h. rosea*, *Lantana*.

Evergreen. *Andromeda calyculata*, *Arbutus Uvedo* and *Andrachne*, *Ascarus Japonica*; *Buddleya globb.*, *Buxus balearica* and *sempervirens*; *Citrus aurantiaca*, *aurantia*, *lusciana*; *Cistus cypricus*, *Crataegus Pyracantha*; *Daphne Laureola* and *pontica*; *Erica hercynica*, *Debercia polifolia*; *Genista anglica*, *Helianthemum apenninum*, *grandiflorum*, and *vulgaris*; *Ulex Aquifolium*, and nume-

rous varieties; *Jasminum fruticans* and *humile*, *Juniperus Sabina*, *Kalmia angustifolia* and *latifolia*, *Lavandula Spica*, *Leucurus nobilis*, *Ligustrum vulgare*, var. *sempervirens*; *Magnolia grandiflora*; *Phillyrea angustifolia*, *latifolia*, *ilicifolia*, *media*, &c.; *Rhododendron maximum* and *poticum*; *Rosa indica*, *semperflorens*, and *Hanksia*; *Rosmarinus officinalis*, *Ruscus racemosa*, *Spartium junceum*, *Flaxus bacata*, *Tubia occidentalis* and *orientalis*, *Viburnum Tinus*, *Ulex europæi*, *Yucca filamentosa*, *gloriosa*.

Climbers and trailers. *Ampelopsis berberacea*, *bipinnata*; *Atragene austriaca*, *sibirica*; *Caprifolium Periclymenum*, *h. belgicum*, *flavum*, *viridatum*, *chinense* and *sempervirens*; *Clematis cirrhosa*, *flammula*, *florida*, *Viorna*, *Vitalba*, and *Viticella*; *Hedera Helix* and varieties, *Jasminum officinale*, *Lycium barbarum*, *Pasiflora cereum*; *Rosa arvensis*, *h. Arachne*, and *sempervirens*; *Tecoma radicans*, *Vinca major* and *minor*.

CHAP. XI.

Frame Exotics.

6077. *Frame exotics* are such plants as are rather harder than those kept in the greenhouse, and of low growth. Some of those enumerated here will also be found among the green-house, and a few among the hardy plants. The frames or pits in which they are kept are never artificially heated, but are well covered with mats or other materials during severe frost. The frames are sometimes attached to the front of the green-house or stove, and thus derive some heat from the front flue, which, when an outside frame is in contemplation, is generally built in the front wall. When this is not the case, they may be advantageously placed on a border sloping to the east, south, or west, under the shelter of a hedge or wall. The pots should be plunged in scoræ, ashes, saw-dust, or any similar non-conductors, and abundance of air and little water given in the winter time. Few scenes are more interesting in the spring season than a small oblong flower-garden, surrounded by a holly-hedge enriched with many spikes of coral berries: within the hedge, a sloping frame-border all round; on the north side, containing frame exotics; on the west, early-flowering bulbs, as hyacinth, crocus, narcissus, &c.; on the east, choice auriculas; and on the south side (the border facing the north) a collection of alpine: the middle of the garden laid out in beds of florists' flowers. In summer the sashes are applied to various useful purposes, as to ripen fruits against walls, to raise late crops of cucumbers, melons, &c.

SECT. I. Frame Woody Plants.

Those marked *cl* are climbers; *tw* are twiners; *tr* are trailers; those marked * are hardy in most parts of England.

6078.

FRAME WOODY PLANTS.

FEB. MAR. APR.	MAY.	JUNE.	JULY.	AUGUST.	SEPT. TO NOV.
<i>Anagallis foetida</i> , glauca	<i>Cistus vaginatus</i> , and many others	<i>Andromeda hypnoides</i>	<i>Amorpha canescens</i> , <i>erecta</i> , <i>Lewisia</i> , <i>microphylla</i>	<i>Alysum spinosum</i>	<i>Antirrhinum molle</i>
<i>Convolvulus tetragona</i>	<i>Convolvulus Cneorum</i>	<i>Apophyllum suaveolens</i>	<i>Antennaria contorta</i>	<i>Amorpha canescens</i>	<i>Asparagus acutifolius</i> , <i>albus</i>
<i>Anthyllus erinacea</i> , <i>Hermaphrodite</i>	<i>Daphne hybrida</i>	<i>Atraphaxis undulata</i>	<i>Calceolaria thyrsiflora</i>	<i>Calceolaria suffruticosa</i>	<i>Caprifolium chinense</i> <i>tr</i>
<i>Cerasus prostrata</i>	<i>Edwardsia chrysophylla</i> , <i>grandifolia</i> , <i>microphylla</i>	<i>Calceolaria integrifolia</i> , <i>rugosa</i> , &c.	<i>Capri altum oblongifolium</i> <i>tw</i>	<i>Calceolaria ascendens</i> , &c.	<i>Eriobotrya elliptica</i> , <i>japonica</i>
<i>Cydonia speciosa</i>	<i>Fuchsia microphylla</i>	<i>Caprifolium flax.</i> <i>tr</i>	<i>Celastrus subulatus</i>	<i>Cinorrum triecocum</i>	<i>Euphorbia imbricata</i>
<i>Hypericum</i> <i>Erica</i>	<i>Fuchsia microphylla</i>	<i>Cissampelos</i> <i>tr</i>	<i>Cistus</i> , many	<i>Dianthus arbuscula</i>	<i>Gaultheria pulchra</i>
<i>Rivina japonica</i>	<i>Helianthemum</i> , many	<i>Dianthus fruticosus</i>	<i>Cistus</i> , many	<i>Dianthus arbuscula</i>	<i>Heimia salicifolia</i> , <i>myrtifolia</i>
<i>Magnolia complanata</i> , <i>obovata</i> , <i>Soulangiana</i> , <i>tormentosa</i>	<i>Hippocrepis laevis</i>	<i>Erigeron glaucus</i>	<i>Helianthemum</i> <i>tr</i>	<i>Helianthemum</i> <i>tr</i>	<i>Hibiscus bipinnatus</i>
<i>Mahonia fasciculata</i>	<i>Hypericum ericoides</i>	<i>Helianthemum atriplicifolium</i>	<i>Hudsonia ericoides</i> , <i>tormentosa</i>	<i>Lechenaultia formosa</i>	<i>Hypericum empetrifolium</i> , <i>nudifolium</i> , <i>rosmarinifolium</i>
<i>Paeonia Moutan</i> , var. <i>papaveracea</i> , &c.	<i>Illicium emittatum</i> , <i>floridatum</i> , <i>parviflorum</i> , <i>chinensis</i> , <i>bermudiana</i>	<i>Linum arboreum</i>	<i>Linum suffruticosum</i>	<i>Luculia gratissima</i>	<i>Malva angustifolia</i>
<i>Phloxina serrulata</i>	<i>Magnolia obovata</i>	<i>Linum arboreum</i>	<i>Linum suffruticosum</i>	<i>Marrubium Pseudo-Dictamnus</i>	<i>Marrubium acetabulosum</i> , <i>Pseudo-Dictamnus</i>
<i>Raphiolepis salicifolia</i>	<i>Ononis Natrix</i>	<i>Lewisa herbifolia</i>	<i>Nicotiana fruticosa</i>	<i>Dictamnus</i>	<i>Phloxina dubia</i>
<i>Rhododendron antheopogon</i> , <i>c. setosum</i> , <i>aromaticum</i>	<i>Pentstemon campanulatus</i> , <i>elegans</i> , <i>roseus</i>	<i>Ononis crispus</i> , <i>virginialis</i>	<i>Nicotiana fruticosa</i>	<i>Dictamnus</i>	<i>Rubia fruticosa</i>
<i>Rosa odorata</i> , <i>flavescens</i> , <i>Grevillei</i> , <i>semperflorens</i>	<i>Rhododendron nepal.</i>	<i>Pinckneya pubens</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Pinckneya pubens</i>	<i>Tecoma canadensis</i> , <i>coriacea</i> , <i>fruticans</i>
<i>Rubus roseifolius</i> , <i>h. cotinarius</i>	<i>Rhododendron arboreum</i> , <i>h. album</i>	<i>Raphiolepis indica</i> , <i>glaucescens</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Pinus lucidus</i>	<i>Teucrium flavescens</i>
<i>Tilia articulata</i> , <i>cupressoides</i>	<i>Rosa microcarpa</i> <i>cl</i>	<i>Raphiolepis indica</i> , <i>glaucescens</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Rosmarinus hypericifolius</i>	<i>Teucrium fruticosum</i> , <i>maxillare</i> , <i>montanum</i> , <i>Narum</i> , <i>Polium</i> , <i>regium</i>
	<i>Rubia calidula</i>	<i>Rhododendron chrysanthum</i> , <i>cinereum</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Rosmarinus hypericifolius</i>	<i>Ulex europæi</i>
	<i>Sutherlandia frutescens</i>	<i>Rubia calidula</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Rosmarinus hypericifolius</i>	<i>Yucca filamentosa</i>
	<i>Tenoreia plantaginifolia</i>	<i>Sutherlandia frutescens</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Rosmarinus hypericifolius</i>	
	<i>Vestia lycioides</i>	<i>Tenoreia plantaginifolia</i>	<i>Rosa involucrata</i> , <i>sinica</i>	<i>Rosmarinus hypericifolius</i>	

SECT. II. Frame Succulents.

6079.

FRAME SUCCULENT PLANTS.

FEB. MAR. APR.	MAY.	JUNE.	JULY.	AUGUST.	SEPT. TO NOV.
<i>Saxifraga cuneifolia</i> , <i>sarmentosa</i>	<i>Opuntia polyacantha</i> , <i>vulgaris</i>	<i>Opuntia fragilis</i> , <i>media</i>	<i>Mammillaria muscoulensis</i>	<i>Agave americana</i> , <i>virginica</i>	<i>Cacalia Kleinia</i>
<i>Sempervivum plan-dubium</i>	<i>Sempervivum album</i>	<i>Sempervivum canaliculatum</i>	<i>Echeveria coccinea</i> , <i>grandifolia</i>	<i>Monanthes polyphylla</i>	<i>Ruphrisia Myrsinitis</i> , <i>Sempervivum tabulariforme</i>

arranged as before, so far as respects time of flowering and colour; but, considering the limited height which all exotic plants attain in pots, it has been deemed unnecessary to attend to size. Such as are trees in their native country will be indicated by the letters *t*; such as are biennials, by the letter *b*; the most tender, by *t*; the most showy, by *s*; and those continuing in flower two or three months, by *S*, as before.

SECT. I. Select Green-house Plants.

6086. *As select green-house plants* we shall consider the pelargoniums, ericas, and camellias; which three tribes united will supply a green-house with flowers of almost all colours, during every month of the year.

SUBSECT. 1. Geraniaceae Dec., Gerania J., Monadelphica L.; Geranium L., Geranium, Erodium, and Pelargonium of modern authors. Geranium, Fr.; Geranium, Ger.; and Geranio, Ital.

6087. *The green-house kinds of Geraniaceae* are nearly all from the Cape of Good Hope, or have been obtained from the species brought thence by a course of cross impregnation, practised on them by British cultivators, and recently also by those of Belgium, Holland, and France. The various species display much dissimilarity of habit in the following modes:—A rootstock tuberous, fasciculatedly tuberous, or devoid of tubers, and ligneous or herbaceous; devoid of stem, or endowed with an herbaceous, half shrubby, or more usually shrubby, stem; furnished, in the tuberous-rooted stemless kinds, with simple, pinnate, or decomposed leaves, and in the shrubby-stemmed kinds with leaves usually entire but variously toothed, lobed, and, in some kinds, divided and invested with all degrees of pubescence, and possessed of some variety of odour and of flavour. The flowers in all the kinds are borne in umbels on a peduncle which in the stemless kinds arises from the centre of the source of the leaves, and in the shrubby kinds from the axil of almost each of the upper leaves. The number of flowers borne in an umbel is very different in different kinds, and greatest in those of the Ciconium or horsehoe-leaved group.

6088. *The flowers of the majority of the Geraniaceae* are devoid of obvious colour; but here, as in other cases in nature, gifts are equalised; for, although to the kinds whose petals are remarkable for their beauty little or nought of odour appertains, certain kinds whose petals are less showy, and even, in some, of a dingy mournful hue, effuse at eve, and through the night, a free supply of most delicious odour. Of this last kind are *Pelargonium flavum*, *gibbosum*, *triste*, and species allied to these. The flowers of *V. vespertinum*, which have their petals white, spotted with red, are very gracefully fragrant in the evening.

6089. *The kinds which are most estimable for the size of their flowers, and the beauty of their colours, and the markings of them, are those which have been originated, by hybridisation, by cultivators, the most distinguished of whom, in Britain, are Messrs. Sweet, Dennis, Russell, Hill, Gains, and Bunney.*

6090. *Hybridisation by manipulation, as applied to pelargoniums, was not in use anterior to the present century, and*

6092. *Old kinds, all or most of them reputed species.* The letters following the names denote the months in which the kinds flower.

Pelargonium affine, f. var. ap.

platum, f. var. ap.
laciniatum f. var. ap.
Grevilleanum, f. var. ap.
palchellum f. var. ap.
apicatum, f. var. ap.
ardens, f. var. ap.
degarum, my.
quinatum, my.
fusatum, my.
grandiflorum, my.

Pelargonium gladium, ja.

paniculatum, ja.
echinatum, ja. es.
sanguineum, ja. es.
lobatum, ja.
triste, es.
flavum, es.
odoratissimum, es.
cruciatum, es.
clatum es.
reniforme, es. s.

Pelargonium monstrum, es.

rigidum, es.
Erodium incarnatum, es.
Pelargonium quinquevultum, s.
serotinum, ja. s.
bicolor, s.
tricuspidatum, s.
scabrum, s.
fragile, s.
lancoletum, s.
cortusium, s.

6093. *Of kinds old, or nearly old, of hybrid origin, with large and exquisitely coloured and marked petals, and highest in estimation in 1854, we present the annexed list. It is copied from Mr. Dennis's list, published in February, 1854, and our transcript presents all the sections, and under each a selection of the kinds which have the highest merits, and are therefore*

I. White; with Red or Purple Lines and Spots.

Admiral Cockington, my.
Archduchess, ja.
Beatrice, ja.
Brightness, ap.
brilliantness, ja.
Countess of Plymouth, ji.
**Duchess of Clarence.*
Duchess of Gloucester, my.
Fosterism, my.
glabrescens, my. ja.
Hill's champion, my. ja.
sinoplatum, ja.
lucidum, my. ja.
Navarino, ap. my.
**Oxonides album, my.*
**pavonum album, ja.*
vestiflorum, ap. my.

II. Black; with Red or with Purple Lines and Spots.

didum, my. ja.
Anna Maria, ap.
Betsy, ap. my.
**paniculatum, ja.*
politum, ja. ji.

III. Lilac; of different Shades.

Fairlie, es. s.
**inscriptum grandiflorum, ja.*
obovatum, my.—ji.

IV. Pink; with Red or Purple Lines or Spots.

**abditum, ja.*
Adamsi, ji. ji.
diversatum, es. ji.
**Kilivickianum, ji.*

Louisa Philippe, ja. ji.
**Succedaneum germanicum, ja.*

V. Rose; dark Purple Lines or Spots.

Diadme, or Devonia, ja.
Flora Macdonald, var. ap.
habrathum, var. ap.
**Imperator maximus, my.*
**Imperator perfectus, my.*
incarnatum, ap.

Jack of Newbury, ap.
King of May, my.
lucidum odoratum, my. ja.
magnificum, ja. ji.

Maid of the May, my. ja.
magnitudinem, ap. my.
Miss Pelham, ja.
molitum, ja.

Polly, ap. my.
**Poltemassum, ja.*
Queen of May, my.
Queen of Rose, ap. my.

Rosa floribunda, ap. my.
Rosa mundi, my. ja.
Rose éclatante, ja. ji.
Stemmelianum, ja.

Virginia, ja. es.

VI. Very bright orange; large Black or watery Spots.

Dennis's Q. Adelaide, ja.—s.
Lord Nelson, ja. es.
Lord Ravensworth, ja.—s.

VII. Red or Scarlet; shaded with bright Orange, dark Purple Lines or Spots.

Cecidrum, es. s.
Dennis's Paul Fry, var. ap.

the most desirable. The selection has been very kindly made for us by Mr. Dennis; who has, besides, added the names (those starred) of some kinds whose excellence has brought them into estimation even since his list was published. Mr. Dennis has also added the periods at which each kind usually flowers.

Dennis's William IV., ja.—s.

Duchess of Bedford, ji.—s.
Duke of Bedford, ji.—s.
Ecilpas, ja.—s.
Gainsborough, my. ja.
Jenkinson's Psyche, ji.—s.
No plus ultra, var.—s.

perfectum, ji.—s.
quadriflorum, ja. ji.
Red Rover, my. ja.

VIII. Oak-leaved; Red or Scarlet; dark Lines or Spots.

Bellefleur (le scarlet), shaded with dark crimson, my.—ji.
Bishoppe, ji.
Brown's Lady Gore, ja. es.
Eminent, ap.—ja.
Fire king, ap.—ja.
glorianum (crimson), my. ja.
rotunda, ap.—ji.

Othello (scarlet, shaded with dark crimson), my.—ji.
Paganini, ap.—ji.
guercifolium superbum, ap.—ji.

Russell's Queen Adelaide, ja.
Stewards (scarlet, shaded with dark crimson), my.—ji.

IX. Bright Scarlet; shaded with light or dark Crimson; very dark or Black Spots or Lines.

Adonis, ja.
Ariel, ji.
Burnettsium, my. ja.
Duke of Northumberland, ja.
**Krebeurium, ja.—s.*

Lord Brougham, my. ja.
obtusidentatum, ji.
Plantagenet, ja.—es.
Princes Augustus, ja.—s.
Prometheus, ja.—s.
Sir William Wallace, ap.

X. Very fine large Red, with Black Lines or Spots.

Admiral Nelson, ji.
Bluebird, ja.—es.
Clarissimum, es.—s.
Agraria, ja.—es.
Laender, ap. my.
laxum multiflorum, ap. my.
magnum bonum, ja.—s.
Speculum, ap.
**Zoraba, ji.*

XI. Purple; dark Lines or Spots.

albinotum, ap.
Albion, ap.
Brutus, ja.
Collegium, my.
**forbidentum purpureum, ja.*
Fusus superbus, ap. my.
**Jacquinum, ji.*

XII. Large Crimson, very dark Shaded.

concolorum, ji. es.
Darleydawn, ja.
**Defensivum, ji.*
**Stratum, ja.*
Maria Louise, ja.—es.
sacculatum, or Young's
Agrippina, ja.—es.

XIII. Crimson Purple: with White, Scarlet, or Black Marks or Lines.

Black Prince, *my.-j.*
calamistratum, *my.-o.*
*Catebysseum, *my.-o.*
conspicuum, *ap.-ja.*
Dardanus, *ap.-ja.*
Fanny Kemble, *my.-o.*
Humel grandiflorum, *ap.-es.*
*lanigerum, *ja.*
Master Walter, *my.-es.*
Richardson, *my.-au.*
Smith's Q. Adelaide, *my.-es.*
Waltjeum, *my.-au.*

XIV. Clouded or obscured

with dark Purple or Black.

*Brunette, *j.*
*Carate, *j.*
Eldonia, *ja.-au.*
*goldmann, *my.-es.*
*Lord Ebrington, *ja.-j.*
nubilum, or Rob Roy, *ja.*
obscuratum grandiflorum, *ja.-j.*
Rollinbois, *ja.-j.*
tinctum, or Dennis's rival, *ja.-j.*
Yestmanum grandiflorum, *my.-j.*

XV. Upper Petals, approaching nearly to Black, with paler lower Petals.

King's Psycho, *ja.-j.*
olymicum, *my.-es.*
amty, *my.-au.*

XVI. Bright Rose-red.

amandum, *ja.*
Cindrella, *ja.-es.*
Coplie, *my.-ja.*
*Glaucous, *ja.-j.*
*pavoninum maximum, *ja.*

XVII. Dark Rose-red.

Gowri asperum, *ja.*
Inscriptum rubrum, *my.-es.*
malachrofollum, *my.-es.*
*Preston, *my.-es.*
spectabile striatum, *my.-es.*
Van Housen, *ja.*

XVIII. Dark Red.

Palki, *ap.-j.*
Pizarro, *ap.-j.*
Reuben Aspley, *ap.-j.*

XIX. Purple-shaded Red.

fulminans, *my.-j.*
grandissimum, *my.-j.*
Lady Catherine, *my.-j.*

XX. Various.

bipinnatifidum, *my.-ja.*
King of the Sandwich Isles, *ja.-es.*
Smith's Man of Rom, *ap.-es.*
versipellum, *es. s.*

6094. *Propagation.* The ordinary mode of continuing such species and variety, is by cuttings; but almost all the sorts produce ripe seeds in this country, by which they may be multiplied, and also new varieties produced. The seed, if ripe before midsummer, may be sown as soon as gathered, in pots of light rich earth, and placed in a gentle hotbed and shaded. The plants will soon come up, and if, when they show two proper leaves, they are transplanted singly into pots, and kept under a cold frame, several of them will flower in the following spring and summer, and most of the remainder in the next spring and summer. No plant grows more readily by cuttings than the shrubby or suffrutescent species of this family; the cuttings may be taken off at a joint where the wood is beginning to ripen; laid in the shade for an hour or two till the wood heals; and then planted in sandy loam, and placed in a gentle heat. The hardier sorts, as *P. zoster*, *linguata*, &c., will strike in the open air or in any shady situation, without being covered with a glass. Cuttings of the roots of such sorts, as *P. triste*, *gibbum*, &c., strike readily; a single joint, or a cutting of the root, being left above ground. The fibrous-rooted herbaceous sorts, as *Erdium Reichardtii* and *glandulosum*, may be multiplied by dividing the roots. "From the latter end of March to the middle or end of July," Cushing observes, "cuttings of all the common kinds of *Pelargonium* may be put in with success: Let a moderate hotbed be made up, and surfaced with some old tan; when it is of a proper temperature, let the cuttings be made, and put in some nice rich loam, plunge the pots to the rim in the bed, and shade them for a day or two, but no longer; pick off any damping leaves that may appear, water them occasionally, and observe to pot them off in due time, by which means they will be stout plants by the end of autumn: the more curious kinds are in general done by cuttings of the thick fleshy roots, which they produce in abundance: as many of these as can be spared with safety being taken off carefully from each plant, and a few of the finer fibres attached to them and neatly potted in small pots, leaving the crown of each about one fourth of an inch above the surface, covered and set on a moderate heat, will, in a few weeks, make excellent plants: one, two, or more stems, which they in general produce, being left to form the plant." (*Rae's Gard.*, p. 90.)

6095. *Culture.* The *Geraniums* require a light rich soil; they grow well in equal parts of sandy loam and well-rotted dung; or they will grow in leaf-mould and a little sand, without any thing else. As most species are rapid growers, the pots require to be examined in spring and autumn, and the roots and top reduced, or the plant shifted into a larger pot. In general

the shrubby sorts should be kept low and bushy by pruning; for, when they are allowed to grow tall and straggling, they are very unsightly and do not flower well. Some of the herbaceous sorts may be considered as frame plants; but the greater number require the green-house, and some of the very succulent sorts are best grown in the dry-stove. Where an extensive collection of *Geraniums* is kept, it is desirable to devote a house entirely to their culture: in this the roof should be of a construction to admit as much light as possible, the stage should be near the glass, and there should be ample means of giving air and heat. Most of the species require rather more heat during winter than evergreen woody exotics from the same climates; otherwise they are apt to lose their leaves and rot at the points of the shoots. To prevent this, heat should be given in the daytime and air admitted at night, and when any leaf begins to decay, it should be removed. The hardier *Geraniums*, like other green-house plants, are generally placed in the open air from May to September; but, as the flowers are much injured by heavy rains and winds, the more delicate sorts, and all those intended to flower in the best manner, should be kept in the house with abundance of air night and day. In warm situations it is customary, in April or May, to plant many of the *P. zonale* and other free-growing sorts in the border of the flower-garden or shrubbery: these have a splendid effect till attacked by frost, when the plants may either be protected by they stand by abundance of litter and mats, or they may be removed into single pots, and placed in a dry part of the green-house till the following spring. The Rev. W. Williamson has found, that if the plants are taken up, deprived of their stalks and fibrous roots; the wounds made in doing this healed by exposure in a dry place; and afterwards the roots deposited in layers in a mass of sand, placed in a cellar, or otherwise excluded from frost; they will retain their vegetative power through the winter, and grow vigorously when replanted. In the open air in spring. (*Hort. Trans.*, vol. iv. p. 414.) Mr. Mackenzie has recommended in the *Gard. Mag.*, vol. ix. p. 343, to secure a stock of rooted cuttings previous to winter, to be thickly planted in pots, and preserved in the green-house or dwelling-house throughout the winter.

6096. *Forcing the Geraniums.* The hardier shrubby sorts, as *P. zonale*, *geraniifolium*, *formosum*, *cordatum*, &c., force well with a very gentle heat, and in this way may be kept in flower during the winter months till April and May, when they will be succeeded by those that have been kept in the common green-house temperature.

SUBJECT 2. Exotic Heaths. — *Erica* L.; *Oxandria Monogyna* L. and *Erietz* J. *Brugère*, Fr.; *Heide Kraut*, Ger. and Dutch; *Maccia*, Ital.; *Brazo*, Span.

6097. *The heath family*, constitute an extensive assemblage of low shrubby evergreen plants, much valued for the beauty of their flowers, and the blossoming of many of them in the winter season. Scarcely any exotic heaths were known in Miller's time, and none of the Cape species. Almost the whole of these have been introduced to Europe during the reign of Geo. III., and the greater part by Masson, a collector, who made two voyages to Africa at that king's expense. (*See Gard. Mag.*, vol. v. p. 47.; *will* p. 216.)

6098. *Species and varieties.* Above 400 species have been introduced, some of which from the difficulty of propagation, or from accidental causes, have been lost; but there are still upwards of 250 sorts, which may be procured from the nurseries. There are also several varieties which have been raised from seed. The Hon. and Rev. W. Herbert has raised several hybrid heaths, which give reason (*Hort. Trans.*, iv. p. 37.) for thinking that many of the sorts imported from the Cape, and considered as species, are only hybrids produced by promiscuous impreg-

nation. We have here arranged most of the sorts procurable in the nurseries; and, in addition to the time of flowering, and colour, designated the form of the flower, as tubular shaped (t), ventricose (v), with a spreading border (b), with an inflated calyx (c), small globular (g), or small ovate (o). Consult a valuable article by Mr. Bowie in *Gard. Mag.*, vol. i. p. 365. Mr. D. Don has recently divided the genus *Erica* into several: see *Gard. Mag.*, vol. x. p. 401.

6099. ERICA. — MARCH.

RED.	RED.	RED.	RED.	RED.	RED.
<i>andromediflora</i> c.	<i>canaliculata</i> c.	<i>grandinosa</i> g.	<i>nidularia</i> g.	<i>pubescens</i> g.-po. minor g.	<i>tenax</i> g.
<i>ardens</i> g.	<i>costata</i> s. <i>superba</i> f.	<i>herbacea</i> o.	<i>oxycochylifolia</i> o.	<i>pubescens</i> g.-po. minor g.	
<i>australis</i> o.	<i>erubescens</i> f.	<i>hispida</i> g.	<i>paniculata</i> g.	<i>pyramidalis</i> o.	
<i>calva</i> o.	<i>filiformis</i> g.	<i>incarnata</i> f.	<i>persoluta</i> g.	<i>striata</i> o.	
	<i>gracilis</i> f.	<i>longifolia</i> f.		<i>tenuis</i> o.	
PURPLE.	PURPLE.	PURPLE.	PURPLE.	PURPLE.	PURPLE.
<i>abundantiflora</i> g.	<i>blanda</i> f.	<i>fasciculata</i> f.	<i>mundula</i> f.	<i>paniculata</i> f.	<i>rugosa</i> f.
<i>aristata</i> f.	<i>concolor</i> g.	<i>glabra</i> c.	<i>mundula</i> major f.	<i>plena</i> c.	<i>venusta</i> f.
<i>Banksiana purpur.</i> bicolor f.	<i>decora</i> g.	<i>hirta</i> f.	<i>Nivea</i> l., N. minor f.	<i>pubescens</i> verna g.	
	<i>exserta</i> o.	<i>linnæoides</i> t.			
YELLOW.	YELLOW.	YELLOW.	YELLOW.	YELLOW.	YELLOW.
<i>Bonplandiana</i> l.	<i>lanata</i> f.	<i>onomeiflora</i> t.	<i>Paterfamilia</i> t.	<i>simpliciflora</i> f.	<i>spicata</i> f.
<i>capitata</i> c.	<i>lanuginosa</i> v.	<i>pellens</i> f.	<i>Peperisera</i> t.	<i>Spartanica</i> t.	<i>strobilifera</i> o.
<i>foliolularia</i> f.	<i>modiflora</i> c.		<i>Sedana</i> t.		
GREEN.	GREEN.	GREEN.	GREEN.	GREEN.	GREEN.
<i>elegans</i> c.	<i>vernix</i> v.	<i>vernix</i> major v.			
WHITE.	WHITE.	WHITE.	WHITE.	WHITE.	WHITE.
<i>acutifolia</i> f.	<i>citrina</i> f.	<i>bellantherifolia</i> g.	<i>paniculata</i> alba g.	<i>plumifolia</i> f.	<i>serotina</i> g.
<i>arborescens</i> g.	<i>clonata</i> f.	<i>tecanthera</i> c.	<i>paniculata</i> alba g.	<i>pyrophylla</i> f.	<i>thymifolia</i> o.
<i>stylota</i> g.	<i>granulata</i> c.	<i>limnæa</i> t.	<i>perspicua</i> f.	<i>racemosa</i> g.	<i>triflora</i> c.
<i>major</i> o.	<i>gracilis</i> g.	<i>Muscari</i> f.	<i>Peziza</i> g.	<i>setacea</i> g.	<i>velutina</i> f.
<i>minor</i> o.			<i>pyramidalis</i> g.		

ERFCA. - APRIL.

RED. amar-na g. anthera f. arctica f. Bankiana var. r. pera f. Boisfordiana f. bella f. Bergiana o. Bergiana o.	RED. bracteolaria o. candescens o. castrovalia o. comosa f. costata f. cylindrica f. erosa f.	RED. exigua o. Sordida moschata o. hirta o. Lambiana l. low-aria o. muscosa o. oppositifolia rubra o.	RED. pallida c., pill. rh. bra o. purpurea o. perspicua f., pers. nana f. pallida f. Platanifolia t. sericeifera o.	RED. racemosa g. rubra o. alula o. sparsa g. squamosa c. tenuiflora f. tridactyla var. rubra f.	RED. tubiflora f. ventricosa f., vent. clonus f., vent. erecta f., vent. al. liffera f. virens g. viciosa o.
PURPLE. ambigua o. aperta c. Acheriana f. aristata f. curvicularis g. baccata c. cinerascens o. concolora f. Constantia g.	PURPLE. cruciformis f. cubica major a. spinaeflora f. decora v. dentulata f. diambiflora c. dumosa g. empetrifolia g. eximpta o.	PURPLE. Sibirica f. fudata o. sinuata f. fuchta o. glomerata g. guttata f. hirtata f. hirtifolia g. inundibularis f.	PURPLE. Luzonesis f. lucida cor g. mellifera g. serulosa f. moesta g. notula f. notatilla f. pavlovii o. parviflora o.	PURPLE. petiolata c. pura cor g. purpurea v. pumila c. purpurata f. recurvata f. Smithiana f. sparsa f. spuria f.	PURPLE. stellaria g. stellata f. stellifera g. tardiflora f. tubercularia g. tubiflora f. tardiga c.
YELLOW. aspera f. Blanfordiana f. Boislandiana l.	YELLOW. campanulata g. flava g. foleosa g.	YELLOW. longiflora f. lutes f. Pateroni f.	YELLOW. monstrata f. Pateroni major f. Pateroni minor f.	YELLOW. Sedae lites f., Sed. minor f. sensiflora f.	YELLOW. spicata f. tenuiflora f.
GREEN. densa f.	GREEN. grida f.	GREEN. acopharia minima g.	GREEN. socciflora f.	GREEN. sensiflora f.	GREEN. sensiflora f.
WHITE. angustula o. albena o. argentiflora o. crispata c. Bankiana var. alba f. brunnea c.	WHITE. capitata spicata o. Chloriflora l. colorata f. crispata c. conferta g. cordata g.	WHITE. discolor f. flexuosa c. grida albena f. lutes alba f. luteo-alba f. Muscana v.	WHITE. nigrita c. nivea g. odorata c. oppositifolia f. penicilliflora f. phylicoides o.	WHITE. primulaeides f. procreta f. protuberans o. rosulata f. salax c. strigosa g.	WHITE. sensiflora alba f. tridactyla c. tridactyla f. ventricosa alba f. villosa g.
SCARLET. Ardena g. coccinea f.	SCARLET. schiffiora coccinea o. schiff. superba f. lensiflora f.	SCARLET. mutabilis g. Pateroni coccinea f., Pat. superba f.	SCARLET. reflexus f. sanguinea f.	SCARLET. splendens f. splendida f.	SCARLET. ventricosa coccinea f.

MAY.

RED. accha o. adenophora o. ampullifera o. approximata o. aristata f. auxiliaris f. barbata o. craucata o. candevae f. cuntidoides	RED. cónica c. costata f. cruenta f. daphnoides f. dénua v. Dickensian ribra v. dénua f. erectiflora f. empetroides f. emarginata c. exa. pilidita f.	RED. ferruginea v. florida o. glauclunba f. guttatiflora f. hybrida f. ignescens f. imbricata o. inflata v. jubata o. kalmiflora o.	RED. Lamberione p. latifolia o. longiflora f. lucida c. malanthra o. melastoma f. monadelphica f. palustris v. peruviana f., pamp. pinnata f. pennsylvanica f.	RED. etaphylla di- color o. purgans o. princeps c. reginiana v. retorta o. rigida f. rubra o. Russelliana f. Savileana f.	RED. teucriifolia o. tiarabifera o. transbaena f. varius rubra o. vernicolor f., ven. major f. vestita incornata f., vest. rosea f.
PURPLE. Acte's g. oleocarpoides o. bucciniformis f. calycina c. Calyculata o. cerudifolia o. complanata f. clamydiforma o.	PURPLE. coarctata g. coerulesa f. Comptoniana o. cruciatiflora o. crowea g. cumuliflora c. cupressa o. daphnoides v.	PURPLE. decolorata f. floribunda f. florida moechata o. fragrans f. glauca c. Hartwelli d. hypnoides f. intervalis g.	PURPLE. lasiochrysa o. parvifolia f. modesta g. molle o. smucronata o. munda c. nervosa f. octopetala o.	PURPLE. ovata g. parvifolia f. patens c. Pulcherrima palli- f. g. plumosa o. recurvata f. Schubertii g. Seminifera f.	PURPLE. aphylla f. tenella o. thyrsifolia o. tricolor o. umbellata o. vestita elegans f., vestita purpurea o. viridipurpurea g.
YELLOW. ampulliflora o. Aspera f. campanulata g. complanata o.	YELLOW. compurpa f. flavilla c. flammea f. flava g., imbricata g.	YELLOW. glava f. grandiflora f., grand. fragrans f. humilis f. Malicdaba f.	YELLOW. lacticolor o. Macquet f. nana o. resinosa g.	YELLOW. occidua f. spicata f. tenuiflora f. Thunbergii g.	YELLOW. vestita lutea f.
WHITE. acutángula o. álbida d. aristata p. asurgens o. baccan' c. Banksiana var. álba. brachy. major o. biflora c. Bovianae t.	WHITE. distifolia g. conferta p. confertiflora o. asurgens o. cylindrica f. Dicksoniana v. ál. v. domiana d. erectophylla g. fastigiata v.	WHITE. flaccida c. flexuosa o. glabra v. incisa c. inflata álba v. lachenussifolia c. lactea g. Lamberione g. margaritacea g.	WHITE. marifolia g. molissima g. incandula f. nigrita c. noveborac. odorata g. passerina g. penciliflora g. Persicula álba g.	WHITE. Peziza g. phylicoides o. pyroliflora c. rictica o. sálex c. ascutáscula o. scutifolia o. apemosa c. transparens f.	WHITE. triceps g. triphyllana o. trunciflora f. vestita álba f. ureocaulis o. urina g.
GREEN. capitata o.	GREEN. dégrea c.	GREEN. apiculata f.	GREEN. pilosa o.	GREEN. viridescens f.	GREEN. viridis f.
SCARLET. cerithioides v., var. major f., var. nárea o.	SCARLET. coerulesa f. costata superba f.	SCARLET. expansa f. gemmiflora f.	SCARLET. imperialis d. princeps v.	SCARLET. sangu. nárea o. spicifera f.	SCARLET. thimida v.

JUNE.

RFD.	RSD.	RED.	RSD.	RED.	RED.
acuminata pallida s. an-pulicaria rubra f. bicolor f. cylindrica f. (Coventryana) f. saxifraga carnosa f. var. pallida f.	formosa rubra s. foliolata f. gemmifera f. Acanthobolus f. Acanthobolus f. Acanthobolus f. lobata f. lobulata f.	longifolia f. metastachya f. minima f. mitis-flores f. obscura rubra f. umbellata f. ovata f. pallens f.	pectinifolia s. pelticida rubra s. perspicua f. prostrata carnosa f. repens f. ramulosa rubra s. rosea f. rubella f.	ribens s. Ruelliana s. Ruelliana s. Saxifraga minima f. Saxifraga f. spendens f. staminea f. teguia f.	tricolor s., tricol. major v., tricol. minor v. prostrata carnosa f. vestita incarnata f. vest. rubra f.
PURPLE. "egregia" f. "arctica" f. t. articularia s. Hepatica s. lobata v. brunnea s. buccinoides f.	PURPLE. Celsiana f. concolor f. droserifolia minor f. semipetiolata f. geminifolia f. lobulata f. humilis f.	PURPLE. limbifolia f. lobulata f. metastachya s. nana f. Niviverna f. pedunculata f. evalvata f.	PURPLE. penicillata f. peltata f. procumbens s. pedunculata f. pelticella s. Saxibotrys s. Schottii f. stellata f.	PURPLE. quadrangulata v. ramulosa f. rigidifolia f. Nollobolus f. Saxibotrys s. Schottii f. stellata f.	PURPLE. tendula s. tomentosa f. tota f. turbata f. vestita elegans f. vires f. Walkeri f.

ERFCA. — JUNE — continued.

YELLOW. complanata f. dorsosa a. serotia f.	YELLOW. exurgens f., etc. grandiflora f., etc. major f. flammula f.	YELLOW. ciliolata f. Falcata f. Hilbertiana f. insidia f.	YELLOW. intermixta f. longiflora f. multiflora v. simpliciflora f.	YELLOW. Spergularia v. pilosa f. vestita filigula f., vest. lites f.	WHITE. arctica v. caerulea v. serotina v. vestita filis f.
WHITE. stellatibunda f. secta f. Altoniana f. ampullacea filis f. calycina f. congesta g.	WHITE. divaricata v. digitata v. formosa filis a. horrida f. lychnis f. jasmiflora f., jasmifolia filis f.	WHITE. lactiflora a. laciflora a. lim' via g. Luncheonae t. marginellana g. umbellifera filis a.	WHITE. pellucida filis a. petiolata c. platyfolia spiralis f. pyrophylla f. pra'dans f. primuloides f.	WHITE. para pyramidalis a. regimenaria filis a. scryphillana g. scutellaria f. triflora f.	SCARLET. vestita coccinea f., vest. muskilla f.
GREEN. capitata g. dignus c.	GREEN. Mugunculosa ferruginea v.	GREEN. Nivensana t. plum b.	SCARLET. coccinea f. sanguiinea f.	SCARLET. vestita coccinea f., vest. muskilla f.	SCARLET.

JULY.

RED. acuminata a. Altoniana f. ampullacea f. Bandonensis f. calycina f. carneola f. Coventryana f.	RED. curviflora rubra f. denata f. Evermanni t. Ev. glabra f. glabra f. Ew. pilosa f. Ev. speciosa f. exurgens, etc. carnea- la, etc. pallida f.	RED. globosa a. horizontalis a. lucana c. lachnanthida mammosa f., pal- lida f. Ev. pilosa f. obcordata f. Parneterianae f. Parn. rubea pendula g. plendula g.	RED. Mâsoni t., Mân- minor t. moschata f. mucosa g. Nivensana f. Parneterianae f. Parn. rubea pendula g. plendula g.	RED. pinastri-folia rubra f. primuloides f. propinqua c. runcinata g. spadicea f. speciosa c. Strawsoniana v.	RED. Thompsoni v. tenuis f. Thunbergii h. transversaria v. strychia f. vestita lacustris f., vest. rosea f.
PURPLE. aggregata f. Altoniana f. calycina f. Bandonensis l. bianda v. calycidolosa c.	PURPLE. destra g. elata f. glabra f. guttulosa f., gut- tuosissima f. dracunculoides f. hispidia g.	PURPLE. mammosa f., man. minor f. mutabilis f. obliqua g. Parneterianae f. pendula f.	PURPLE. parviflora f. planifolia g. mutabilis f. prostrata a. pulverulenta a. purpurea f.	PURPLE. pygmaea g. quadrangulatis v. Sebanis t. squamosa c. stellata g. umbellata g.	PURPLE. Swainsoniana t. taxifolia c. viridis a. vestita purpurea f. virginia a.
YELLOW. curviflora f. elongata f. exurgens f., em. grandiflora f.	YELLOW. Patersoniana maj. f. foliosa g. grandiflora f.	YELLOW. Hilbertiana t. intermixta a. lites, lut. minor f.	YELLOW. magifica a. molissima g. rudiflora f.	YELLOW. Sebanis sarriata f. spicata f. tetragyna f.	YELLOW. Thunbergii c. vestita filigula ad vest. lites f.
GREEN. capitata g.	GREEN. coronata f.	GREEN. diagnos c.	GREEN. Mâsoni t., straggia f.	GREEN. pilosa c.	GREEN. viridiflora f.
WHITE. aggregata filis g. pedunculata c. campanulata g. catifolia g.	WHITE. decussata deflexa c. Dicksonii filis p. glomerata f.	WHITE. Hammetti f. lachnanthida f. lim' via g. swarifolia g.	WHITE. alida f. penicillata c. sinifolia f. pra'dans v.	WHITE. retrofracta g. rupicola c. serafira c. sensillata g.	WHITE. arctica v. arctostaphylis v. ventricaria filis a. vestita filis a.
VARIEGATED. cliffa spicata a. coloratus f.	VARIEGATED. fuchsa c. melastoma f.	VARIEGATED. Sebanis t.	VARIEGATED. tricolor maj v., tric. min. f.	VARIEGATED. varius v.	VARIEGATED. verticillat.
SCARLET. coccinea f.	SCARLET. pinastri-folia f.	SCARLET. angustata f.	SCARLET. verticil. c., var. maj.	SCARLET. vestita coccinea f.	SCARLET. vest. muskilla f.

AUGUST.

RED. ampullacea f. Broadleyana f. carneolata g. cerinthoides v., cer- minor v., mâna v.	RED. crucata f. curviflora rubra f. deflexa c. elongata f. exurgens rubea f.	RED. furcata v. Irbysen v. Leones t. ollina g. panicillata c.	RED. ginea g., discolor f., pla. echidnata f., p. favosides f., p. pul- chella f., p. spiralis f. pubescens minor g. rubella c.	RED. Solomonica a. subvolens g. taxifolia f. verticillata f.	RED. vestita lacustris f., vest. rosea f.
PURPLE. oërnua a. chibba c. laevale g. hibida c.	PURPLE. magifica a. mammosa f. nitida g. obcordata c.	PURPLE. obliqua g. ocruvia f. palida c. pallidula a.	PURPLE. gina purpurea f. palchella a. purpurea f. quadriflora c.	PURPLE. retorta f. scardea g. sulcata c. Stanhamsi l.	PURPLE. stricta a. stripta a. vestita dignus f. vest. purpurea f.
YELLOW. albena c. denticulata f.	YELLOW. elata f. exurgens grandifl.	YELLOW. horrida f. Patersoniana, t. Patern. major f.	YELLOW. monodonta f. audiflora c.	YELLOW. picta sarriata f.	YELLOW. epicata f. vestita lites f.
GREEN. Bandonensis f.	GREEN. clavifolia f.	GREEN. gemmatifera f.	GREEN. Imperialis t.	GREEN. Swainsoniana t.	GREEN. viridis f.
WHITE. arbutifolia g. argentiflora f. Bowlesia t. cliffa g.	WHITE. daphnoides f. digitata v. filicoides a. intermixta v.	WHITE. jasmiflora filis f. Lambertiana g. mirabilis f. Moussonia v.	WHITE. oppositifolia v. phyllodes v. pilosa g. pura g.	WHITE. rufica filis a. subrotundifolia f. vestita filis a.	SCARLET. Archardiana t. coccinea t. sanguiinea f.

SEPTEMBER.

RED. acuminata f. calycina f. currikata f. carneola f. oërnua f.	RED. condensa t. declinata g. erubescens f. exubans f.	RED. exurgens f., ex- ruba f. fibula g. Gorlandina g. horrida f.	RED. globosa a. lobulicarpa v. Major minor f. macrodonata a. mollicifera a.	RED. obcordata c. ollula g. pallidula a. peltaria f. Prichardiana nana f.	RED. rubrica f. Ruficarpa f. sensillata f. vestita lacustris f., vest. rosea f.
PURPLE. Archardiana v. carinata f.	PURPLE. declinata g. Lawsoni f.	PURPLE. pluvialis g. runcinata c.	PURPLE. Ragata f. Salisburyana c.	PURPLE. Smithsonia t. taxifolia c.	PURPLE. vestita dignus f., vest. purpurea f.
YELLOW. exurgens grandi- flora f., etc. major f.	YELLOW. glandulosa f. lanuginosa v.	YELLOW. Leones t. spicata f.	YELLOW. vestita lites f.	SCARLET. coccinea f.	SCARLET. sanguiinea f.
GREEN. superba f.	GREEN. viridescens f.	GREEN. viridiflora f.	GREEN.	GREEN.	GREEN.
WHITE. arctica f. caerulea v. campanulosa c.	WHITE. erubescens f. glaciifolia g. strobilifera f.	WHITE. laciflora a. planifolia f.	WHITE. Pritchardiana filis f. pura f.	WHITE. scitacea g.	WHITE. vestita filis f.

ERICA.—OCTOBER.

RED. <i>cerinthoides</i> f. <i>coccinea</i> f. <i>exaltata</i> f.	RED. <i>exsurgens coccinea</i> f. <i>exs. pallida</i> f. <i>flavesc.</i> f.	RED. <i>horizontalis</i> f. <i>montana</i> g. <i>mutica</i> g.	RED. <i>perla rubra</i> g. <i>pulverulenta</i> g. <i>pyramidalis</i> o.	RED. <i>targida</i> c. <i>vestita cocc.</i> f., vest. flüg. f., vest. in- can. f., vest. rosea	GREEN. <i>viridescens</i> f. <i>viridis</i> f.
PURPLE. <i>acuminata</i> v. <i>coccinea</i> f.	PURPLE. <i>declinata</i> g. <i>esserta</i> f.	PURPLE. <i>filamentosa</i> v. <i>lanuginosa</i> v.	PURPLE. <i>pedunculata</i> g. <i>pubescens</i> g. <i>rosea</i> v.	PURPLE. <i>purpurea</i> f. <i>roacea</i> v.	PURPLE. <i>vestita elegans</i> f., vest. purpurea f.
YELLOW. <i>alba</i> f. <i>corrugata</i> f.	YELLOW. <i>exsurgens grandifl.</i> f., exs. major f.	YELLOW. <i>filamentosa</i> f. <i>flava</i> f.	YELLOW. <i>picta</i> f. <i>radiata</i> f.	YELLOW. <i>serratifolia</i> f. <i>spicata</i> f.	YELLOW. <i>sulphurea</i> f. <i>vestita lutea</i> f.
RED. <i>coccinea</i> f. <i>exsurgens coccinea</i> f.	RED. <i>exs. pallida</i> f. <i>distachnata</i> v.	RED. <i>hispidula</i> g. <i>longipedunculata</i> v.	RED. <i>mundula</i> v. <i>vestita coccinea</i> f.	RED. <i>vest. fulgida incan-</i> <i>ta</i> f.	RED. <i>vest. flüg. rosea</i> f.
PURPLE. <i>collata</i> f.	PURPLE. <i>filamentosa</i> v.	PURPLE. <i>laxa</i> c.	PURPLE. <i>Sedha frasca</i> f.	PURPLE. <i>vestita elegans</i> f.	PURPLE. <i>vest. purpurea</i> f.
YELLOW. <i>exsurgens grandifl.</i> f.	YELLOW. <i>Paternonias</i> f.	YELLOW. <i>spicata</i> f.	YELLOW. <i>sulphurea</i> f.	YELLOW. <i>vestita lutea</i> f.	YELLOW.
WHITE. <i>pinas</i> f.	WHITE. <i>rupetris</i> v.	WHITE. <i>vestita alba</i> f.	WHITE.	WHITE.	VARIEGATED. discolor f.

NOVEMBER.

6100. *Propagation.* A number of the sorts ripen their seeds in this country, and may be so propagated; but the greater number are struck from cuttings, and some few, as *E. Masoni*, *retorta*, *petiolata*, &c., by layers, which require to be planted in a frame or pot till autumn, when they may be potted in a frame, and arrive in winter: they should be sown early in the spring following, in frames filled with equal parts of peat and sand, very thinly covered, placed in the shade, and well-glassed below them. The soil must be kept moderately moist by gentle waterings: they will in general come up in six weeks or three months, and may then be kept close to the glass in the hothouse, or in a frame or pot till autumn, when they may be potted in a frame. Seeds which are saved in this country may be sown as soon as gathered, if they ripen before September, but after that period it will be better to preserve them till next spring; as the plants produced from them would not be sufficiently advanced to endure the winter. Cushing (*Ericid Gard.*, p. 74), prefers a September sowing, because he finds the plants will stand the winter in the seed-pot better than those that have been raised early in spring, and transplanted in autumn into single pots. Ample directions for striking heaths will be found in Cushing's *Ericid Gardener*, who observes, that cultivators failed at first by planting large cuttings of ripened wood, instead of taking only the points of the fresh shoot. The true method, he considers, of propagating heaths was first discovered in the Hammer-smith nursery, and the following abstract of his practice, taken from Page's *Predominate*, &c. About the month of June, or as soon as the plant has made fresh shoots, cut off the extreme points about an inch long or less, according as the sort may afford, but always in the fresh shoot; take off the leaves from the lower part, as far as it is to be put in the sand, without injuring the shoot: this is rather a nice operation, and should be done with a sharp penknife, for the least bruise spoils the cutting. Dibble them into a pot, filled with moistened common white house-sand, before they have time to flag; when they are all planted, water the whole to fix them still better; let the moisture a little subside, then cover them with a small bell-glass, fitted within the rim of the pot, and place them in the shade on a spent hobble, keeping them close till rooted, which will, with the free sorts, take place in about two months: when rooted, which is known by their shining, take off the small glass, for three or four weeks, at night, previous to its total removal. They will be fit to pot off in March the ensuing year.

6101. *Henderson of Woodhill's mode of striking erica* is as follows:—"The month of July is a good time for putting in most of these cuttings; but the cuttings must not be taken off till the young wood is firm. Cuttings of erica may be put in at any time when the wood is in a proper state. Take the cuttings off the plants about three quarters of an inch long, pulling them off downwards; strip off the leaves nearly half the length of the cuttings; place the cutting on the end of the thumb, and, with a sharp knife, at right angles, cut off the small end close to the joint, or place where it was pulled off the plant. Having done this, plant them into a pot filled with small pit or river sand, giving them a good watering to settle the sand about them. Put them on a shelf where they are a little shaded;

cover them with glasses, and notice to keep the sand always moist. Some of these sorts will be well rooted in three months, and others will require six months." (*Caled. Men.*, vol. iii. p. 243.) Henderson keeps his ericas, at all times, cool, and airy; "opening the glasses in winter when there is no frost, and letting the wind blow on them, and using no fire but in time of frost. Never," he says, "shift any plant till the pot is quite full of roots. When the plants get large, five or six of them will continue in good health for three or four years without shifting, and flower well. I have plants of *Erica retorta* here, in pots, seven inches in diameter, which are very bushy, being fifteen inches across, and fourteen inches high above the pot; *Erica infundibuliformis*, two feet and a half in diameter, and two feet nine inches high; *Erica pinas*, betwixt five and six feet high, and three feet across, in pots eleven inches in diameter: these have not been above for five years since first in high health, and covered with strong fine flowers from the mouth of the pot to the top of the plant." (*Caled. Men.*, vol. iii. p. 247.) For Mr. Forster's practice at Woburn Abbey, see *Gard. Mag.*, vol. ix. p. 636.

6102. *Culture.* "A prejudice," Page observes, "having spread that the culture of these plants is difficult, one of the greatest ornaments of the green-house has hence, of late, been neglected; although the method of culture is as easy, and nearly as certain, as that of the pelargonium, but requiring a little more delicacy in the execution." The soil for all the species is peat-earth mixed with from one sixth to one fourth of fine white sand. The pots should be well drained, and rather small; but large, in proportion to the size of the plants. Heaths thrive best in a house by themselves, and placed as close to the glass as possible, without risk from frosts; they do not require so much heat as most green-house plants, but abundance of air, and, above all, great regularity as to water, so as to preserve, as much as possible, an equable and moderate degree of moisture about their roots. The mass of mould being once thoroughly dried, the plant is irreversibly lost; and it is equally so, though the operation goes on with less rapidity, if the plant is kept in a pan of water. No kind of plant is more injured by being kept in a chamber than heath, nor will they thrive in a green-house, or in the open air, within the influence of the smoke of large towns. In the best situations, and under the best management, many of the species are short-lived, and therefore require to be frequently renewed by cuttings or seeds. Mr. M'Nab, curator of the Botanic Garden, Edinburgh, cultivates the *Cape erica* with extraordinary success; and the best essay on the culture of them is, "A Treatise on the propagation, cultivation, and general treatment of Cape Heaths, in a climate in which they require protection during the winter months." Pamphlet, 1832; see *Gard. Mag.*, vol. viii. p. 210.

6103. *The erica* are not subject to insects. Henderson says "I have never had any insect on them except the green fly. The old grandiflora is the only one with me that has been attacked. I destroyed the flies by dipping the plant into an infusion of tobacco. The erica, I find, do not agree well with being smoked with tobacco-paper in the usual way." (*Id.*, vol. iii. p. 247.) On preventing erica from mildew, see *Gard. Mag.*, vol. ix. p. 344; see also p. 6134.

SUBJECT. 3. *Camellia*.—*Camellia W.*; *Monad. Polyand. L.* and *Camellia Dec.*

6104. *The genus Camellia* includes some of the most ornamental of green-house shrubs, and most of them are so hardy as, in many parts of England, to require little more care, during winter, than protection from frost. The great value of this genus is, that it flowers early in spring, and even, when properly treated, during winter. In our *Hortus Britannicus* there will be found six species, and upwards of fifty varieties; and in the excellent work of Chandler and Booth, entitled *Illustrations and Descriptions of the Camellia*, forty sorts are most beautifully figured, and scientifically described. Among these forty sorts are five species, sixteen varieties of Chinese origin, and upwards of twenty raised from seeds ripened in this country. By far the most complete collections in Britain are that of Messrs. Loddiges of the Hackney Nursery, and that of Messrs. Chandler, nurserymen, Vauxhall. The former is celebrated for the size and splendour of the plants, and the latter for the numerous varieties. In Messrs. Chandler's work, besides the figures and descriptions, will be found an excellent treatise on their propagation and culture; but as it accords perfectly with former directions, we have not thought it worth while to give it here. The genus *Thea*, by many authors included under that of *Camellia*, may be subjected to the same treatment. The *Thea viridis*, or green tea, is much more hardy than the *Thea Bohéa*, or black tea. (See *Gard. Mag.*, vol. ii. p. 33, vol. iii. pp. 56, 181, vol. iv. p. 464, vol. viii. p. 211.)

6105. *Propagation.* The single red camellia is propagated by cuttings, layers, and seeds, for stocks; and on these the other sorts are generally inarched, and sometimes budded or grafted. The cuttings, without being covered with glasses, take root in summer, which are taken off in August, cut smoothly across at a joint or bud, two or three of the lower leaves only taken off,

and the cuttings then planted and made firm with a small dibble, in pans of sand or loam, or, by some cultivators, sand and peat, or sand alone. The pans are kept in a pit or cold-frame, the cuttings without being covered with glasses, but shaded during power-ful sunshine; and in the following spring, such as are erect will begin to push, when they are to be placed in a gentle heat.

In September or October following, the rooted plants will be fit to pot off; and in the second or third spring they may be used as stocks. Henderson puts in camellia cuttings at any time of the year, except when they are making young wood. He puts fifty cuttings in a pot of sand eight inches in diameter, sets them in a cool place in the back of a vinery or peach-house for a month or six weeks, and then plunges them to the brim in a holed wheel where there is a little bottom heat. A speedy mode of obtaining stocks is by planting stocks in a pit devoted to that purpose, and laying these in autumn; the following autumn most of the layers will have produced roots, when they may be taken off and potted, and used as stocks in the succeeding spring. Inarching or grafting is performed early in spring, when the plants begin to grow; the chief care requisite is to place and fix the stocks so that they may not be disturbed during the connection of the scion with the parent plant. The graft being cayed over, is then covered with moss, to prevent its cracking. When independent grafting is resorted to, the mode called side-grafting (1944.) is generally used, as in the case of orange-trees (5352.); but the operation of tongueing is generally omitted, as weakening the stock, and unnecessary, with a view to prevent the scion from being blown off by winds. A few seeds are sometimes obtained from the single red and semidouble camellias, and from the single variegated; these require two years to come up, but make the best stocks of any. The tea-camellias are generally propagated by layers, but will also succeed by cuttings.

6106. *Soil.* Some cultivators grow the camellias chiefly in peat; but Messrs. Loddiges, who have the most splendid collection of this genus, formerly used a little sand in the peat, and the peat for most of the sorts; and they are grown in a similar soil in the Hammermith nursery. Of late, Messrs. Loddiges find light loam alone to answer as well or better. In the Count de Vande's lake garden, at Bayreuth, the roots are planted in loam and peat, and the surface of the pots were top-dressed with fresh cow-dung, free from litter. The plants appear to us to grow most luxuriantly in a strong rich loam; but to be most prolific in flowering, the loam and peat mixture in which I saw one of the most successful growers of the camellia in Scotland; his compost is as follows:—Take one part of light-brown mould, one part of river sand, one part of peat, and one half part rotten leaves. Mix them all well together, and when the camellias require shifting, put some broken coal-char in the bottom of the pots, and some dry moss or hyacinth over it. (*Caled. Mew.* vol. iii. p. 316.)

6107. *Camellia-house.* Camellias have the best effect, and are grown to most advantage, in a house entirely devoted to them. Such a house should be rather lofty, as the plants never look so well as when six or eight feet high, trained in a conic form, and clothed with branches from the root upwards. The plants should be raised near to the glass by means of a stage; which should be so contrived that, as the plants advance in height, it may be lowered in proportion. Only the very best crown or patent glass should be used; because it is found, from experience, that the least inequality of surface, or thickness of material, so operates on the sun's rays, as to concentrate them, and burn or produce blotches on the leaves of the plants. Every cultivator must have observed that leathery shining leaves, like those of the orange, myrtle, &c. are more or less obnoxious to this solar injury; but the leaves of the camellias are particularly so. Some nurserymen recommend a roof which will not admit much light; others, the use of green glass; of an opaque red, with glass in front only; or, of a house facing the north. Our opinion is, that a light-house facing the south, or better still, glass on all sides, is essential to the perfect growth of the plants; and that all solar accidents may be avoided, or at least rendered less injurious, by using the best glass, and placing the plants as near it as possible.

6108. *To grow the camellia to a high degree of perfection,* considerable care is requisite. The roots are very apt to get matted in the pots, and by the space they occupy, so to compress the bill of mould as after a time to render it impervious to water. Hence frequent attention should be paid, to see that the water poured on the pots moistens all the earth, and does not escape by the sides of the pot moistening only the web of fibres. The same cause renders examining the roots, and shifting or reducing and replanting them, a necessary measure, at least once a year. When the plants are in flower, they require to be liberally watered; and, when in a growing state, to be liberally watered, and to be supplied with a degree of heat somewhat more than is usually given to green-house plants. If this heat is not given in November and December, the plants will not expand their blossoms freely; and if both water and heat are not regularly supplied after the blossoming season, vigorous shoots will not be produced. To form handsome plants, they should be trained with single stems to

rods, and pruned so as to make them throw out side branches from every part of the stem: to encourage these, the plants should not be set close together on the stage. In summer they may either be set out of doors on a stratum of scoré, or on a pavement, in a sheltered but open situation; or the plants themselves may be taken off. The hardier sorts, as the double red, bluish peachy-flowered, &c., answer very well when planted in the bed or border of a conservatory, provided the roof or entire superstructure can be removed in summer to admit the full influence of the weather. Where this cannot be done, the camellias and most other plants are better in portable utensils, which admit both of examining their roots, and placing them in the open air, or in a greater degree of heat at pleasure. The single and double red camellias will endure the open air, when trained against a south wall, and protected by mats in winter; and it may be found that others of the numerous varieties now extant are not less hardy.

6109. *Henderson of Woodhall* gives the following account of his mode of treating the camellias. "The best time for a regular shifting of the camellias is the month of February or beginning of March. After shifting all those that require it, put them into the peach-house or vinery, where there is a little heat; if there be no peach-house, vinery, or pinery, set them in the warmest part of the green-house. They will soon begin to make young wood. From the time they begin to make their young shoots, till they have finished their growth, give them plenty of water. They may be kept in pots, or in the ground, till they have formed their flower-buds at the extremity and sides of the young growths, when a few of them may be removed to colder places, say colder vinery, or pinery, or the green-house; for the camellias are fond of being shaded during strong sunshine. In three or four weeks after, a few more of the camellias may be brought from the vinery or peach-house, and put into a cooler situation. The plants may be shifted two or four times, which will make as many different successions of flowering. Those that are wanted to come into flower early, may remain in the warm house till they are beginning to weaken; when they should be kept in pots, or in the coolest place of the green-house; give them plenty of light only, and they will open their flowers well, and stand long. A camellia cannot stand heat when it is in flower; indeed, they seldom open their flowers fine when in heat, and, as all events, the flowers soon fall off. Those that are kept all the summer in the vinery will come into flower by the 1st or middle of October, and will produce a pretty large plant, and a hundred flower-buds, will continue in flower till the month of January. Those plants that are removed early from the vinery, will now be in flower, to succeed those that were in flower in August, and have now done flowering. These plants should be immediately taken into the heat. They will make their young wood early, and they may remain in heat till they come into flower; when they will, perhaps, be a month the earlier next year. By attending to shifting the camellias in pots, or in the green-house to the cold, a regular succession of flowers may thus be had from the first of October to the middle of July. I have even had a camellia in flower in the summer, but the plants are wintered. Those produced in the summer are far from being so fine, and do not stand half the time of those that come into flower in November, December, January, February, March, and April. I would advise delight to be kept all the summer months, and a little shaded from the strong sun. Give them plenty of water while they are making their young shoots; they may also get a gentle sprinkling over the leaves once every week during the summer season, except when their leaves are in flower. Camellias will stand a great deal of cold without being much injured, but they will not form many flower-buds without some amount of heat. I find they flower best when kept in rather small pots or tubs. I never shift them but once or twice a year, or often once in three years. There are several very large camellias here that have not been shifted these five years, and they are still in high health; but the plants produced about a hundred fine large flowers every year. Six years ago, I shifted a single camellia from a twelve-inch pot into a lat sixteen inches wide; by seven-inch deep, and grafted it with two different sorts of double red, one double striped, and one double white; it is still in the same tub, and all the four sorts in high health. I have had all the four sorts in flower at once on it, producing a contrast of colour. The plant is large and handsome, being eight feet six inches high, and six feet nine inches wide. There is another plant here, twelve feet high, having upon it all the sorts I possess. They were only grafted last summer, and a number of the sorts are showing flowers; grafts of all of them have taken and are growing well. The plant is growing in a box sixteen inches over by sixteen inches deep." (*Caled. Mew.* vol. iii. p. 316.) Camellias are subject to the scale, which may be removed by washing with a lather of soft soap.

SUBJECT. 4. Various Genera which may be considered as select Green-house Plants, showy, fragrant, and of easy culture.

6110. *Of other select green-house plants,* the first we shall mention is the citrus tribe, already treated of as fruit-trees (5317.); the beauty and fragrance of which need no encomium. They merit a house by themselves, though they will thrive perfectly in the same climate as the camellia. The myrtle comes next in order: Nerium is a well-known genus, whose flowers are of great beauty and long duration; Fuchsia is universally admired; Jasminum, Gardenia, and Daphne have flowers of great fragrance; Heliotropium is remarkable as smelling like new hay; various species of Rosa and varieties of R. indica and semperflorens are both beautiful and odoriferous, and flower throughout the winter. Among the plants from the Cape and Botany Bay, those of the genera dracæa, Mimosa, Eucalyptus, Melaleuca, Metrosideros, and the Proteaceæ, are admired for being prolific in showy flowers, which, for the most part, appear early in spring, and for being chiefly evergreens and large-growing hardy plants. Dicoma, Gnida, and Struthiola are admired for their minute foliage and elegant flowers; those of Xeranthemum are prized for their durability. Bignonia, Cobæa, Döllchoa, Jasminum, and Passiflora are admired climbers; of Passiflora some beautiful hybrids have been originated by Milne of the Fulham Nursery. (*Hort. Trans.* vol. iv. p. 268.; vol. v. p. 70.) A'loe, Mesembryanthemum, Cactus, Crassula, and their allies, are genera of curious and beautiful succulents; Amarillis, Cyclamen, Frits, Fxia, and Gladiolus, Lachenalia, Babiana, Ferraria, and O'xalis include Pericallis, Dietes, Lobelia, Richardia, Tropæolum, and Calceolaria select herbaceous sorts.

6111. *The principal species of these genera* will be found arranged in the following sections, with their colours, and other particulars, added to each. They are of easy culture, and, with the genera of the preceding subsections, may be considered as affording the best choice for a small, showy, odoriferous, evergreen, and ever-flowering collection.

SECT. II. *Woody Green-house Plants.*

6112.

WOODY GREEN-HOUSE PLANTS.—JAN. FEB. MARCH.

RED. <i>Adenandra sprangalis</i>, <i>Azalea indica</i> <i>Boronia cruenta</i> <i>Camellia reticulata</i>, and others <i>Enkianthus quinque-</i> <i>folius</i>, reticulatus <i>E. paeoniflorus</i>, 6. rubra, variabilis, campanulata <i>Grevillea laevis</i>, &c. <i>Indigofera australis</i> <i>Lytham pentapetalum</i>, pungens rub. <i>Nerium Oleander</i>, <i>Oleand. apiculata</i> <i>Pimelea rosea</i>	PURPLE. <i>Aphelandia fasciculata</i> <i>Azalea indica corolla</i> purpurea and pl. <i>Brachytema undulatum</i> <i>Cineraria Petasites</i> <i>Daphne odora</i> <i>E. paeoniflorus</i> <i>Hovea Celis</i>, elliptica, lanceolatus latifolius, mucronata, villosa <i>Lonicera Jacobae</i> <i>Muraria Heliotropis</i> <i>Polycarpon chorosan-</i> <i>folium</i>, discifolium BLUE. <i>Agathis emuloides</i>, Anfilia	YELLOW. <i>Acacia juniperina</i>, and many others <i>Azalea sinensis</i> <i>Brachytema undulatum</i> <i>Cineraria Petasites</i> <i>Dryandra armata</i>, Baueri, floribunda, longifolia, mucronata <i>Embothrium acrobili-</i> <i>num</i> <i>Gompholobium grandi-</i> <i>folium</i>, latifolium, polymorphum <i>Isoopon anethifolius</i> <i>Pittosporum hirtum</i>, revolutum <i>Pultene's polygalifolia</i> <i>Scottia angustifolia</i>	WHITE. <i>Azalea indicifolia</i> <i>Barydama ovata</i> <i>Camellia euryoides</i>, Sesquiped. alb. and sempil., and others <i>Dioma cricoides</i> <i>E. paeoniflorus</i>, camp- nulae alba, corollata <i>Gardneria radicans</i> <i>Leucopogon juniperinus</i> <i>Lysinema attenuatum</i>, pungens <i>Myoporum laetare</i> <i>Nerium Oleander album</i> <i>Pimelea laevis</i>, hyperic- oides <i>Protea maritima</i> <i>Spartanum africanum</i> <i>Thes viridis</i>	VARIEGATED. <i>Azalea indica variegata</i> <i>Camellia</i>, various sorts SCARLET. <i>Azalea indica</i> <i>Callistemon speciosus</i> <i>Correa's pulchella</i>, specio. <i>Lechenalia formosa</i> <i>Templetonia retusa</i> ORANGE. <i>Dillwynia glaberrima</i>, parvifolia <i>Eucalyptus eucalyptoides</i> <i>Eutaxis myrtifolia</i> <i>Gastrolobium bilobum</i> <i>Pultene's</i>, various
RED. <i>Adenandra amara</i>, fragrans, speciosa, umbellata, villosa <i>Astenia</i> <i>Barydama serratifolia</i> <i>Camellia</i>, many <i>Correa pedicellata</i> <i>E. paeoniflorus</i>, palmata, pulchella <i>Grevillea arvensis</i> <i>Muraria stipulacea</i> <i>Polygala oppositifolia</i> <i>Protea incarnata</i> <i>Templetonia glauca</i>	PURPLE. <i>Astenia canescens</i> <i>Boronia pinnata</i> <i>Eriostemon multifolius</i> <i>Gompholobium venosum</i> <i>Grevillea acanthifolia</i> <i>Hermannia trifurcata</i> <i>Magnolia anomala</i> <i>Mirabilis speciosa</i>, and others <i>Polygala cordifolia</i>, &c. <i>Thomasis foliosa</i>, purpurea, solanacea	YELLOW. <i>Acacia</i>, numerous <i>Anthoceros littoralis</i> <i>Arctostaphylos</i> <i>Davalia siliqua</i> <i>Gompholobium berbi-</i> <i>gerum</i> <i>Lasiacanthus serrugi-</i> <i>neum</i> <i>Oxylabium cordifolium</i> <i>Polycarpon fulvum</i> <i>Podolobium atropophyl-</i> <i>lum</i>, trilobatum <i>Pomaderris discolor</i> <i>Pultene's</i>, many	WHITE. <i>Acrotriche cordata</i> <i>Anthoceros albicans</i>, vulgaris <i>Barydama odorata</i> <i>Camellia euryoides</i>, japonica, many var. <i>Dracophyllum secundum</i> <i>Dryandra tenuifolia</i> <i>E. paeoniflorus</i> <i>Eugenia myrtifolia</i>, Smithii <i>Sphenodermis gracile</i>, ca- pitatum <i>Trochocarpa laurina</i>	SCARLET. <i>Brachytema latifolium</i> <i>Correa's pulchella</i>, specio. <i>E. paeoniflorus</i>, grandis, im- pura <i>Grevillea speciosa</i> <i>Oxylabium obtusifolium</i> <i>Salvia eucalyptoides</i>, formosa VARIEGATED. <i>Camellia japonica</i>, many <i>Chorozema apertissima</i> ORANGE. <i>Dillwynia floribunda</i>, ciner. <i>Lechenalia obtusa</i> <i>Pultene's subulnacea</i>
RED. <i>Adenandra fragrans</i> <i>Adenanthos obovata</i>, sericea <i>Agathodes hirta</i> <i>Baccharis rubroides</i> <i>Boronia alata</i>, denticu- lata <i>Chorozema filicifolium</i>, cuneatum <i>Eriostemon buxifolius</i>, capitulatus, nifolius <i>Grevillea arenaria</i> <i>Grevillea tomentosa</i> <i>Leucopogon formosus</i> <i>Lodiglesia axillifolia</i> <i>Muraria anomala</i>, fasciata <i>Mahonia pinnata</i> <i>Mirabilis dilatata</i>, gran- difolia <i>Prostanthera hispida</i> <i>Podalyria calyptrata</i> <i>Polygala latifolia</i>, umbel- lata, and many others <i>Styphelia tubiflora</i>	PURPLE. <i>Aphelandia nematodes</i> <i>Chloranthus multifolius</i> <i>Conospermum cordifolium</i> <i>Daphne odora</i> <i>Dioma purpurea</i> <i>Grevillea Flanderii</i>, and many others <i>Heliotropium hybridum</i>, peruvianum <i>Indigofera australis</i> <i>Lonicera Jacobae</i> <i>Mirabilis pungens</i>, reticulata, speciosa <i>Muraria alopecuroides</i> <i>Podalyria latifolia</i>, and many others <i>Polygala attenuata</i>, Garcini, speciosa, oppositifolia <i>Prostanthera violacea</i> <i>Protea aculeata</i> <i>Sarcophyllum Burmanni</i>, Hertleri <i>Melanthus major</i>	YELLOW. <i>Acacia pentandra</i>, hast. <i>Banksia oblongifolia</i> <i>Banksia ensata</i>, Scolio- pandrium, and others <i>Bartonia scabra</i> <i>Callistemon salignus</i> <i>Daphne chinensis</i> <i>Davalia alata</i>, cordifolia, corymbosa, latifolia <i>Dryandra armata</i>, longif. <i>Eucalyptus obcordatus</i> <i>Gentiana canariensis</i> <i>Gentiana imbricata</i>, opposi- ta <i>Grevillea sulphurea</i> <i>Hibbertia pedunculata</i> <i>Hymenanthus dentata</i> <i>Lonicera trifurcata</i> <i>Oxylabium ellipticum</i> <i>Oxylabium trian.</i>, Mur- rayanum, obtusum <i>Pomaderris discolor</i>, elliptica <i>Protea mellifera</i> <i>Pultene's</i>, &c. <i>Sclerothermus microph.</i>	WHITE. <i>Alyxia roseifolia</i> <i>Camellia euryoides</i>, Kiss, oleifera <i>Daphne indica</i>, pyrrha- ca <i>Dioma ciliata</i> <i>Eucalyptus arborescens</i> <i>Eucalyptus globulus</i>, and many others <i>Hakea</i>, many <i>Hibbertia dentata</i>, interfoliata <i>Leucopogon lanceolatus</i>, Richii <i>Momordia lineata</i> <i>Pimelea sylvatica</i> <i>Pittosporum undulatum</i> <i>Podalyria cuneifolia</i> <i>Protea mellifera</i>, mel- lifica <i>Serissa foetida</i>, fl. pleno <i>Struthiola latifolia</i> <i>Westringia Dampieri</i>, &c. <i>Zieria pilosa</i>, Smithii	SCARLET. <i>Alouatta aculeata</i>, incisifolia, linearis <i>Astragalus humifolius</i>, speciosus <i>Chorozema Fenchmanni</i> <i>triangularis</i>, ovatum <i>Correa's pulchella</i> <i>Stenanthus pinnifolia</i> <i>Tetraplea speciosa</i> GREEN. <i>Correa's virens</i> <i>Metrosideros glomerulifera</i> <i>Styphelia violiflora</i> ORANGE. <i>Platylabus prostratum</i> <i>Pultene's</i>, several BLUE. <i>Carmichaelia australis</i> <i>Forsteria stylifolia</i>, pinnata <i>Westringia rosmarinifolia</i>
RED. <i>Adenandra amara</i>, corollata, fragrans, uniflora <i>Baccharis carinata</i>, spiraea <i>Boronia alata</i>, denticu- lata, serrulata <i>Brachytema latifolium</i> <i>Choronia decussata</i>, frut- ticosa <i>Cineraria pectinata</i> <i>Conospermum longifo-</i> <i>lium</i> <i>Croton saligna</i> <i>Dioma cupressina</i>, rubra <i>E. paeoniflorus</i> <i>Escallonia glandulosa</i>, rubra <i>Fraxinea pauciflora</i> <i>Hibiscus Pateronii</i> <i>Isoopon anethifolius</i>, formosus <i>Lambertia echinata</i> <i>Melaleuca thymifolia</i> <i>Mimetus hirtus</i>, &c. <i>Oxylabium obtusifolium</i> <i>Prostanthera salicina</i> <i>Pimelea decussata</i>, rosea <i>Rosa Montezuma</i> <i>Scottia dentata</i> <i>Sphaerolobium medium</i> <i>Stylidium frutescens</i>	PURPLE. <i>Agathodes pubescens</i> <i>Barydama pulchella</i> <i>Bejaria racemosa</i> <i>Cineraria spiraea</i> <i>Cineraria aurita</i> <i>Dioma cupressina</i> <i>Grevillea acanthifolia</i> <i>Lonicera longifolia</i> <i>Illicium floridanum</i> <i>Indigofera australis</i> <i>Melaleuca bipinnata</i>, grandifolia <i>Melaleuca nodosa</i>, pul- chella, thymifolia, thyrsoides <i>Mimetus pulchellus</i> <i>Muraria alopecuroides</i>, Heterotis, humilis, micrantha, mixta <i>Nerium affine</i> <i>Nivensia acutepum</i> <i>Podalyria calyptrata</i>, speciosa <i>Polygala bracteolata</i>, cordifolia, filiformis, latifolia, oppositifolia, speciosa <i>Prostanthera violacea</i> <i>Rodolia ciliata</i> <i>Salvia africana</i> <i>Silene fasciculata</i> <i>Serraria feniculacea</i> <i>Swainsonia galegifolia</i>	YELLOW. <i>Acacia</i>, many <i>Banksia nemula</i>, attenuata, cricoides, latifolia, marginata, nutans, oblongifolia, serrata, speciosa, verticillata <i>Calceolaria ascendens</i>, integerrima, rugosa, thyrsifolia, crenati- folia <i>Callistachys cuneata</i>, lanceolata, ovata, retusa <i>Cinchoa bacifera</i> <i>Davalia acicularis</i>, cordata, latifolia, vir- gata <i>Dillwynia floribunda</i> <i>Dryandra armata</i>, florib. formosa, nervosa, nivea <i>Gentiana radicata</i>, &c. <i>Gonolobium grandifolium</i> <i>Goddia latifolia</i> <i>Hermannia micans</i>, necsa, tenuifolia <i>Illicium parvifolium</i> <i>Jacobinia scoparia</i> <i>Nerium flavescens</i> <i>Persea linearis</i>, pil- lida, apiculata, &c. <i>Pittosporum revolutum</i> <i>Pultene's</i>, &c. <i>Seneciothus viciatus</i> <i>Pultene's</i>, &c. <i>Viola dentata</i>	WHITE. <i>Acadadenia tetragona</i> <i>Adenandra linearis</i> <i>Anthyllus fragrantissimus</i> <i>Barydama latifolia</i> <i>Citrus</i>, all <i>Coleosoma album</i> <i>Conospermum acinacifolium</i>, axillifolium <i>Cryptocarya glaucescens</i> <i>Dillwynia</i> <i>Eucalyptus</i>, many <i>Hakea amplexicaulis</i>, curculata, dictyodonta, elliptica, florida, filicifolia, Lambertii, saligna <i>Lachne's taxifolia</i>, conglomerata, crio- cephala, glauca <i>Leptopogon grandifolium</i>, longepum, scoparium, many <i>Lissanthus daphnoides</i> <i>Lomatia longifolia</i> <i>Microstylis barbata</i> <i>Paserna grandifolia</i>, and others <i>Petrophylla fastigiata</i>, pedunculata, pulchella, <i>Pimelea longifolia</i> <i>Pharadensis pruinosa</i> <i>Pimelea glauca</i>, florifolia <i>Stylidium fasciculatum</i> <i>Thomasis dumosa</i>	SCARLET. <i>Astelia eximium</i> <i>Callistemon lanceolatus</i> <i>Calochortus clavatus</i>, quadrifolius, villosus <i>Correa's speciosa</i> <i>Halleria linearis</i> <i>Lambertia form.</i>, longif. <i>Lechenalia formosa</i> ORANGE. <i>Banksia ciliata</i>, hetero- phylla, hypophylla, rufa, Scolopandrium <i>Isopachia canariensis</i> <i>Leucopogon medium</i> <i>Lomatia filicifolia</i> <i>Mahonia bipinnata</i> <i>Platylabus formosus</i>, ovatum, triangularis GREEN. <i>Callistemon leptan- chrysus</i>, imbricatus, pinnifolius, viridifolius <i>Lomatia longifolia</i> <i>Melaleuca cricoides</i>, armillaris VARIEGATED. <i>Prostanthera lasiantha</i> BLUE. <i>Artanema simbratium</i> <i>(Torenia scabra)</i> <i>Bartonia corymbosa</i> <i>Convolvulus Cucurum</i>

WOODY GREEN-HOUSE PLANTS.—JULY.

RED. <i>Arbutus fasciculata</i> <i>Baheia humilis</i> , rubrifolia <i>Buddleia cornea</i> <i>Bovandrea triphylla</i> <i>Jacquini, varicolor</i> <i>Chirata indica</i> <i>Eucarya pulchella</i> <i>Fuchsia arbutacea</i> <i>calceola, gracilis, globosa</i> <i>Melaleuca decussata</i> <i>densa, Fraseri</i> <i>Myrtus Oleander</i> <i>Oleand. apiculata</i> <i>odoratum, odor. phytolium</i> <i>Oxyanthum cordifolium</i> <i>Pimelea decussata, rosea</i> <i>Protea laetifolia, latif. coccinea</i> <i>Swaenholia galapagolia</i>	PURPLE. <i>Asterocarpus africanus</i> <i>Cyrtus laetifolia, saligna</i> <i>Grevillea linearis</i> <i>Lachna purpurea</i> <i>Lightfootia tobia</i> <i>Melaleuca calycina</i> <i>Mirtilis Baccari, dilatata, grandiflora, reticulata</i> <i>Murtelea Heliotris</i> <i>Savia laetifolia</i> <i>Rufina triflora</i> <i>Salvia coccinea</i> <i>Salix monophylla</i> <i>Swaenholia corallifolia, folia, galapagolia, laetifolia</i> <i>Tephrosia purpurea</i>	YELLOW. <i>Acacia acicularis, &c.</i> <i>Banksia serrata</i> <i>Borbonia, many</i> <i>Candollea cuneifolia</i> <i>Classa australis, corymbosa</i> <i>Cyclopia gaudichaudii</i> <i>genistoides</i> <i>Dalrymplea forficata</i> <i>Dryandra nivea, tannifolia, prostrata</i> <i>Isopetia scriptura</i> <i>Loebelia coccinea</i> <i>Sempervivum cilicorne, tabulare, and others</i> <i>Tristitia laetifolia</i> <i>Viborgia obovata</i>	WHITE. <i>Acornia forficata</i> <i>Asplenium alba</i> <i>Aspidia speciosissima</i> <i>Bacchia camphor, virg.</i> <i>Clethra arborea</i> <i>Diosma laetifolia, &c.</i> <i>Franciscoa Hopaea</i> <i>Hakea cucullata, undul.</i> <i>Hasselia asphyllia</i> <i>Leptocarpum umbellatum, flavescens</i> <i>Melaleuca squarrosa</i> <i>Myrtus communis</i> <i>Petrophylla fastigiata, pedunculata, &c.</i> <i>Salvia lyrata</i> <i>Swaenholia stragaliifolia (galapagolia var. alba) &c.</i> <i>Vancea Meisneri</i>	SCARLET. <i>Bomarea decussata, glob.</i> <i>Bacchyrhiza laetifolia</i> <i>Calceolaria clavata, gracilis, quadrif.</i> <i>Fuchsia, many</i> <i>Melaleuca forficata, hypoleuca</i> <i>Swaenholia densa</i>
RED. <i>Baheia humilis, rubrifolia</i> <i>Fuchsia parviflora, thymifolia</i> <i>Hermansia cuneifolia, odorata</i> <i>Melaleuca decussata, linearifolia</i> <i>Myrtus Oleander</i> <i>Oleand. apiculata</i> <i>Pimelea decussata, rosea</i> <i>Swaenholia abrotanifolia, gracilis, odorata, pinnata</i> <i>Tetratheca glandulosa, juncea, thymifolia</i>	PURPLE. <i>Banksia macrocarpa</i> <i>Banksia ericoides, purpurea</i> <i>Diosma tetragyna</i> <i>Chymidictia, &c.</i> <i>microphylla, &c.</i> <i>Kleinia suffruticosa</i> <i>Lachna purpurea</i> <i>Leucostylinthe</i> <i>Lightfootia subulata</i> <i>Podalyria sericea</i> <i>Polygala filiformis, speciosa</i> <i>Serraria eremianifolia, millefolia, Nivalis, pedunculata</i>	YELLOW. <i>Acacia discolor</i> <i>Banksia integrifolia</i> <i>Calceolaria nudicaulis, integrifolia, rugosa</i> <i>Chymidictia, &c.</i> <i>Callicoma serratifolia</i> <i>Chrysoedema ciliata, coccinea</i> <i>Dalrymplea forficata</i> <i>Symphoricarpos aglyca, and others</i> <i>Leucocarpum candelabra</i> <i>Melaleuca incana</i> <i>Scaevola tomentosa</i> <i>Tectaria distans</i>	WHITE. <i>Agathodes laetifolia</i> <i>Andrena spirale</i> <i>Banksia attenuata</i> <i>Borbonia spinosa</i> <i>Clethra arborea</i> <i>Cumbria capensis</i> <i>Cynobolus acrodon</i> <i>Endemania tetragyna</i> <i>Hakea, several others</i> <i>Hoveia delicata</i> <i>Plagiathanthus divaricatus</i> <i>Sclagoe corymbosa</i> <i>Struthiola incana</i> <i>Thlas Bata</i> <i>Virgilia capensis</i> <i>Vancea Meisneri</i>	SCARLET. <i>Bomarea dentata, undul.</i> <i>Stemocratus saligna</i>
RED. <i>Cyrtus saligna</i> <i>Fuchsia lydioidea, parviflora</i> <i>Hermansia flammula</i> <i>Pimelea decussata, rosea</i>	PURPLE. <i>Fuchsia calceola, exorticata, gracilis, macrostigma, flowering from May to October</i> <i>Melaleuca Heliotris</i>	YELLOW. <i>Banksia dryandra, &c.</i> <i>calceola, repens</i> <i>Calceolaria rugosa</i> <i>Leucostylinthe</i> <i>Hermansia plicata</i>	WHITE. <i>Gomphocarpus arbutacea, fruticosa</i> <i>Myoporum parvifolium</i> <i>Yucca aloifolia, draculata, superba</i>	SCARLET. <i>Cornus speciosa</i> <i>Leucostylinthe</i> <i>Phacodroma prostrata</i> <i>Ruscobolus coccinea</i>
RED. <i>Chrysanthemum sinense flava lilac, rose or pink, quilled flamed, quilled pink</i> <i>Fuchsia arbutacea, thymifolia</i>	PURPLE. <i>Chrysanthemum sinense expanded light purple, quilled light purple, purple, brown purple</i> <i>Mimulus purpurea</i> <i>Podalyria sericea</i> <i>Stictis mucronata</i>	YELLOW. <i>Banksia comper</i> <i>Calceolaria integrifolia, rugosa</i> <i>Chymidictia sinense numerous yellow var.</i> <i>Dryandra nervosa, pteridifolia</i> <i>Linum africanum</i>	WHITE. <i>A'rhutia longifolia</i> <i>Chrysanthemum sinense asperb white, tannated white, and others</i> <i>Gardinia Thunbergia</i> <i>Hakea swainsonii</i> <i>Myoporum parvifolium</i> <i>Rapicladia cuneata</i>	BLUE. <i>Flamboy capensis</i> <i>Skivia bicolor</i> <i>Wittsteinia corymbosa</i>
				ORANGE. <i>Chrysanthemum sinense buff or orange, semi-double quilled camp</i>

5113. *Propagation.* The means universally applicable is by cuttings; but a few sorts, which are very difficult to strike, are sometimes layered, grafted, or inarched, and a number are raised from seeds.

5114. *Many green-house plants bring their seeds to perfection in this country; at whatever time these ripen, unless before midsummer, it is best to keep them till the following February.* Sown at that season they soon vegetate, and make strong plants before winter. The pots should be well drained, filled with mould suitable to the species to be sown, and the surface covered with mould of the finest quality, as a bed for the seeds: several kinds may be sown in a pot, where the quantity of seed is not great, or its quality doubtful; cover with the same fine mould, according to the size of the seeds, and then give a gentle watering with the finest rose watering-pot. They may now be set in the most dry airy part of the propagation-house, where they can be regularly attended, as to watering and weeding.

5115. *Watering.* Cushing observes, they will require at least once a day, in a greater or less degree; particularly those in which they attain any size; also, besides their care in watering the young seedlings which may have started, the roots, in getting them out afterwards, not only disturb them, but also the remaining seeds that may be perhaps on the point of bursting their embryo. As the spring advances, it will be necessary to lay a few sheets of strong paper over the pots, for two or three hours in the middle of the day, if the weather happens to be clear, and the sun sets fiercely on the plants, in such cases in which the finer seeds are sown, in order to prevent the surface getting over dry and powder-like; or otherwise, if the mould happens to be pretty moist, it is liable to form a mossy crust, which might be particularly injurious, by preventing the young seedling withering itself into the light, from penetrating through it with that ease which is requisite. In this manner must they be managed until the beginning or middle of June, at which season the larger kinds of seed may be removed to some shady border, where the pots can be plunged nearly up to the rim in cool-sand or sand, which will greatly assist to keep them in a proper moist state; here, all the care they will require is to be kept clear from weeds, and regularly watered, morning and evening, if requisite; but never when the sun shines strong upon them, lest the tender leaves of the young plants should get scorched; it will be also necessary to have a careful eye daily for slugs, worms, &c. Should there be any fine light-colored seeds, such as *beetles*, &c. they must be set in such a manner, that they may be covered with a common

hothed frame, in a moderately exposed situation, so that in case of sudden or heavy showers, which might otherwise wash the seeds out of the pots, they may be occasionally covered to preserve them from such violence; yet they may be exposed to gentle rains at times, but never long together, lest they become over wet, which would soon render them, in this tender state, unhealthy. They will likewise require to be shaded with a mat in clear weather, or even a double mat, in the very hottest season.

5116. *Potting off.* Early in July, many of them will be growing pretty fast, and will require to be potted off into separate pots; as it is much preferable to do this while they are young and small, before their roots become matted together, than it is afterwards: besides, that they have a considerable portion of the growing season before them to establish themselves, before the winter stops their career. In performing this work, care should be taken to match the pot to the size of the plant, and nature of the species to be potted; as even to select small seedlings might be attended with some consequence. The largest-sized pots for this use, unless the plants are particularly strong, are of the size called 60; less for heads, and such like very small kinds, a still less size, known by the name of *four pots*, are to be preferred, as they are provided with a number of these, and the different sorts of mould properly prepared, that may be requisite for the kinds to be done, proceed to part the plants; in doing which, let the seed be taken to preserve as much root and earth as each plant as can possibly be done without injuring the others: let them be neatly potted in the proper mould, which must be gently watered, then to the roots, and they may the sooner incorporate themselves with it. In this manner, pot as many as may be thought sufficient for the present purpose, at the same time allowing a few for deaths. They must then be well watered, in the manner already directed for seedlings, and set in a cool frame, on cool-sand well rolled, or any substance that will prevent the worms getting so readily into them, as they otherwise would. The lights must be kept close on, and closed, for a few days, more or less, according to circumstances may require; and it will be also necessary to shade them very securely from the strong rays of the sun at first; however, in a little time, the lights may be taken off at night, if the wind will permit, and shading in the day, until by degrees the plants are so hardened as to be able to withstand the full power of the sun; thus, in the space of a fortnight or so, they will be fit to be set along with the other plants. This sort of care should not be undertaken later than the middle of August, for, if executed at a more advanced season, the plants will not have time to establish themselves; therefore, any that may remain in the

pots, not strong enough to be parted by that period, should be removed into the propagation-house early in September, and there placed in the proper situation in that department until the spring following. Indeed, there are some seeds which absolutely require to be kept for that term before they will vegetate; whereby it becomes necessary to examine with care whether pots have not by that time taken any degree of vegetation, and those which are found alive must be saved, and treated in the same manner as fresh-sown seeds.

6117. The pots set in the house will require nearly the same treatment as usual, but in a kept perfectly clear from weeds, and regularly watered. Water should now be given in the morning only, as any damps it may occasion will have time sufficient to evaporate by the course of the ensuing day; whereas, if given in the evening, it causes a chilliness about their tender leaves, and from the necessary closeness of the house at night, not having free exhalation, it may do a material injury, not only to the seedlings themselves, but likewise to the adjacent plants, by tending to increase the general damp of the house. When first housed, if the weather prove clear, they must be shaded for two or three hours at mid-day; but this practice must not be followed too closely, as the influence of the sun is but seldom too powerful for them at this season, and during the winter months the more sun they receive the better: it is also necessary to be particular in observing that no slug, snail, or any other insect harbour about them. Those seeds received from New South Wales, in general, as well as many others of the South Sea Islands, and also several of the seeds of the course of the course of the Cape of Good Hope, from the warmer countries of temperate America, and, in short, any of the climates in, or approaching the same latitudes, although the plants when grown will flourish and come to perfection in more than half-filled pots, seeds will require the aid of a hothead when first sown, to set them in vegetation, and until they are parted and established in their separate pots, they are to be handled by degrees to the open air; from which time they may be treated as directed for the more hardy and common sorts of seedlings. (*Exotic Gard.*, p. 84.)

6118. By cuttings. This mode of propagation may be commenced about the middle or end of January. As young shoots in a growing state generally strike root freely, where there are wounding on particular specimens, the plants may be secured for a few weeks in the house, and then be cut into small pieces, flower-garden, to adhere them. All the soft-wooded, tender, pithy kinds, such as *Indigofera*, *Crotalaria*, *Polygala*, *Bouvardia*, *Thurbergia*, &c., as well as some of the seeds of the course of the course of the Cape of Good Hope, by the end of February the best will have reached shoots of from two to four inches in length, and from that to any time in March, proceed to cut and dress them accordingly with a sharp knife, to remove all the leaves, and to the shoot as possible without wounding it, except a few at the top, to be left for the free respiration of the cutting; this observation should be particularly attended to in making cuttings of evergreens in general, where the leaves are not so tender, and cut off at bottom with a clean horizontal cut, at a joint or bud, and immediately inserted in their proper pots. To have the pots properly prepared is a very necessary part of the business, being well drained, they should be rather more than half filled with the mould or compost best suited to the nature of the plant, and afterwards filled with good loam or sand, whichever may be thought more advisable to insert the cutting in; if sand is used, it should be previously well watered, otherwise it cannot be sufficiently settled to the base of the cutting; a most essential point to be observed; however, it should have time to be well drained off from the pot before the seedlings are put in, as they, being so tender, are extremely liable to damp at this season, than which nothing is more injurious. The loam will, in general, be found sufficiently moist of itself; and should it be of a fine sandy nature, so much the better, if not, a third or fourth part of fine sand should be added, and well mixed previous to the soil's being used.

6119. Before properly covered, the pots should be covered immediately with the proper glass, well fitted, and covered moderately on the mould, so as perfectly to exclude the air. They should then be plunged in the front of the bark-pit of the propagation-house; or otherwise in a hothead frame made up for that purpose. The inside of the glasses should be regularly wiped with a dry cloth every morning; and any of the cuttings that happen to damp, carefully taken away before they contaminate the rest. If the sun happen to be unclouded, they must be shaded for a few days moderately with strong paper, or some such article; but by no means is it to be left on too late in the afternoon, as the cuttings, being so soft and tender, are extremely susceptible of injury by over-shading. In the space of ten days or a fortnight, some of the free-rooting kinds will be making efforts of growth; as soon as this is noticed, it will be necessary to give shade to the rest, and to remove them in the evening, when the sun has quite receded from them, and putting them on again early the following morning; until they are by that means hardened, so as to be able to bear the full power of the sun without being injured, it is to be entirely discontinued. If any of them should drop their heads when this operation is first performed, it is proper to refrain from moving the glasses until they have gained more strength. The shading is also to be decreased by degrees, but not so much as to be entirely done away while there remains any of them under glasses. In this manner is the business to be followed at different intervals, according to the cuttings are ready during the months of March and April.

6120. May and June is the most proper time for propagating most or all of the woody shrub-like plants; such as myrtles, oranges, nutmegs, &c. These plants, when they are in the pot, as the young wood used by that time be in general pretty far advanced. If this business is begun in June, which is early enough, they must, on account of the increased heat of the season, be in some cool shady situation, where they can be conveniently shaded when requisite: an exhausted hothead, with a frame and good light on it, will answer very well; or otherwise, the shade of any other method, or place, where they will be a little sheltered from the noonday sun, and have the benefit of it in morning and evening; in either place, the pots must be plunged up to the rim in old tan or sawdust; and in the case of the more delicate kinds, to be covered with large cap-glasses over the small ones, as well mixed cuttings, as heaths, except a few of the herbaceous sorts, such as *Arctostaphylos*, *Colandrea*, &c., and strong, substantial, broad-

leaved kinds, as *Camellia*, *Laurus*, &c., which will succeed better without the small glasses at this season, so that they are covered with round air-tight caps. There are many others indeed all late-growing deciduous, as well as evergreen sorts, as pomgranates, olea, myrtles, &c. which, in general, only form their callosities previous to the ensuing spring, that do better without the small glasses; their leaves drop off much sooner when too closely covered, than they do when differently managed; and it is well ascertained, that the longer the leaves are retained in an active state, the greater the probability of success; this is to be merely mentioned to expose them to cuttings; for the same articles, if put in early in spring, very young, in a moderate heat, closely covered, properly shaded and watered, will strike astonishingly quickly. Cuttings of all the kinds that remain to be propagated should also be made at this season, and managed in the same manner. The whole being thus arranged, they must be carefully shaded whenever the sun sets violently on them, especially when first put in; but they ought not to be shaded longer than four or five o'clock in the afternoon, according to circumstances, as the mild influence of the sun at that hour will be necessary to dry up any damps that may have arisen within the caps. It will be also requisite to dry the small bell-glasses every morning, as directed for the spring cuttings, and to water moderately any of the pots which may require it; for though it is proper to keep the top of the cutting dry, yet the mould in the pot must be kept as near a medium as possible between wet and dry, otherwise they will not vegetate freely.

6121. In the month of June, the cuttings of the cuttings, in May or June, require to be parted and potted separately in small pots; in performing which, be careful to avoid breaking the roots, using them much in the same manner as before directed for seedlings. When the cuttings are parted, they must be set in the propagation-house for a few days, and shaded until they have established themselves in the fresh mould; and soon as they have taken to grow freely, let them be removed to frames, but observed that the cuttings in the open air entirely at first, as it might do them a material injury, on account of which, the lights over them should be kept clear of them until for a few days. Towards the end of June, any of the tender green-house cuttings that have been left in the propagation-house since spring, should be plunged under the cap-glasses along with the others, where the whole ground is intended to be exposed to the sun, while the cuttings of the glass, and to water when wanted; it is advisable, when fresh watered, to let the glasses stand off for about a quarter of an hour, to dry the surface a little, unless the sun happens to be very clear and shining; when they should have been already remarked, that there are many kinds which do better without the small glasses; such as the strong-growing, and hardy kinds, as *Camellia*, and some species of *Laur.*, &c., which are very liable to have their leaves scorched by the glasses reflecting the rays of the sun. Any time during the months of July and August, cuttings of the earlier cutting growing, and success; as by that time the young shoots will be sufficiently firm for that purpose, and will strike freely in good loam; but cuttings, and much like sorts, should not be cut until the shoots have finished their growth, and the leaves attained their full size, as they are, when taken too young, particularly subject to rotteness and damp. In July and August, the cuttings of the earlier cutting growing, and success; they should have their glasses taken off, as before directed, and afterwards be set for a few days in a more exposed situation, to harden them by degrees, in which they must be shaded moderately from the hot midday sun, but freely exposed to the air at the other times.

6122. Parting and potted should also be occasionally performed on such as are ready for that operation; when, if any of them happen to be more backward than others in the same pot, they should be put in a separate pot, and be treated as such; those potted should be set in a cool frame, as directed for seedlings, where they must be kept close and shaded, except in mild weather, until they are by degrees inured to the free air.

6123. Removing to the propagation-house. At the season in which it is judged advisable to house the general collection of green-house plants, it will be also requisite to have the cuttings removed to the propagation-house, to be cleaned, sorted, and regulated, according to their different kinds and stages of growth. The commoner sorts will do to be set in any part of the house where they will have free air and light, and where they can be got at conveniently to water, and pick them when necessary; the more curious kinds should be set in a dry airy part, where they can be carefully attended, to prevent their getting over dry or dirty, and also to take the glasses occasionally off those that may be growing. All the backward kinds, proteas, or any other hard-wooded kinds, such as are mentioned in the Botany Bay plants &c. that require a long time to strike, should be set in one of the coolest and driest parts of the hot-house, where they must be watered and cleaned, like the others, throughout the winter. Towards the commencement of the new year, many of the earlier cutting growing, grow, therefore the glasses must be taken off such as are necessary. With the advancing season, they will likewise advance, and soon require to be parted, and potted separately. (*Exotic Gard.*, p. 101.)

6124. Almost all the woody green-house plants may be propagated by cuttings; but a few are occasionally layered, inarched or grafted, as the *Camellia*, *Citrus*, *Daphne*, &c., which have been already treated of.

6125. General culture of woody green-house plants. We shall commence with the shifting-season, which generally takes place about the end of May and trace the business to the end of the year for their general culture and management throughout the year. Green-house plants, this author observes, for the most part require a considerable share of pot-room, as many of them are not so easily grown; but still grow, and it is necessary to avoid over-potting the tender weak-growing kinds. When shifted, let them be neatly tied up, if requisite, and well watered or ill-grown parts can be removed with propriety, cut away, so as to give the heads a regular new appearance. In bright sunshine it may be also necessary to shade them for a few days from the influence of the sun and winds, until they are again established in the fresh mould.

6126. Placing in the open air. By the middle of June, it will be time to think of preparing the out-door departments, in which it is intended the plants should stand during the sum-

mer months. The most eligible situations for this purpose are, the north aspect of vacant walls or hedges, where they will be a little shaded from the noonday sun, or between rows of close hedges, vertically planted for, and solely appropriated to, this purpose. By no means set them close under the shade or branches of large trees, as the plants are thereby inevitably drawn into a weak state, and the shelter afforded by such situations are not infrequently under the disagreeable necessity of throwing away many, or perhaps their most rare, plants every autumn, and even those that remain will have a bad unsightly appearance. Indeed, the shelter from the wind is the great desideratum to prevent their being upset; for most green-house plants are fond of the warmth of the sun, except when recently potted, provided their roots are kept moderately moist. The practice of some gardeners is to plunge them amongst the shrubs and flowers of the pleasure-ground: this answers pretty well with the strong-growing kinds, such as myrtles, geraniums, coronillas, &c., old plants or super-nutrients that will not be wanted to house in the autumn; and even has a very pretty effect when judiciously done; but it will by no means do for the tender species. Therefore, upon the whole, the most unexceptionable situations are such as at the same time afford a moderate portion of shade, and are so situated as to break the force of those strong gales which frequently blow in the summer and early autumn months, and yet allow that free circulation of air so necessary to the well-being of plants in general and at all seasons. Having fixed on the place where they are to stand, it must be thoroughly cleansed from weeds, and the hedges, if any, neatly clipped. It should then be well rolled, so that the surface may be at this level, over it a layer of good lime, slaked and made into the consistency of thick whitewash, should be poured, and left to soak into the surface, as a preservative against the winter frosts. When this is dry, let about an inch of fine sifted coal-ashes be regularly laid on, and firmly rolled a second time. Being thus prepared, the plants may be brought out and set regularly on levels on the surface, in whatever form or arrangement may best suit the situation or the taste of the cultivator.

6117. *House in autumn.* As the young tender shoots of the summer's growth are extremely liable to be killed by the frost, as soon as any symptoms of this appear, they should be removed to their winter quarters, where, if the green-house is built on a proper principle, they can all have the benefit of the free air, and at the same time be in a situation to be protected when necessity requires. They should, at all events, be removed in the earlier part of September. Therefore, about a fortnight before that time, when the plants have time to recover themselves from the partial check they may have received by it, which would come doubly severe, if deferred until the time of removing them into the house; the transition from the cool bottom on which they stood, to the dry boards of the green-house stage, being so materially different. Whatever may be the mode of arrangement adopted (5654.), the plants must not be set too close when first put in, as it will occasion most of the tender leaves to turn yellow and fall off; neither should they, if the house happens to have been built on a close construction, be, by any means taken in when their leaves are wet.

6120. *When they are all housed,* and dirt of every description is taken away, let as much free air be given as possible in the daytime, and even at night, should the weather prove moderately mild, and free from any sharp levelling of the frost. As at this early season, are seldom so severe as to injure any green-house plants that are not immediately exposed to its perpendicular effect; therefore the front windows may be kept open continually, and there is no need of their being particularly severe, or accompanied with cold driving winds, in which case it will be necessary to have them pretty close. If air is too sparingly admitted at this season, when many of the plants have not yet finished their summer's growth, it will inevitably cause them to produce weak and tender shoots, which will be extremely liable to damp off at a more advanced season, when the house must be unavoidably kept close on account of the severities of the external air; and besides, it will tend to give them a more general tender habit, and render them less able to resist the winter colds than they otherwise would be. Hence it is evident, that they cannot receive too much air, whenever the state of the external air will admit of it, by being free from all appearance of frost, as it will be so much to their advantage to be thus hardened before the winter assumes its greatest severity.

6129. *Water* should also be plentifully administered when they are first taken into the house, as the dry boards on which they now stand, as well as the elevated situation and free circulating air, occasionally require more water than when the stood on the moist earth; however, by no means go to the extreme; give it only when evidently necessary.

6130. *As the close foggy weather advances,* water must be given more sparingly; else it will conspire with the atmosphere to increase the damp of the house, which will inevitably injure the plants, by rotting their leaves. These, and dead flowers, should be picked off as soon as they are observed, otherwise they will make a very disagreeable appearance.

6131. *The months of November and December* seem to be more noxious to the health of plants than any other season, by reason of these being the months of young sprouts, and the remains of many of the autumn flowers still on them, when the weather (which at this time generally becomes close and chilly) renders it necessary to keep the house shut and warm; that occasion a very pernicious tendency to exhale from every part of the house, and even from the earth in the pots, which fixes on the leaves and other parts of the plants, to their inevitable injury, particularly the younger parts, such as the tender growing buds, &c. If in this kind of weather to continue for any considerable time, it will be advisable to give a little fire-heat, to help in drying up these baneful exhalations, and also as much air as can be conveniently admitted by the doors and front windows, more especially when fire is added, otherwise the heat of the fire will, instead of expelling the contaminated air, rather occasion it to exhale more freely, and be of worse consequences. At this season, also, the plants should be regularly examined, to clear them of all dirt, and also to scrape off any

moss, &c., that may have grown on the surface of the mould, and to renew it with a little fresh loam; this, if neatly executed, contributes much to their good appearance.

6132. *Fire-heat.* Very little fire-heat seems to be requisite for the preservation of green-house plants in this climate; in fact, the less it is found necessary to use it the better. Except in case of damp, as before mentioned, it need not be used till the frost be so severe as to lower the thermometer several degrees below 48°, and then merely sufficient to raise it again to that point. If this can be done without the assistance of fire, the better; for, when put into the house, they must be used along the lower parts of the house, where they can be conveniently fastened: these will be of infinite service, even when fire is used, as less of that element will suffice; but they should be always taken off in the day to admit the light, unless the weather happens to be particularly severe. It may be also proper to remark, that the more dry the mould in the pots as kept at this season the better, as it will be less liable to attract the frost; therefore, water must be used very sparingly, and only to such as are in actual want of it. Sometimes, in the depth of winter, there is a succession of very clear weather for several days together, wherein warm sunny days succeed the coldest frost, and nights in which fogs have been absolutely necessary; in this case, it will be requisite to give all the air possible in the day (unless strong harsh winds, or other occasional preventives, happen to prevail), observing to shut the windows up close early in the afternoon, so as to include part of the natural heat of the atmosphere within the house. Such weather renders an increase of water necessary, especially over the expense of the fluids down the pots, and the system must be actually necessary by the action of the fire, or the extreme drought of the season (a circumstance not much to be dreaded in the present climate at this time of the year), and the system must be better; for, though the plants in general like to be kept pretty moist in the summer, there is hardly any thing more pernicious to them now than an extreme of moisture.

6133. *The winter and spring weather* is the season, &c. During the months of January and February, and, indeed, all through the winter and early spring, on account of the necessary closeness of these compartments, it may be expected to see a few dead flowers, and whatever damps may occasionally appear, should be picked off as soon as discovered.

6134. *The mildew and green-fly* are the insects, &c. During the visits at this season; particularly on the young shoots of bushes, and such like tender-leaved plants. The best remedy for the first of these is, to procure about equal proportions of sulphur and rosin, finely sifted and finely sifted, and the quantity of the number of plants infected, to be used in the following manner:—As soon as the least symptom of this disease is perceived (for the sooner it is stopped the better), which makes its appearance like a whitish downy substance on the tender shoots, or a species of fungus on the back or under part of the leaves, provide a vessel full of clear water, large enough to immerge the plant in, enclose of the pot, which must be held in an inverted position, and the plant placed in it, to prevent the mould falling out; in this manner, plunge the plant into the water; and while it is wet, holding it in the same position, let another apply the above preparation with a powder-puff, or some such machine, in such a manner, that every part of the plant may be perfectly covered, one dressing in this way will, in general, be found sufficient. The plants should be taken to the open air, and the pots should be placed in some dry dry part of the house, not conspicuous, until it has recovered its verdure. Should the aphids show itself upon the plants, fumigation with tobacco, as before recommended, will do much to destroy them; but if they are shrubs, at some period or other, cast their leaves, and this natural repose of vegetation should be selected as the most appropriate time for destroying them. As winter insects, then existing for the most part in the eggs. If water, as recommended (5646.), will effectually destroy the eggs of the aphids, and check the progress of the red spider, and of the different species of Cicadas. During fumigation, great care must be taken to close every aperture by which the vent may be given to the smoke.

6135. *Towards the end of winter,* the plants should be regularly examined and cleaned from any filth they may have acquired during that dreary season; such as moss on the surface of the pots, and leaves that have dropped thereon; also any plants that may have grown into a loose habit should be tied up. The platforms or stages should be cleared, and while the plants are removed, and any worms that may have harboured in the pots dislodged, by turning them upside down, and lifting them carefully off the ground, and the remains of roots, at the bottom, or sides of which they are generally to be found. It is easily known when they are in the pots, by their casts on the surface. Indeed, this is a thing that should be attended to at every season of the year, as the plants may be served more or less at all times, and considerably damage the economy of the pot, when they are suffered to persevere.

6136. *As the spring advances,* it will be found necessary and convenient to admit a more free circulation of fresh air, and on account of the increasing drought and heat of the season, water must be given more plentifully; but the house must not yet be left open at night, particularly the top-light, as the weather is in general so very changeable at this season, that frequently happens, although the evening may appear mild and serene, the morning waters in with a severe frost, which, if admitted to the plants, would be of great injury, and perhaps at once render all the winter's care and attention abortive. Until about the middle or end of May, the weather seldom becomes in any degree settled; but at that season we may venture to expose the plants to the open air, and the vicissitudes of the weather, should it continue in any degree moderate. Being thus treated, they will require a considerable increase of water, which may now be plentifully given to them, particularly the more free-growing kinds; and as the following be observed as a general maxim not to be departed from: that it is necessary to the health of plants, especially the tender species, to be permitted to grow in a little water, before they are again watered; because, when kept in a continually wet state, the mould becomes strictly denser than that

active quality so indispensably necessary to vegetation; and the plant, in consequence, will assume a very unhealthy appearance, which many might tempt me not attribute to the proper cause. (*Exotic Gard.*, p. 150.)

6137. *Treatment of green-house plants in a conservatory.* This should resemble the treatment of plants in pots, as far as the difference of circumstances will permit. The plants in the conservatory cannot be set out in the open garden; but the roof can be removed to produce the same effect, and should be done about the same time. Instead of shifting, the soil can be refreshed by manure and top-dressings, or it may be entirely renewed; and pruning, training, and attention to cleanliness and neatness are alike applicable to both modes of culture. When the green-house is proper, the lights or roof of the conservatory should be replaced. The plants, in the mean time, will require as much air as it is possible to admit on all fine days; and in case rain prevents the letting down of the roof-lights, the frost ones, if any, should be as open as possible. This is to prevent the plants being drawn into long naked stems, and weak branches, which, from their free habit of growth, they inevitably otherwise would be. As the cold of winter increases, which it naturally will do in the months of October, November, and December, a proportionate decrease must be observed in giving either air or water; and, if necessary, add a little fire-heat, and mats along those parts of the glass nearest the plants, in such manner as to prevent the frost or piercing winds from injuring them. The conservatory, in these particulars, requires to be managed in the same manner as directed for the green-house. As few objects are more desirable than to preserve the gay appearance of the plants, it will be requisite to pay constant attention to the removal of decayed leaves and other things superfluous; also to tie up or cut short any loose straggling branches that happen to show themselves, to remove those pots which may have been plunged or set on the pit when out of flower, and, if convenient, to have their places supplied with others in a fewer number.

6138. *During November, December, January, and February,* the moisture of the atmosphere in such departments, where there is a great body of damp mould, will occasion several species of the Bryum, and other mosses, to be very luxuriantly vegetate; particularly as the mould has had time to settle, and the surface to become of a close firm texture, which would give the house a very unpleasant appearance. It must be remedied by frequently stirring with a small fork the whole of the soil to the depth of two or three inches, and raking it over smoothly with a neat close-toothed rake, which, as well as the fork, should be particularly adapted to this use, by being furnished with short handles, so as to enable the operator to use them with freedom under the plants, by which means many branches and flowers will escape being broken off, which cannot be well avoided when a trowel is allowed to be used for this purpose. As soon as raked, let some fine-sifted fresh loam be thinly scattered over the surface, and it will tend to give it a more agreeable appearance; besides, being dry, it will serve to imbibe a good quantity of the superabundant moisture.

6139. *As the spring advances,* the plants will require considerable attention to keep them in proper order, and to prevent their great increase of growth, more particularly the climbing

plants, trained against the walls or trellis-work; these should be daily attended to, and trained in their proper places, directing their course to those parts of the house which, from their nakedness, appear to want them most; also these species of plants being remarkably free growers in general, it will frequently be found necessary to thin them, by cutting away any unsightly parts, and those branches most destitute of flowers; by which means there will be sufficient room for the young vigorous growth, and these should be trained in regularly as they advance, otherwise they will attract themselves to the first object they meet, and render it difficult to remove them neatly afterwards.

6140. *Sage, myrtle, and other verdant,* are very fond of harbouring among the leaves of these plants, when permitted to grow crowded; also under any low bushy plants in the pit, whence they make their nightly excursions, to the great injury of the foliage in general, if not seasonably detected. The drought and warmth increasing with the year, will render it convenient to admit more air, and an increase of water; two very essential points, that should never be neglected.

6141. *In summer,* the lights having been removed, as before directed, the plants should be then permitted to grow, and be all regularly fresh tied up, to secure them against the free action of the wind; they will, if the weather happens to be dry, which is most frequently the case at this season, require an abundant supply of water, particularly the strong free-growing sorts, on account of being thus exposed to the open air. The cause for thus taking off the top lights every summer is, that the plants may have the benefit of the warm insulating showers of that season, and the action of the perpendicular air, which will be a great means of their acquiring that strong, healthy, robust growth, so much to be desired, where it is not practised, the plants seldom fail of being drawn into the opposite unsightly extreme. In two or three years from the first planting, many of them will be grown to as large a size as the house will admit. The knife must be then very used among such, to keep them within bounds, and prevent their injuring each other, which they inevitably would, if permitted to grow too close together. However, in performing this, we must be very careful not to disguise the general appearance of the plant, cutting away only the rude and overgrown parts, which should be taken clean off, without leaving any of the stems behind. The younger sprouts which are removed should be tied neatly up, so as to form a handsome middling-sized bush. It will also be necessary to observe whether any have outgrown their neighbours in the front rows; these may conveniently be moved into more backward situations, and their places supplied with other new varieties, if to be had. This work may be done with safety any time in spring or autumn, when the weather happens to be a little dull; it will be advisable, however, to cut off a few of the most luxuriant shoots, and to run a spade or large trowel down, around the roots, so as to form a ball, some days previous to its final transplanting, which also operates as a partial check on the free growth of the plant. It should be taken up with a good ball of roots and earth, and well watered as soon as replanted; it may also be found requisite to shade lightly, for a few days, after thus removed, if the weather happens to be very clear. (*Cooking*.)

SECT. III. Climbing Green-house Plants.

Those marked A have herbaceous stems.

6142.

CLIMBING GREEN-HOUSE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Asparagus albus A. dependens</i>	<i>Billardiera fasciformis, longifl., multifl., scand.</i>	<i>Caprifolium japoicum Deliceus Jacquin, lig.</i>	<i>Asparagus albus A. retrofractus, scandens</i>	<i>Brunniclula cernua</i>
<i>Cobaea scandens</i>	<i>Convolvulus Maesii</i>	<i>Hibiscus crinita</i>	<i>Aeschynanthus triflorus</i>	<i>Caprifolium japoicum</i>
<i>Ipomoea pindula</i>	<i>Eilwenia glycinefolia</i>	<i>Hoya Pottii</i>	<i>Convolvulus canariensis</i>	<i>Convolvulus canariensis</i>
<i>Kennedy coccinea</i>	<i>Philadelphus angustifolius, latifolius</i>	<i>Microclima sagittatum</i>	<i>Kennedya dilatata, monophylla, ovata</i>	<i>Jasminum aedricum</i>
<i>Comptonia, monophylla, ovata, prostrata, rubicunda</i>	<i>Hibiscus rostratus, dentatus</i>	<i>Lophospermum Rhodochiton</i>	<i>Paeonia Colvillei</i>	<i>Lophospermum rubesc.</i>
<i>Wistaria Consequiae</i>	<i>Hoya carnea</i>	<i>Solanum Neofortitatum</i>	<i>Sollya (Billardiera) heterophylla</i>	<i>Paeonia ceriseo-racemosa, cer. var. trilobata.</i>
	<i>Lydalis straminea</i>	<i>Troscus grandiflora</i>		<i>Troscus pentaphylla A.</i>

6143. *The propagation and culture of this tribe is the same as for woody plants.* (6123.) The situation proper for planting climbers and creepers has already been considered. (9653.) To cultivate them to perfection, a house should be entirely devoted to them, in which they should be planted in prepared soil, and

trained on poles, like hops, or on archedes, or on single rods running from the front or sides of the house to the back or centre; but sufficiently distant from the glass to show the beauty of the flowers and foliage to the spectator.

SECT. IV. Succulent Green-house Plants.

6144.

SUCCULENT GREEN-HOUSE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Aloe glauca, socotrana</i>	<i>Aloe perfoliata</i>	<i>Aloe maculata, mitre-formis, nodosa</i>	<i>Aizoon lanceolatum</i>	<i>Aloe arborescens, picta, purpureascens</i>
<i>Bowiea africana</i>	<i>Alycia pentagyna</i>	<i>Anacampseros arachnoides, filamentosa</i>	<i>Aloe deprava, dichotoma, bispinosa, virens</i>	<i>Anthurium revolutum</i>
<i>Boltonia coruscans</i>	<i>Cotyledon jasmintiflora</i>	<i>Aloe sepiaria, spiralis, spiralis</i>	<i>Croton columnaris, ericoides</i>	<i>Cacalia ariculata, ficoides, Kleinia</i>
<i>Crisola cordata, obliqua, punctata</i>	<i>Ocularia</i>	<i>Cotyledon hemisphaerica, ovata, pichra</i>	<i>Curtocyme undulata, undulata</i>	<i>Crassula revivens, filicoides</i>
<i>Globularia lingua, sulcata</i>	<i>Echeveria coccinea, grandifolia</i>	<i>Globularia lingua</i>	<i>Globularia alpicarpa, arachnoides, cymbiformis, pellicida, recurva</i>	<i>Dactyloctenium globose</i>
<i>Haworthia transdracina</i>	<i>Globularia lingua, nigra</i>	<i>Haworthia viscosa</i>	<i>Kalanchoe flava</i>	<i>Globularia radicans</i>
<i>Kalanchoe odoratissima</i>	<i>Haworthia margaritifera, media, minor</i>	<i>Kalanchoe jasmintiflora</i>	<i>Litsea geminiflora</i>	<i>Mesembryanthemum depressum, difformis, minutum, minutum, nobile, nuncifera, obconicum, obcordatum, testiculare, tigrinum, vulpinum</i>
<i>Mesembryanthemum crassicaule, marginatum, microphyllum, versicolor</i>	<i>Mesembryanthemum auriculatum, capitatum</i>	<i>Mesembryanthemum multiflorum, prodrumum</i>	<i>Mesembryanthemum</i>	<i>Targuia pertusa</i>
<i>Pachidendron ferax, pseudo-Frax</i>	<i>Rhipidodendron plicatum</i>	<i>Rochus falcata, perforata</i>	<i>Scutellaria, scalpat.</i>	
<i>Portulacaria fra</i>	<i>Sempervivum alatum</i>	<i>Sempervivum barbatum, glutinosum, uricum</i>	<i>Moonanthus polyphylla</i>	
<i>Sempervivum arbutum</i>	<i>Smithii, taliaefolia</i>			
<i>Urginea tomentosa</i>				

6145. *Propagation.* With succulents this is remarkably easy, as cuttings and suckers, where they can be procured, seldom fail to put out roots; however, some sorts of *Aloe*, *Crasula*, &c., do not readily produce shoots of any sort by which they may be multiplied. When the plants are cut off at the joints or suckers, the latter should be laid in a dry airy place, till the wounds heal; they may then be planted in the proper soil, one in each of the smallest-sized pots; and being kept a few weeks in a dry heat, and shaded from bright sunshine, they will soon fail to emit miniature plants from their surface about the point of its junction with the surface of the soil. In raising succulents from seed, the process is as directed for the seeds of woody plants; but observe to be more sparing of water after the plants have come up.

6146. *Culture.* A sandy loam is the soil universally allowed to be the most proper for these plants; but even sandy loam, in order to let the water pass the more rapidly through it; and for the more succulent and dwarf sorts, as *Stapelia*, *Cactus*, &c., about an eighth part of old lime-rubbish may be added. Succulents do not associate well with any other description of plants, neither as to appearance nor modes of culture; therefore, wherever they are extensively cultivated, there should be a house or houses on purpose for them. One house would be required for the more hardy sorts included in this section, and another for the dry-succulent succulents given in a succeeding table. They require very little watering, and never over the top during the winter; but in summer, if the pots be well drained, they will bear more water, especially when in flower. The pots in which they are placed should be smaller in proportion than for other plants, as they grow slowly, evaporate little, and consequently derive great part of their sustenance from the air. They need not be shifted often than once in two or three years; but the surface earth should be taken off, and fresh compost added every year. They do not require to be set out in the open garden during summer; but as much air as pos-

sible should be admitted to them, and the roof of the house should be open at that season, night and day, except during heavy rains. "The greatest injury," Page observes, "which these plants have to be guarded against is that from damp in the soil; therefore they should be freed from soil, and any still decayed parts removed, particularly from those which are stemless; and when the leaves touch the earth." He adds, "few of these plants, either those of the green-house or hot-house, are cultivated in general, but merely to fill up the by-places and odd corners of the exotic houses; but if a proper attention were paid to them, and their cultivation better known from a study of their characters, we have no doubt but they might be rendered as ornamental and interesting as those now considered the most select. Most of the forms and growths of these plants are truly curious; and many of their flowers of the greatest beauty and brilliancy. Since the year of Dilemma and the late James Lee, these plants have had few admirers; but the present Emperor of Germany, the Prince of Salern, the Vice-King of Lombardy, and our countrymen Haworth and Anderson, the latter the able curator of Chelsea Botanic Garden, are endeavouring to bring them again into that notice which they so eminently deserve." (*Prodromus*, 220.)

6147. *House-glasshouse* are planted out by Mowbray, in a pit along the front wall of a hot-house. The soil he uses is rich garden-mould and fresh loam: "the sorts are *M. incandens*, aurantium, perfoliatum, deltoideus, barbatum, and several species of different habits; the strong-growing kinds are put towards the back, and the dwarf ones in the front. They grow vigorously, and flower in a superior manner to what they do in small pots; nothing can surpass the brilliancy of their blossoms in a bright sunny day, and some of them continue flowering all winter. All the culture they require is, thinning, and protection by mats over the glass in severe weather. In summer the sashes are taken off, and the soil may be covered with stones like rock-work." (*Hort. Trans.*, vol. v. p. 274.)

SECT. V. Bulbous Green-house Plants.

6148.

BULBOUS GREEN-HOUSE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Anisanthus splendens</i> <i>Antholyza æthiopica</i> <i>Bekina stricta</i> <i>Chaidanthus fragrans</i> <i>Chrysiphalia curdian-</i> <i>tata</i> , flava, pauciflora, <i>Conanthera bifolia</i> <i>Cyrtanthus collinus</i> <i>Geissorhiza secunda</i> <i>Gladiolus Watsonii</i> <i>Hesperantha radiata</i> <i>Paxia alba</i> , patens <i>Lachenalia angulata</i> <i>Lapeyroussia corymbosa</i> <i>Melampyrum trifidifolia</i> <i>Mora's edulis</i> <i>Sparaxis tricolor</i> <i>Synedra variegata</i> <i>Trichonema speciosum</i> <i>Tritonia flava</i> , crocata <i>Tulbaghia affinis</i> <i>Valotia purpurea</i> <i>Viesseuxia trifidifolia</i>	<i>Amaryllis formosissima</i> , pauciflora <i>Antholyza fimbriata</i> , montana <i>Bekina tubiflora</i> <i>Bravaisia Josephine</i> , multiflora <i>Calceolaria alba</i> <i>Cyrtanthus striatus</i> <i>Crimum riparium</i> <i>Cummingia campanula</i> <i>Geissorhiza setacea</i> <i>Gethyllis spiralis</i> <i>Gladiolus bifidus</i> , Calvillii, pubiflorus <i>Melanthium lineatum</i> <i>Ornithogalum lineatum</i> , tenellum, acillidens <i>Pancratium carniense</i> , carolinianum <i>Trichonema calucense</i> <i>Viesseuxia Bellendii</i> , herbacea, tricapite <i>Watsonia rosea</i> , roseo-al.	<i>Alibea vittata</i> <i>Amaryllis macrantha</i> <i>Antholyza æthiopica</i> , fulgens <i>Brunsvigia minor</i> <i>Crimum flaccidum</i> , filiberti, longilobum <i>Cyrtanthus capensis</i> <i>Cyrtanthus striatus</i> <i>Drimys nervosa</i> <i>Gladiolus alatus</i> , b. al- goensis <i>Haleranthus lorifolius</i> <i>Hesperanthus sanguineus</i> <i>Nerine coriacea</i> , pul- chella, rosea, varicolor <i>Ornithogalum aureum</i> , flavescens <i>Pancratium rotatum</i> <i>Phydelia cyrtanthoides</i> <i>Trichonema monadelph.</i> <i>Watsonia rosea</i>	<i>Amaryllis coccinea</i> , &c. <i>Bekina villosa</i> <i>Cyanella lutea</i> , archidi- formis <i>Drimys purpurascens</i> , revoluta, serotina, &c. <i>Hemeranthus coccineus</i> , pubescens <i>Hesperantha grandiflora</i> <i>Drimys ciliaris</i> , elata <i>Paxia colummaria</i> , stellata <i>Nerine aurea</i> <i>Ornithogalum niveum</i> <i>Oxalis tricolor</i> <i>Phydelia</i> <i>Pollinthes tuberosa</i> , b. fl. pleno <i>Sturmiana geminata</i> <i>Thysanotus fuscus</i> <i>Trichonema pudicum</i> <i>Tritonia pallida</i> <i>Uretholium longifolium</i> <i>Zuccaginia viridis</i>	<i>Amaryllis spathacea</i> and others <i>Bekina's</i> <i>indides</i> <i>Brunsvigia ciliaris</i> , coriacea, toxicaria <i>Calceolaria lutea</i> , purpurea <i>Coburgia coccinea</i> <i>Crimum crassifolium</i> <i>Drimys ciliaris</i> , elata <i>Gladiolus breviflorus</i> <i>Hemeranthus hamilis</i> , quadrivalvis <i>Lachenalia mutabilis</i> , rufes <i>Lapeyroussia anceps</i> <i>Masonia cincta</i> <i>Nerine exilis</i> , ar- ticulata <i>Oxalis rubra</i> , tri- color <i>Sturmiana filifolia</i> stellata

6149. *Propagation and culture.* After the ample directions on the subject of propagating and cultivating bulbs, given (5984, 5985.), very little can be required to be added here. A mode of propagating such as rarely produce offsets may be mentioned: it applies only to tunicate bulbs, which, if cut over transversely, a little above the middle, will form young bulbs in abundance near the margin of the outer coat. This has been successfully practised with *Hemeranthus pubescens*, and several of the more rare *Ornithogala*, &c. The grant air in cultivating bulbs is, in attend to the proper time for putting them into a state of rest; and when they are in a growing state, to place them so near the light, and to afford such a supply of air and water as will enable them to bring their leaves to perfection. The management of exotic bulbs is, in general, very imperfect among gardeners, who cannot be too much impressed with the importance of attending to these two points, — the perfecting the leaves, and the putting the bulbs

into, and keeping them during a proper time in, a state of rest. Bulbous-rooted plants associate almost ill with all others as succulents do; and, therefore, wherever a good collection is kept, there should be a house entirely devoted to their culture. The roof should be low and not very steep, and the pots should be kept on a level stage or platform, raised table high, or about two feet and a half, that the flowers may be near the eye. A house, glass on all sides, with a central platform, six or eight feet wide, and two side ones, or side borders, about three feet wide, would form an excellent house for plants of this description, as all of them would be near the glass, and near the eye of the spectator. Whenever any of the bulbs cultivated in such a house become in a dormant state, they could be removed to a pit or frame of proper temperature in the reserve-garden, and kept there dry, till the growing season. Exotic bulbs require nearly the same degree of heat, when lying dormant, as they do when growing.

SECT. VI. Herbaceous and stemless Green-house Plants.

6150.

HERBACEOUS AND STEMLESS GREEN-HOUSE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Androsymbium eucop-</i> <i>oides</i> <i>Androsymbium flavida</i> <i>Aristea cyanea</i> , melaleu- <i>chitoides</i> <i>Arthropodium cirratum</i> <i>Calceolaria corymbosa</i> <i>Campanula mollis</i> , acutifolia <i>Canarina Campanula</i> <i>Cypripedium</i> <i>Dactylis corymbosa</i> <i>Dianthus prostratus</i> <i>Ethalia trimeris</i> <i>Orchidium humifusum</i> , pusillum <i>Lobelia triquetra</i> <i>Marcia curvica</i> <i>Monarda grandiflora</i> , lobata, speciosa <i>Oxalis herbifolia</i> , interflora, perennans, rosea	<i>Anelloma equinoctialis</i> , sinica <i>Aretbia acutifolia</i> , tricolor <i>Aristea pusilla</i> <i>Arthropodium cirratum</i> , minus, panicu- latus <i>Bobartia gladiata</i> <i>Cypripedium</i> <i>Calceolaria cuneifolia</i> <i>Dampiera stricta</i> <i>Erythrina aurifolia</i> <i>Erythrina Cates-galli</i> , saviana <i>Goodenia gracilis</i> , grandiflora, ovata, paniculata <i>Lobelia Erinus</i> , lutea, minima, minuta, rufi- cifolia, varifolia <i>Melanthium fuscum</i> , uniflorum <i>Orthosanthus multiflor.</i>	<i>Anelloma biflora</i> , spirata <i>Aristea capitata</i> <i>Blandfordia nobilis</i> <i>Calceolaria corymbosa</i> , ascendens, Fothergillii, plantaginea, purpurea, Campanula mollis <i>Cypripedium</i> <i>Dionea's Muscipula</i> , leg <i>Erythrina aurifolia</i> <i>Gazania heterophylla</i> , pavonia <i>Gomera peripha</i> <i>Hemerodorum planiflo-</i> <i>rum</i> <i>Hypoxis erecta</i> , scaberrima <i>Lachenanthus tinctoria</i> <i>Lobelia cærulea</i> , &c. <i>Melanthium fuscum</i> <i>Morina repens</i> <i>Portulaca repens</i>	<i>Achillea ægyptica</i> <i>Agapanthus umbellatus</i> <i>Anelloma biflora</i> <i>Arthropodium mollis</i> <i>Calceolaria corymbosa</i> , purpurea <i>Calla aromatica</i> <i>Calceolaria cuneifolia</i> <i>Cephalanthus foliolatus</i> , leg <i>Dionea's muscipula</i> , leg <i>Frankenia Nitrida</i> <i>Grielin laetiflora</i> <i>Helicthrum orientale</i> <i>Linum flavum</i> , suffru- tescens <i>Lobelia cærulea</i> , &c. <i>Lupinus</i> , corymbosa <i>Lupinus atropurpurea</i> <i>Monarda ovata</i> <i>Ononis crispata</i> <i>Portulaca repens</i>	<i>Agapanthus medius</i> , minor, umbellatus <i>Arthropodium mollis</i> <i>Arthropodium cirratum</i> , fimbriatum, minus <i>Calceolaria corymbosa</i> , plantaginea, purpurea, ascendens <i>Disporum flavum</i> <i>Lobelia grandiflora</i> <i>Lobelia corymbosa</i> , minor, umbellata, cincta, minuta, pubescens, pyramidalis, rufi- phylla, serotina, &c. <i>Lupinus</i> <i>Richardia æthiopica</i> <i>Salvia pulchella</i> , spin- dosa <i>Samolus littoralis</i>

HERBACEOUS AND STEMLESS GREEN-HOUSE PLANTS. — continued.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Pericallis triandris</i> <i>Polygatum oppositifolium</i> <i>Scavola microcarpa</i> <i>Sorbaria japonica</i> <i>Valeriana</i> <i>Veronica gracilis, labiata</i> <i>Wachendorfia paniculata, thyrsiflora</i> <i>Wistaria corymbosa, mastra</i>	<i>Paeonia longifolia, sericea</i> <i>Salvia leucantha</i> <i>Scheuchzeria multi- flora, umbellata</i> <i>Statice mucronata</i> <i>Tropaeolum hirsutum</i> <i>Tropaeolum majus</i> <i>f. pl., minus f. pl.</i> <i>Veronica pulchella</i> <i>Wachendorfia hirsuta</i>	<i>Libertia grandiflora,</i> <i>paniculata</i> <i>Simoula littoralis</i> <i>Sisymbrium umbellatum</i> <i>Scoropocarpus Rasi</i> <i>Styidium grandiflo- rum, scandens, tenui- folium, hirsute, others</i> <i>Tropaeolum hybridum,</i> <i>pinnatum</i> <i>Valeriana parviflora</i> <i>Veronica perfoliata</i> <i>Wistaria reniformis,</i> <i>sarmentosa</i> <i>Wistaria corymbosa</i>	<i>Richardia scutellaria</i> <i>Ruellia ciliosa, squarrosa</i> <i>Stavia amethystina</i> <i>Scavola macrodon</i> <i>Sisymbrium caryophyl- litum</i> <i>Trachibidum diffusum</i> <i>Tropaeolum hybridum,</i> <i>pinnatum</i>	<i>Streptocarpus Rasi</i> <i>Styidium Jacquinum</i> <i>Tradescantia crinita</i> <i>Wistaria corymbosa</i>

6151. *Propagation and culture.* A small house, constructed like a bulb-house, should be devoted to these plants, some of which are of considerable beauty; but they do not assert well with woody and evergreen species. All the difference between the culture of hardy and exotic herbaceous plants consists in the latter being kept in a different climate and in pots.

SECT. VII. Selections of Green-house Plants for particular Purposes.

6152. *The particular purposes to which green-house plants are applicable* are few compared with those for which plants which grow in the open air may be selected. The most hardy species will be found arranged as frame plants; the most showy and odoriferous under the first four sections. There are scarcely any green-house aquatics, but a few marsh plants; and no parasites, or air plants suitable for the green-house, have been introduced hitherto. Collections, however, might be made of such as are grown in their native countries for useful or economical purposes, and whose produce is imported to this country, as of *Cinnamomum Camphora*, the camphor tree; *Platanus Lenticulus*, the tree which affords mastich; of such as are highly odoriferous, as *Aloysia*, *Heliotropium*, &c. In a botanical collection, *Dionaea* and *Sarracenia* are plants of interest, and difficult to preserve or propagate. They are generally procured from their native countries, and grown in peat-earth, kept moist, and the atmosphere also rendered humid by covering them with a hand-glass. Creswell has produced very strong plants of *S. purpurea*, by treating it as a stove plant. Under his management, "it is planted in a mixture of the fibrous roots, obtained from peat earth, with an equal quantity of rotten willow wood, broken into small pieces, by which the soil is kept perfectly drained. The pots in which the plants grow are kept in a shaded part of the stove, and watered occasionally, but they do not require to be placed in pans of water, except they become so dry as not to absorb the water given in the usual way." (*Hort. Trans.*, vol. iii. p. 360.) Some fine specimens of these genera, and also of *Nepenthes distillatoria*, are contained in the collection of Messrs. Loddiges, at Hackney; and plants of the rare *Cephaelis follicularis*, and of the *Dionaea Muscipula*, and the *Nepenthes*, are cultivated in the collection of Mr. Knight, Chelsea.

CHAP. XIII.

Dry-stove Plants.

6153. *What are called dry-stove plants* are such as have been found from experience, to require an intermediate degree of heat between the green-house and bark-stove plants, and a more dry atmosphere than the latter. Their propagation and culture are the same as for green-house plants; with this difference, that they are not in general removed to the open air during summer; but, where the construction of the house admits, the sashes may be removed in dry weather during the three warmest months, but always replaced on the commencement of heavy or cold rains, and boisterous winds. We shall arrange them as woody, climbing, succulent, bulbous, and herbaceous plants. To cultivate them to any degree of perfection, it is essentially necessary that a house be appropriated to each section, and each house so arranged as that the plants may be near the glass, and that heat and air may be supplied at the pleasure of the cultivator; or a long narrow house may be divided so as to keep each class separate.

SECT. I. Woody Dry-stove Plants.

6154.

WOODY DRY-STOVE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Antidesma alexandria,</i> <i>paniculata</i> <i>Baccharis frutescens</i> <i>Cleome rubra</i> <i>Eugenia reynoldsii</i> <i>Ficus bengalensis</i> <i>Ostrya speciosa</i> <i>Solanum viridiflora</i>	<i>Barringtonia speciosa</i> <i>Bontia daphnoides p.</i> <i>Boronia flabelliformis</i> <i>Boronia Allacstrum,</i> <i>splurum</i> <i>Justicia Gendarussa</i> <i>Muntingia calabura</i> <i>Opibidion serpentum</i>	<i>Achras mammosa,</i> <i>sepioides</i> <i>Adiantum decapetalum</i> <i>A. vidua lentiginosa</i> <i>Bilaka trinervia</i> <i>Cestrum vespertinum</i> <i>Gardenia florida p.</i> <i>Heliotropium pervilina.</i>	<i>Artisia segana, interi- flora, paniculata</i> <i>Clerodendrum fragrans</i> <i>Gardenia amoena</i> <i>Grewia asiatica</i> <i>Hedera cochlearia</i> <i>Hibiscus Rosa-andrea</i> <i>Triphala trifoliata p.</i>	<i>Artisia acuminata, co- lanica</i> <i>Bona Orellana</i> <i>Cestrum diurnum</i> <i>Clerodendrum panicu- latum, Siphonanthus</i> <i>Duranta Plumieri</i> <i>Punica frutescens</i>

SECT. II. Climbing Dry-stove Plants.

6155.

CLIMBING DRY-STOVE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Cissus acida</i> <i>Pandanus racemosus, rac- alata carlesii, phanolo-</i> <i>Securidaca volubilis</i> <i>Siphonia elastica</i> <i>Solanum grandiflora</i>	<i>Bemisia tomentosa</i> <i>Dracodendrum pertusum</i> <i>Gonolobus grandiflorus,</i> <i>maritimus</i> <i>Hoya Fittii</i> <i>Phlox scandens</i>	<i>Caladium symphora-</i> <i>folium p.</i> <i>Scilla elastica, stellata</i> <i>(Gonolobus scandens</i> <i>Hoya carnea, crassifolia</i> <i>Notobargia gloriosa.</i>	<i>Amphibolum panicu- la.</i> <i>Bacilla alba, rubra</i> <i>Cissampelos Parisii</i> <i>Cissus acida, elvichii,</i> <i>vitiginea</i> <i>Physanthus libani</i>	<i>Gonolobus suberosus, p.</i> <i>Diocorea pentaphylla</i> <i>Ipomoea insignis,</i> <i>paniculata, spirodora</i> <i>Nissolia frutescens p.</i> <i>Sarcostemma viminalis</i>

SECT. III. *Succulent Dry-stove Plants.*

6156.

SUCCULENT DRY-STOVE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Cereus flagellif.</i> , Mal-laboni, phyllanthoides <i>Euphorbia canariensis</i> <i>Obelia decora</i> , geminata <i>O'rea rugosa</i> <i>Peperomia acuminata</i> , amplicaulis, incana, magnoliaefolia, num- mulariaefolia, pubes- cens <i>Podanthes incornata</i> , pulchella <i>Rhipsalis salicoides</i> <i>Stapelia Asotiana</i> , Masoni <i>Tridentea Simsii</i> , virens	<i>Bryophyllum calycinum</i> <i>Cereus gibbous</i> , speciosus Jenkinsoni, truncatus, phyllanthoides <i>Euphorbia cereiformis</i> , clava, officinarum <i>Hudera venusta</i> <i>Kalanchoe pinnatifida</i> <i>Mammillaria laniflora</i> , stellata, vivipara <i>Obelia serrulata</i> <i>Opuntia cuneata</i> and varieties, pusilla <i>O'rea normalis</i> , varia- gata <i>Pedilanthus sithymaloides</i> <i>Peperomia clusgatefolia</i> <i>Stapelia ambigua</i> , hamata, hirsuta	<i>Agave lilioides</i> , rigida <i>Caralluma ascendens</i> , umbellata, fimbriata <i>Cereus grandiflorus</i> , heptagonus, pentago- nus, peruvianus, speciosissimus, Mal- laboni, phyllanthoides, Ackeri <i>Euphorbia mesoformis</i> , sericea, officinarum, piscatoria, antiqui- rum, <i>Tirucalli</i> <i>Hudera campan.</i> , retic. <i>Kalanchoe</i> sagittata <i>Opuntia spinulosa</i> <i>Pedilanthus sithymaloides</i> <i>Rhipsalis grandiflora</i> <i>Stapelia acuminata</i>	<i>Cacalia tomentosa</i> <i>Cactus Metacactus</i> , macrocarthus <i>Cereus cylindricus</i> , heza- gonus, lanuginosus, pentagonus, spindlidus <i>Duvallia cespitosa</i> <i>Euphorbia Lacini-Med.</i> <i>Kalanchoe laciniata</i> , rotundifolia <i>Mammillaria prolifera</i> , simplex <i>Opuntia decumana</i> , cochinchinensis, <i>Flores</i> indica, nigricans <i>O'rea orbiculata</i> <i>Piaranthus pallus</i> <i>Rhipsalis Cassiope</i> <i>Stapelia flavicomata</i>	<i>Agave virginica</i> , vivipara <i>Cacalia papillaris</i> <i>Cereus griseus</i> , repandus <i>Euphorbia hexagona</i> , hirsuta, mammillaria <i>Furcraea gigantea</i> <i>Gynostemon strictus</i> , viridis <i>Kalanchoe acutiflora</i> , ceratophylla, crenata <i>Opuntia Dilensis</i> <i>Peperomia polystachya</i> <i>Pereskia aculeata</i> , <i>Ble</i> <i>Piaranthus punctatus</i> <i>Stapelia angusta</i> , glandu- liformis, rufa <i>Tridentea geminiflora</i> , moschata, xygia

SECT. IV. *Bulbous Dry-stove Plants.*

6157.

BULBOUS DRY-STOVE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Albica altissima</i> , major, spiralis <i>Anthurium cancella-</i> <i>trum</i> <i>Drimys pusilla</i> p. <i>Stomoxis bifida</i> (April)	<i>Albica caerulea</i> , cau- data, cuneata, fru- gosa, minor, phy- des, viridiflora, vis- serica <i>Bulbine esphodeloides</i> <i>Galaxia grandiflora</i>	<i>Albica frutgens</i> , phy- des, spiralis <i>Amaryllis tabaphanta</i> <i>Stomoxis punctata</i> <i>Galaxia graminea</i> <i>Oxalis monophylla</i>	<i>Bulbine hastata</i> , elodides <i>Chlorophyllum isomac- rum</i> , ochridastrum <i>Drimys altissima</i> , elata, lanceolata	<i>Amaryllis pusilla</i> <i>Bulbine graminea</i> <i>Drimys elata</i> p. <i>Oxalis monophylla</i> , tricolor

SECT. V. *Herbaceous Dry-stove Plants.*

6158.

HERBACEOUS DRY-STOVE PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Bitlis Tankervillei</i> p. <i>Besleria coccinea</i> <i>Gloxinia hirsuta</i> <i>Nectria elata picta</i> , spec. <i>Peltocannae</i> , cor- data, angustata <i>Peperomorphus archid.</i>	<i>A'rum divaricatum</i> p. <i>Commelina bengalensis</i> <i>Gean-rie Douglasii</i> <i>Maria Nerthiana</i> , Nabini <i>Phytolacca octandra</i> <i>Peltocannae</i>	<i>Adiantum reniforme</i> p. <i>A'rum Colocasia</i> <i>Begonia nitida</i> <i>Besleria melitensis</i> <i>Caladium bicolor</i> <i>Gean-rie ulmifolia</i> <i>Stingingia Helieri</i>	<i>Asteromeria</i> , many <i>Begonia Evansiana</i> , macrophylla, and others <i>Caladium bicoloratum</i> p. <i>Gloxinia caulescens</i> , hirsuta, speciosa <i>Sensarvieu longiflora</i>	<i>A'rum orizense</i> , angustifolia <i>Begonia graminea</i> <i>Loas macrophylla</i> <i>Pitcairnia angustifolia</i> <i>Sensarvieu guineensis</i> , seyalica <i>Trevirana coccinea</i>

CHAP. XIV.

Hot-house or Bark-stove Plants.

6159. *Bark-stove plants* are such as require the highest degree of heat: this has generally been given by the aid of a bed of bark or other fermenting substance, in which the pots containing the plants are plunged. Sometimes, steam (2512.), or hot water (2527.), or flues, are applied under a vault covered with earth or sand, as a substitute for bark; and more recently the pots have not been plunged in any material, nor bottom heat applied; but a greater atmospheric heat communicated, and the atmosphere about the pots kept moist by watering, &c. We shall arrange the most ornamental species which flower freely under woody, climbing, bulbous, perennial, annual, aquatic, and reedy plants; and add some remarks on palms, air plants, and ferns, which, though they seldom flower in this country, or have for the greater part flowers of little show, yet are grand or interesting specimens of vegetable beings. Those marked with a star (*) seldom or never flower in this country.

SECT. I. *Woody Bark-stove Plants.*

6160.

WOODY BARK-STOVE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. TO NOV.
<i>Astragalus Wallichii</i> <i>Burchardia cap.</i> , Jabel <i>Cassia</i> , spinosa <i>Charwoodia congesta</i> <i>Chrysophyllum Casteio</i> <i>Draconis frag.</i> , <i>Serva</i> <i>Erdtheum strictum</i> <i>Erythrina Corallodend.</i> <i>Crise-pullii</i> , speciosa <i>Euphorbia amplexicaulis</i> , malacodonta	<i>Acetis equetia</i> <i>Ardisia crenulata</i> , punctata, solanacea <i>Brezia madagascariensis</i> , spinosa <i>Cassia latifolia</i> <i>Cerebra Akouhi</i> , <i>Odellii</i> <i>Cinnamomum Cam-</i> <i>phora</i> , <i>Celaia</i> , <i>nitidum</i> , vireum <i>Cordia Sebastiani</i>	<i>Allamanda cathartica</i> <i>Ardisia corata</i> , lateri- folia, paniculata <i>Blechna trinervia</i> <i>Bryonia coccinea</i> , latifolia, rosea <i>Branfistia undulata</i> , americana, uniflora <i>Calceolaria eleg.</i> , procer. <i>Carex Cardenas</i> <i>Cerebra Thersia</i>	<i>Ardisia canaliculata</i> , diagona, humilis, pyramidalis <i>Averrhoa Bilimbi</i> , <i>Carex</i> <i>Barringtonia speciosa</i> <i>Brugmansia arborea</i> , suaveolens <i>Carex spinum</i> <i>Carophyllum aromati.</i> <i>Clerodendrum fragrans</i>	<i>Alagium herpentalum</i> * <i>Anura inermis</i> * <i>Caryophyllum aromati.</i> * <i>Cestrela odorata</i> * <i>Chrysophyllum macro-</i> <i>phyllum</i> * <i>Coccoloba orizaria</i> , * <i>puleiacea</i> * <i>Coffea arifica</i> <i>Dillenia speciosa</i> * <i>Draconis Draco</i> *

WOODY BARK-STOVE PLANTS—continued.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. TO OCT.
<i>Gastonia palmata</i> <i>Orleana tomentosa</i> <i>Urtica longifolia</i> <i>Acacia minnensis</i> <i>Jacquinia aurantiaca</i> <i>Jacquinia coccinea</i> , quadr. <i>Malpighia coccinea</i> , quadr. <i>Melastoma corymbosa</i> <i>Mitras acris</i> <i>Passia arund.</i> <i>Phyllanthus affinis</i> <i>Plumbago rosea</i> <i>Plumieria Cowini</i> <i>Polypora axillaris</i> <i>Schottia leucosticta</i> <i>Solanum viridiflorum</i> <i>Stachytarpheta mutabil.</i> <i>Strophandrus dichotom.</i> <i>Tabernaemontana coran-</i> <i>aria</i> , & pinn.	<i>Brinthenum bicolor</i> <i>Exostemma caribaeum</i> <i>Guaiacum officinale</i> <i>Gomeryia corymbosa</i> <i>Jacquinia armillaris</i> <i>Jatropha multifida</i> <i>Malpighia coccinea</i> <i>Lixia barbata</i> , cune- <i>folia</i> , flava <i>Lagerstrœmia indica</i> <i>Phyllanthus longifolius</i> <i>Melastoma erythroxylum</i> <i>Murruia exotica</i> <i>Nyctrian amabilium</i> <i>Obolobis napellides</i> , peylid. <i>Obolobis chinensis</i> <i>Passiflora americana</i> <i>Pierberia holosericeum</i> <i>Quercus agrifolia</i> <i>Trimeris elegans</i> <i>Wrightia coccinea</i>	<i>Clerodendrum panicula</i> <i>Comocladia ilicifolia</i> <i>Dryas teretifolia</i> <i>Erinanthemum spinosum</i> <i>Gomphia inaequalis</i> <i>Gouplium arboreum</i> <i>Hesperis matronalis</i> <i>Hibiscus Rosa stœnis</i> <i>Lixia Bonduca</i> , <i>Pavetta</i> , <i>Rosa</i> , stricta <i>Justicia flavocoma</i> <i>Melastoma Melandryon</i> <i>Obolobis napellides</i> , stellata <i>Oxyanthus speciosus</i> <i>Samyda rosea</i> <i>Spermatocyon suave-</i> <i>plens</i> <i>Scaevola mollis</i>	<i>Erythrina speciosa</i> <i>Garcinia Mangostana</i> <i>Hemadictyon venustum</i> <i>Hibiscus Rosa male-</i> <i>barica</i> , <i>Rosa stœnis</i> <i>Ilex coccinea</i> <i>Lixia arborea</i> , blanda, <i>Incaranra</i> <i>Justicia speciosa</i> <i>Melastoma macrocar-</i> <i>pum</i> , <i>malabaricum</i> <i>Melastoma purpurea</i> <i>Pierberia granulatum</i> <i>Plumieria alba</i> , rubra, <i>tricolor</i> , tuberculata <i>Sarcocaulis scæulen-</i> <i>sis</i> <i>Scaevola speciosa</i> <i>Tecoma stans</i> <i>Theobroma Cacao</i> *	<i>Brinthenum crenu-</i> <i>atum</i> , <i>fecundum</i> <i>Exostemma pidi-</i> <i>ca</i> *, <i>symphoricar-</i> <i>pa</i> <i>Justicia alba</i> <i>Lixia crocata</i> <i>Passia linearis</i> <i>Lechytia grandiflora</i> * <i>Lobelia surinamensis</i> , <i>fl. rubro</i> <i>Myrica rubra</i> <i>Pavetta indica</i> <i>Pteris gracilis</i> <i>Plumieria bicolor</i> <i>Schottia acutangul-</i> <i>um</i> *, <i>racemosa</i> <i>Strychnos Nix-vénica</i> * <i>Tecoma grandis</i> * <i>Theophrastus Jussieu</i> <i>Xanthochymus</i> , several

6161. *Propagation.* All the known modes are occasionally adopted, but those by seeds and cuttings are the most general. Few stove plants ripen their seeds in this country, and such as are obtained are therefore generally procured from abroad.

6162. *Trusted seeds* for general sowing observations, are very liable to lose their power of vegetation by reason of the transition from warm to cold climates, combined with the length of time which commonly intervenes between the germination and arrival with us, especially if they have been exposed to damp; on that account they should be sown as soon as they arrive, at least a part of each parcel. Much depends on the state of the seeds when received, and on the season of the year in which they arrive with the regular fleets, as indeed do those from the Cape of Good Hope, and all the South Sea Islands, for the most part by the Eastern and China ships; so that one may in general be prepared against their arrival. As early spring is, undoubtedly the best time for sowing, a few weeks' delay may in some instances be advisable. If received late in October or November, wait until the seeds are ripe, and then sow them; evidently appears that they will not keep out of the earth so long a time in a vegetative state: such as can be sown before August have a good chance to acquire sufficient strength of growth to carry them through the winter months, so as to adhere to the general efforts of young vegetable life.

6163. *The pots being well drained* should be filled with the compost suitable to the species of plant by which the seed is intended to be sown (see *Art. 614*): let it be pressed down to about a third or half an inch below the edge of the rim, according to the size of the seeds; if they are small or light sorts, it will be necessary to give it a light, and to add a little of the very fine sifted mould on which to deposit the seed, previously smoothing it with a piece of thin flat wood, bent so as to lie on it level. Being thus prepared, let the seed be sown regularly on the surface, and cover it from about an eighth to a quarter of an inch, according to the size of the seed, as before, with the same sort of fine mould. But if the seed is of the largest sort, as, for instance, the nut or cone kind, no more is necessary than to press them into the earth with the finger, and to cover somewhat thicker than is recommended for the others. In either case, the covering should be pressed moderately on the sides, while the hand is performed: indeed a most necessary caution in sowing seeds of any description whatever. In order to ensure the vegetation of hard or very tough-shelled seeds, some have them soaked in water for a few days, say a week, or even ten days, for such as happen to be very dry, previous to sowing: a shallow pan, placed on the coolest part of the due in the propagation-stove, is the readiest and safest article to receive them for this purpose; they should be examined daily, and when the moment of swelling or growth appears: this process, however, is fraught with danger to many of the lighter and smaller sorts.

6164. *The sowing being finished*, the pots must be set on a level spot, and watered gently, but thoroughly, with a pot, the rose of which has been made particularly fine, for this and other such uses; and immediately plunged in a strong heat, without which they will not be likely to vegetate: if a close dung hotbed the better. A regular but moderate watering, steady heat, and occasional weeding, should any weeds appear, is all they will now require until they are fit to be removed into separate pots, which may be done as soon as they have attained a few inches' growth above their cotyledons or seed-leaves. There are some fruits, such as that of *Nyctaginia*, whose exterior coat is so very hard, that the seeds are not able to break through, at least, with us; to remedy which, the knife is not unfrequently used to pare them thin, even to making a hole in them with good effect, but not too near the eye or part where they sprout. If the business of seed sowing is to be continued in spring, or early in summer, the smaller sorts may be expected to vegetate in the course of five or six months at farthest; whereas, the larger bony kinds will sometimes remain dormant in the earth for more than a year, or even twelve months: this must be attended to, else one might think them beyond a chance of growing, and perhaps throw them away without examination. When business of seed sowing is to be continued, let some of them be taken up and opened with a knife; when they will at once discover whether they are sound or not; if sound, they must be still kept in a strong heat, and regularly watered, as before. For want of this simple examination, valuable seeds are often carelessly thrown on the rubbish-heap, when just bursting their shell or embryo; and not unfrequently, by that accidental check, are so materially injured as to prevent the seeds from ever being able to vegetate again, if they have been at all so fortunate as to be noticed and rescued. (*Kew's Gard.*, p. 6.)

6165. *By cuttings*, a most abundant supply of the different sorts of earth, &c. there is another article necessary to be provided before we begin the business of making cuttings; which is, a few dozen of small bell-glasses (the white glass is best), of as many different sizes as the pots in which the cuttings are intended to be planted: they should be fitted to the pot, so as to rest on the inner side of it, about an inch below the rim;

by observing which circumstance, when the pot is filled with earth, the glass will have room sufficient to sink a little into it, so as to perfectly exclude the external air; this is of very essential importance to the cutting while in a dormant state, that is, from the time they are put in until they begin to grow.

6166. *Cuttings may be planted almost every season* of the year; yet the months of April, May, and June are certainly the most proper; as the plants are at that season plentifully supplied with young wood, which, in most species, produce roots when made into cuttings, much sooner than the old wood will if used in the same manner. When the day is fixed upon for the business, let the number of pots of the size be selected, and prepared by covering their bottoms to the depth of one or two inches with pebbles; and then, as wanted, about half filled with the compost best suited to the plant intended to be propagated; to grow in for a few weeks, when first struck, and the remaining part with the best loam that can be procured, to insert the cutting in when ready. On the purity and richness of the loam depends the success of the business; the success of many of the tender kinds of cuttings, particularly those which are obliged to be kept in moist heat, as the soil is, when contaminated with other composts, very liable in these situations to cause damping by rotting the cuttings, and thereby destroying matter generally contained in mixed earth; and the properties of which are put in motion, by the application of heat. An exception to this rule, may be added sand, which is of very great utility to the more luxuriant sorts, but it is rather stiff for the nature of the cutting; but then, the sand proper for this use is of so pure a nature in itself, that it is evident it cannot have the effect noticed above in regard to mixed soil.

6167. *In the choice of cuttings*, preference should be given to the firmest wood of the same year's growth; and of these, only those whose leaves have attained their full size and proper colour, which are generally to be selected from the lateral shoots; as the upright leading ones are mostly too luxuriant to make good cuttings. The cuttings of many plants, if taken from the lateral shoots, never become proper erect stems; but are inclined at all times to form an irregular, bushy, weak head: this is not of small importance to such collectors as cultivate plants merely for the flower; as such heads generally produce them sooner than luxuriant leaders. The covers of handsome erect plants, however, choose their cuttings from the upright shoots, early in the season, before they acquire that luxuriant growth which is the purpose of propagation. The tops of the shoots are to be preferred, unless they happen to flag before being used. To prepare them for insertion, most of the leaves must be trimmed off close to the stem, leaving only a few at the top, to allow a free respiration of the air necessary to the life of the plant. This is a most essential article in the art of making cuttings, particularly those of evergreens; for if they are deprived entirely of their leaves, or that they otherwise flag, or occasionally fall off soon after they are put in, there will be little or no chance of their growing. The reason is obvious, because the inherent sap of the cutting, being deprived of these organs of respiration that kept it in motion, and the cutting having no roots by the efforts of which to produce new leaves, the sap, consequently, becomes stagnated in the pores of the wood; which, like the stagnation of the blood in animals, will in all likelihood prove mortal, by occasioning an immediate mortification.

6168. *In shortening each cutting* to the most convenient length, care must be taken to do it in a clean cut, in a transverse direction at a joint; but by no means to be exposed, or to let it lie any considerable time before being planted. In planting, a small dibble or other convenient instrument should be used to press the loam sufficient to support the base of the cutting, as that is the principal part to be made fast; as soon as the whole are inserted and the surface of the mould is made level and a little firm, give them a gentle watering to settle them; they should be let to soak about an hour, or an hour, and then covered with a bell-glass, which should be pressed pretty tight, so as perfectly to exclude the outward air. The atmospheric air being prevented by the glass from exhaling any of the juices of the plant, all its powers are forced downward to produce roots, and these will soon prove their existence by producing young leaves and branches. If there are any cuttings of the same sort which they may be put in one pot, unless they happen to be of very large or curious sorts; but in general each species should be kept in a separate one, on account of the difference in time that some of them require to strike root; and also, that any chance of rotting should be put only one in a small pot, as they then are not liable to be injured so much by damps, neither do they require to go through the precarious operation of removing, so soon after being struck. Should it be requisite to have a considerable quantity of cuttings made at the same time, it would be proper to have a one-light frame, with close glasses, placed on a moderate heat, ready to receive them, and to be covered with sawdust or clean tan, about a foot deep, in which to plunge the pots; but if there are only a few dozen, they may

be plunged in any frame among other things, provided there is a moderate heat.

6169. Watering and shading. They will now require the most particular attention as to watering and shading. The water must be given twice or thrice very moderately until the earth has become sufficiently moist, which, if once so, will retain the moisture for a length of time, by being covered with the glass; but the shading is the principal care whenever the sun's rays fall on the glasses, as nothing will create rot sooner than letting the leaves flag, and lay upon each other, which will be the positive consequence of a neglect of shade. The most advisable mode to do it is, to cover the large shade of strong paper to lay over the glasses within a frame; which, at the same time that it shades the cuttings, does not prevent the sun's rays from entering the frame and clearing off any damps that may be accumulated therein; whereas, if glass are laid on the outside of the frame-light, it is evident they will tend to have the direct contrary effect. However, in the course of a week or fortnight, they will be able to withstand a little of the rays of the morning and evening sun.

6170. While in an inactive state, they should be kept rather dry, but not let to an extreme; else the bark will become shrivelled, and occasion a very smart falling off amongst them; the other hand, should they be kept an over-crowded state, the consequence would not be less disagreeable, on account of the damp occasioned by the air being so closely confined under the glasses; in case to it were necessary, it would be well to wipe the glasses wiped with a dry cloth about once a week, which is quite sufficient for hot-house cuttings, as they are not so liable to suffer from this cause as those of green-house plants.

6171. At the end of the bed of cuttings, they should be kept dry, have another, properly tempered, ready, in case to plunge them when requisite; or otherwise, let the old one be removed with linings of fresh warm dung; but in such manner as to avoid creating any violent draughts or strong rank steam in the bed; as it is better to do it often and but slightly at a time, it being but a trifling increase of labour compared with the probable consequences. By increasing the heat, they will have another, properly tempered, ready, in case to plunge them when requisite; or otherwise, let the old one be removed with linings of fresh warm dung; but in such manner as to avoid creating any violent draughts or strong rank steam in the bed; as it is better to do it often and but slightly at a time, it being but a trifling increase of labour compared with the probable consequences.

6172. In taking the bell-glasses off at night, it is necessary to observe that when their closeness they sometimes occasion the cuttings, more frequently the small broad-pointed leaves and even shoots, before they have sufficient roots: if at any time these should be mistaken for well-rooted plants, and their glasses taken off accordingly, in a few hours they may be perceived by the leaves being and so them to be kept the glasses must be immediately replaced; otherwise, if neglected, those tender shoots will be utterly spoiled, and it will be a very great chance whether the cutting will ever produce more or not. Should the above circumstances happen, they will be observed to be more impatient of damp afterwards; as indeed will all those be which are growing: the glasses should therefore be more frequently dried, and kept off until the leaves, &c., which were under them become dry by evaporation; lest we risk their success, I may say, perhaps, their existence, by rotting the first weak efforts towards active life.

6173. The rooted cuttings being thus prepared, they may be occasionally taken out of the frame, and set in more exposed airy situations in the hot-house; but as some kinds require a much longer time to produce roots than others, it will be necessary to keep such still in the frame, shading and watering them when requisite, as already directed. Thus may they be treated until the autumn; when, if any yet remain in the cutting state, it will be advisable to take them taken to a propagation-stove, and plunged in the bark-pit; previously clearing them from any damps, moss, or weeds that may have grown amongst them, and renewing the surface with a little fresh loam. Here they will require the same care as when in the frame, except that, as the influence of the sun decreases, so must the shading in proportion; using it only for two or three hours in the middle of the day, if at all requisite; and, indeed, it is necessary here to observe, that, in the winter and early spring months, they must not be shaded on any account, nor watered, except when absolute necessity requires it: neither should the cuttings that may be occasionally made at evaporation, receive any water when first put in, as directed for those made in summer, as the mould will be found in general sufficiently moist, in itself; and as there is not that quick principle of vegetation at this season, the water might prove materially injurious, by promoting damp and rotteness. It is even necessary in some instances, should the cutting be of a succulent plant, as in any degree exceeding that nature provides loam rather dry, than moist; in which they must be planted and left without water, until they have completely formed their callouses, and the wounds healed by nature; in either case, these fresh put in must be partially shaded for a few days, should the weather happen to be clear and sunny. It will be also necessary to dry the inside of the bell-glasses more frequently in the rainy season, as the increased evaporation; and damp at this season should be more particularly avoided than at any other. In the ensuing spring those put in early, as far as they have produced shoots, and in the summer, will in general make an effort to grow; as soon as they are observed in this state, let them be managed in the same manner as those already rooted have been.

6174. In regard to transplanting and setting the rooted cuttings or seedlings separately, the greatest nicety should be observed; first, in turning them out of the pots without lacerating the roots; and secondly, in shaking and clearing the earth from amongst them, until they can be readily separated without breaking; if any of the mould can be conveniently preserved to them, so much the better; but the preservation of the roots should be the principal object. They must be immediately transplanted in their proper soil, in pots suited to the size of the cuttings, and neatly dug up, if necessary; let them be then well watered with a weak-pot moderately fine, but by no means should they be flooded, or drenched with it, as too many are apt to do, but let it be given gently, and time allowed for it to soak

regularly into the mould. They will require a brisk heat and clear shining for a few days, until they have manifested themselves in the fresh mould. (*Essent Gard.*, p. 35.)

6175. Laying and layering are rarely practised on hot-house plants; however, there are some that are raised most freely by cuttings, which may be multiplied accordingly by these methods.

6176. In laying, choice should be made of the young tender shoots of the plant of the present year; this soft bark will soon form a callus, and produce roots, than that of those of the preceding year's growth. It is particularly necessary to secure them from the sun, and to be laid in a bed of a brittle nature; not for fear if it is too hard, it will be too much pressed gently down to the surface previous to laying, and the soil until their tops naturally acquire a perpendicular direction, which they will do in a few days; within a short time it would be extremely difficult to cut or to break them without cracking, or breaking them off; but if treated in the manner, the most brittle may be laid without danger. It is a conclusion drawn from several experiments, that the layer, which is inserted to a proper depth, roots sooner and better than that which is laid near the surface; the reason of which is, at a certain depth the air is better excluded, and there is a more regular degree of heat, for the cutting, which is inserted in a fibrous, when they are protruded. No part of the shoot should on any pretence be covered with the mould, except that which is intended to produce roots, and the regularity of the soil is extremely liable to rot; and therefore, if any particularly tender plant should happen to be thus treated, it would evidently endanger the whole stock.

6177. In the method of layering, which is so preferable to the common grafting, for evergreens in particular; it is principally practised as the best means of multiplying all the double varieties of Camellia and plants of similar kind, because their strong barks, if only for a few days deprived of their regular supply, by being cut clear from the mother stock, if not covered closely with a glass, will be certain to wither and fall off; after which time they will be found to produce roots, and the regularity of the soil is extremely liable to rot; and therefore, if any particularly tender plant should happen to be thus treated, it would evidently endanger the whole stock.

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6178. General culture. To attain a respectable degree of perfection in the culture of tropical plants, Cushing observes, the principal objects to which we should direct his attention are, regularity in keeping up the stock by propagation, a careful nicety in potting, and shifting in the proper season, a regularity in watering when requisite, a thorough knowledge of the temperature necessary to be kept in the house, and a steady attention to the cleanliness and habits of the plants in general. The business of shifting, or refreshing the roots of plants with earth properly prepared for that purpose, and transplanting them into larger pots than they before occupied, is one of the most necessary operations required to keep them in a good state of growth. The quantity of earth contained in a flower-pot being in comparison so small, and the soil which is requisite to support the generality of plants, so light, and so barren, that, unless it is changed or augmented in due season, they will soon exhaust every particle of vegetative matter contained therein, though frequently watered; and by consequence the doubling contains a large portion of the food of vegetables; the consequence of which is, to the weaker-growing and tender kinds, that its salts being dissolved, and the sandy particles which keep it in a free open state, and the soil, by long and long continued abridgements, it becomes, in the case of ill-drained pots for seeds, sour and congealed; and the plant being no longer able to draw proper nourishment from it, must inevitably decline, and at last be obliged to be removed to the collection, by inducing insects and diseases: to the stronger sorts, though in a different manner, it will be no less pernicious, by starving them, and rendering them liable to be dwindled into naked stems, and awkward ungainly forms.

6179. The season most proper for shifting hot-house plants is about the middle or end of April; if done earlier (though some hot-house plants may be shifted in a small pot, or frame for the greater part of the year) the generality of them will be found dormant; and therefore will not have the power to establish themselves sufficiently in the fresh earth so placed a great part of their leaves will be obliged to fall before acquiring a sickly appearance; and, on the other hand, if done much later, most of them will be in a vigorous state, and it will be more infinite care, and labour to shift them before properly shaded, else the intense influence of the sun on them, at an advanced season, will have, though a different cause,

nearly the same effect; and reduce them to fully as disagreeable a state as in the former case. But if taken soon after they have made the first effort for the season's growth, the fibres being set in motion, and not having a top full of young tender leaves to support, they soon find their way into the fresh mould; and the plants, by being thus taken in time, and when done, placed in a brisk bottom heat to assist them, in the space of three or four days at furthest be well recovered, and in general, able to support themselves against the strongest rays we may reasonably expect at that season, without much danger to their leaves.

6180. *Operation of shifting.* Being fully prepared for the removal of the plants, let a part of them be taken to the potting-shed together, that they may be no longer than necessary out of the stove; and when these are shifted, the remainder may be taken out of the stove, and set on any of the shelves or benches that are over the flues, so as to allow sufficient room to have it forked up and turned; and should it be sunk considerably below the desired height, some fresh well-dried tan should be added, and mixed well with the old in turning; when done, let it be made pretty level with a rake that the plants may be conveniently and regularly set on the surface when shifted. In shifting the plants, the greatest nicety should be used not to injure the roots; because, if the roots, from a multiplicity of wounds (which are more frequently lacerated than cleanly cut), once become cankered, or contaminated in any manner, the branches must also be expected to suffer and decay.

6181. *An old and erroneous practice*, followed by many, is that of peeling off the bark of the roots with a knife; and then the tips or ends of the fibres, which are undoubtedly the active agents in collecting the food for the stem, &c.; then, without ever loosing the remaining part of the ball, set it in the new soil with a little fresh earth thrown loosely about it; as a matter of course, they think it must then be completely drenched or flooded from the water-pot; and lastly, to crown the whole, perhaps set it in a stove, or in a sun-bath, so that the plants only took time to consider the mutilated state to which they have reduced the roots, it is impossible they could ever conceive them to be in a state fit to undergo such treatment with any kind of advantage; but it is the misfortune of many, who will not for a moment hesitate to undertake the care of tender and curious plants, as a matter easily understood, yet will not take the trouble of judging for themselves, to follow the old track of custom, the same as they may, and have before seen practiced on the hardiest perennials or myrtles. Though the method may not seem to hurt some few kinds of strong-growing plants, it never can be allowed as a proper mode of treatment for all plants indiscriminately, because they may happen to have a good portion of roots; indeed, more plants have been destroyed by this practice than by any other particular fault; and it is the misfortune of many, who come so blindly follow. There are instances, however, wherein a knife is necessary to the roots as well as the branches, viz. when they become rotten or otherwise corralled; and also to such as are properly cut by the roots; as in most species of *Palæmarium* may be, some *Mimulus* also, and indeed any that are observed to produce suckers; in all which cases they should be taken and a sufficient quantity of soil be left to support the parent, if considered worth preserving.

6182. *In turning the plants carefully out of its pot*, observe if the roots have perished in any part, so as to render it impossible to part them without breaking the one, or lacerating the other; in which case prefer the former as the slightest damage; however, when the ball of roots is divided of its pot, let the broken tiles, or whatever substance may have been used as draining, be carefully picked out without hurting the roots that may have grown amongst them; also any caked or mossy substance on the surface, which will come easily off with the finger; and then take the roots out of the earth with the hand, or otherwise, by pressing it so as to open the pores of the earth without cracking the roots; shake off any loose soil; and having the roots thus freed, set them in a new quantity of the fresh mould sufficient to raise the crown of the roots to about half an inch below the rim of the pot, on which set the plant; and add more earth, lightly shaking it in among the fibres; let the whole be pressed moderately tight, but not so as to render it hard in the least degree, nor by any means using a stick for this purpose, another never-failing attendant on the former practice, by which the roots are extremely liable to be torn or bruised; add mould sufficient to raise the surface level with the rim, as it will settle to a proper depth with watering, and smooth the whole off neatly with the hand.

6183. *Two or three assistants* will be found necessary, where there is much of this work to be done; one of those should be employed in supplying pots and other necessaries; the others in watering and clearing the plants; and the third should stay to support the plants in the new soil, and in tying them up properly to their sticks afterwards; new sticks should be used at least once a-year, and never be used again, as the old ones very often harbour more or less of the several pestiferous insects which infect these departments. This done, let the plants be set on a level spot together, and moderately shaded with fine muslin, or gauze, at a distance about three feet, so as to give the leaves a good rinsing; but observe to give no more water than is sufficient to settle the fresh mould to the roots, and by no means to wash or give the surface that muddy appearance so very disagreeable to be observed in departments where neatness should be the uniform and leading principle. Having thus finished the first division, let them be immediately shaded, and the second division be turned tan for the present, and those that remained there, taken to the shed to be treated and shifted in the same manner as the others.

6184. *When the whole are shifted*, they may be partially plunged for a few days; setting the pot about half its depth loosely into the tan, to avoid the danger that attends too violent a heat arising in the pit; which is frequently the case when it has been very lately turned. However, the plants must be a pretty brisk fire-heat kept up in the house, until the plants recover from their inactive state, the unavoidable consequence of the treatment; and as no means are disturbed. They will be much benefited at this time by a moderate use of the hand-syringe, in the morning before the sun has begun to act upon them with force; also by raising a strong steam in the house,

to be done by throwing water on the tops and sides of the warm flues. When they are freely treated in this manner, they require but little from the water-pot; as over watering is very pernicious to plants in general, and at no time so dangerous as when they have been lately shifted. However, this must unavoidably depend on the judgment of him in whose care they are placed, as some of them will require considerably more than others; in a few days, when the danger of a violent heat is over, the plants may be plunged nearly in the tan up to the rim; but observe that it is not left scattered on the surface of the pots, as it would give the work an extremely stormy appearance; a few inches of clean sawdust laid over the tan, gives a clean and neat appearance, which, in most gardens, is a particularly essential part of the curater's conduct. All the plants which require the aid of tan-plunging, being properly plunged, and the remaining ones regulated on the different benches or shelves, let the place be well cleaned out, when little more will be necessary for a few weeks than watering when requisite, syringing, fanning, and attention to the degree of heat necessary to be kept in the house at this season. This should in general be about 60°. If it is kept much lower, it will considerably retard the plants in recovering their vigour; and if many degrees higher, the free-growing kinds will soon overtop, and materially injure the weak and more tardy sorts, unless prevented; besides themselves becoming unsightly, the consequence of being drawn, or forced, into long weak ungainly stems.

6185. *Insects.* As the heat increases with the advancing season, the different species of insects to which these departments are so liable, will multiply increasingly. In order to make the greatest havoc amongst plants in the hot-house, are the green fly, the thrips, the mealy white bug, the great scale, the small scale or the plant, and the red spider; the last, although the smallest of the five, is by far the most dangerous of all the species that exist in these departments.

6186. *For the fly and thrips*, there is no process which seems to take so much effect on them as a structure made of tobacco; repeated twice or thrice, according to the strength the insects may have attained.

6187. *For the bug*, there is none of the several expansive methods mentioned in different parts of the work, so simply picking them off; this may be said to be tedious, but then it has every to plead in its behalf; besides, that the plants are in no manner disfigured by the operation; but with some regularity observed in looking over the plants, examining them, and leaf by leaf, from top to bottom, and also any incisions or cracks that may be in the bark of the stem, &c., there will be a constant and tireless employment on the part of the curator; regularly done, one operation will be of more service than five, if executed in a careless instantaneous manner. As each individual plant is picked, it should be carefully washed with a strong liquid of soft soap and water, which will have a powerful effect on their eggs, which are in general so small as to elude the eye, or perhaps so situated within the young suckers that they cannot be got at without materially injuring the future growth; the work will, however, penetrate into these secret holds, and in general be fully adequate to their destruction.

6188. *When the plants are out of the house in summer*, every part of them should be well washed with strong soap-suds, in which a little of the same tobacco as used for fumigating, has been infused; in particular, all the joints of the wood-work, and also the holes or nail-holes or other crevices may happen to be therein; as in these places some of the species, more especially the white mealy bug, is much inclined to secrete itself or breed. This operation will, however, if performed in spring and summer, be of great service, as the curator will find it a great degree to check the multiplication of the others.

6189. *The red spider*, the last and most pernicious of the species mentioned, is to be overcome neither by fumigation nor picking; but by the free but well-directed use of common water; either by steam or with the hand syringe. The steam, by forcing a fine dew in the house, prevents the insects from extending its slender web from leaf to leaf, and thus checks its progress; while the syringe, by superior force, breaks the ligaments of those already made, and in most instances washes the insects to the ground; where, although it may recover its fall for the first or second application, it is in the end rare to perish. They will sometimes, however, elude the greatest diligence for awhile, by collecting under large horizontal leaves, which serve them as citadels against the attacks of the water; but here they will soon betray themselves, by extracting the fluid substance of the leaf for their support, in consequence of which it loses its verdure and becomes conspicuous; this, when found, should be picked off, and taken out of the house immediately; or if left anywhere among the plants, they will in a little time establish themselves on others. If they happen to be discovered under the leaves, which are not so easily rubbed off with the hand on a sheet of paper, and expelled the premises. If at any time the quantity of water necessary to be used in these operations, should occasion the earth to become over wet, in those pots particularly which are plunged in the bark-bed, the syringing must be omitted, and use made of the steam only, until they again become reasonably dry; neither should it be held at a distance above the plants, but freely upon the plants, lest their leaves become in consequence disfigured. For the water forms itself into little spherules, the surfaces of which collect the rays of the sun in a greater or less degree according to their curvature; and if the leaves are disfigured by being burned in the focus of such spherules.

6190. *Summer treatment.* As the season advances, it will become necessary to admit a reasonable portion of air on all fine sunny days, and also to decrease the strength of the fire at night; but in these particulars, the only criteria to be relied on are observation, and the thermometer, which the variations in which render it utterly impossible to lay down any certain rule to act by, further than the admonitions of the thermometer, observing to keep it pretty near to 60°. About the beginning or middle of August, the plants should be omitted entirely, as the natural heat of the season, united to that of the bark-bed, will in general be found sufficient to raise the mercury up to the above-mentioned point.

6191. *Towards the latter end of June*, the plants, by this treatment will generally be in a very luxuriant frame of growth; it will be therefore requisite to raise the pots quite out of the

tan-bed, to check and harden the plants a little, so that they may be able to bear the air of the green-house for a few weeks, which will be of considerable advantage to them the ensuing winter. Should any of them remain of a sickly appearance (and that a few may be of that state, in large collections, must be reasonably expected), or any particular tender sorts among them, they must be removed to a separate house, as already hinted, where, under other circumstances, they must be otherwise properly prepared for their reception, they must be immediately replanted; if no such house is convenient, a large deep hotbed frame, set on a good bed of well-prepared dung, will answer nearly as well as this purpose. Having raised nine or ten inches of rotten tan or sawdust spread regularly over the bed within the frame, in which the pots are to be plunged.

6192. *When the bed has been put ready, a few days should elapse before the plants are set in it, that the steam and violent heat may have sufficient time to evaporate.* At the expiration of five or six days, however, the plants in their pots may be set on the surface, where they should remain a little longer without being plunged; but particular care is necessary that the frame at this time may not be kept too close, which would occasion the heat to ascend more rapidly than the plants could well bear; to avoid this, give plenty of air in the day time, and also a little at night, with a mat hung before it to prevent the sharp air entering into the frame. When the heat of the bed has attained a proper temperature, so that there may be no danger of the plants being scorched or otherwise injured, let the plants be plunged, and afterwards treated in the same manner as if they were still in the hot-house; only observing to keep them dry, as in the green-house, and to see nothing can be more injurious to a sickly plant than too much moisture, by reason of its inability to imbibe the usual quantity through want of vigour. The plants which remain, intended to be set in the green-house, must not expect a considerable increase of fresh air on all five days; and also (the pots being quite out of the tan) they will require a greater portion of water than has been usually given them when plunged.

6193. *As soon as the weather becomes settled, and the night perfectly free from all chilliness and frost, which is seldom much before the middle of July, the plants may with safety be removed from the tan-bed, and set in the green-house, except on the benches lately occupied by the green-house plants, which they will ornament very much, during the time the latter are set in clumps in the open air. The stove may in this interval be furnished with a few of the different tender annuals, to give it something of a gay lively appearance. They will likewise in some measure serve as a kind of natural trap for the spider, &c.; as they will, should there be any of them left in the house, must not be so much as the tender leaves of these plants, in which case, as soon as they are observed to be collected in numbers upon any individual plant, it should be removed to the open air, and if the spider, or another substitute in its room; this practice will contribute towards subduing this formidable enemy, so that, combined with other exertions, by the time it becomes necessary to have in the hot-house a great number of the tan-bed, the house will be pretty free from them.* These being now in the green-house, will require a little attention to preserve their verdure, such as keeping the glasses close at night and admitting air only on fine days; thus to exclude any chilling or strong winds that may happen to prevail, which would occasion the leaves to contract a languid yellowish appearance; however, in course of a week or ten days, they will be able to withstand any weather that may in reason be expected at this season, unless it happens to be unusually violent, in which case it must be guarded against accordingly.

6194. *The removal of insects, and dead leaves is the principal care they will require now for about a month or so, also caustically tying up any that may want it, and watering; in which last article it must be observed, that, as they now stand upon dry beds, and the air acting freely on every side of the pot, they must consequently be allowed an increase of water, to counterbalance its effect. The evening is the most proper time for watering at this season, as well as syringing, particularly when dry and warm; for if administered in the morning, the rising heat of the sun exhales it, before it has time to descend to the lower roots; and unless replenished frequently in course of the succeeding day, they are liable to much injury, by being left in an exhausted state until the following morning, and which, it is probable, may not prove more fortunate; whereas, if administered in the evening, it refreshes them after the preceding day's drought; and having sufficient time to penetrate to the roots, they have the night to recruit themselves against the following day. Besides, in syringing, there is much more danger of having the leaves scorched by the sun's rays, if done in the morning, than if done as here recommended; but as either extreme is dangerous, care must be taken to use no more water than is evidently necessary for the health of the plants; and if the degree of heat that the earth becomes sour and deprived of its vegetative powers, the consequences may be such as are undesirable.*

6195. *By thus setting the plants in the green-house, it tends to prevent the insects, also their too hasty growth, which, during the summer months; and, by hardening and ripening the wood, renders them strong and firm, and therefore more likely to bloom, which is, in these ornamental plants, the principal object of the cultivator. Besides that they are not so liable to be injured by the severities of the succeeding winter.*

6196. *Autumn treatment.* Towards the latter end of August the natural heat of the stove must be allowed to decline, therefore, except on particularly fine days, when a small portion of air may be given, the lights must be kept perfectly close; but more especially so at night, as we have frequently at this season heavy dews, and sometimes showers, and it is to be unexpected showers of rain or hail, to admit either of which might be very injurious to the plants; however, by shutting up the house before the sun has withdrawn its influence entirely from it, and thereby warming the enclosed air, they may safely stand here some days longer.

6197. *As soon as the month of September commences, it is time to think of getting the stove ready for their reception. A fire, a quantity of fresh tan should be provided, sufficient to raise the bed at least six inches above the kerb or wall of the pit, in conjunction with the heat of the old already raised, which is to be carried by sleds or carts, and spread level to dry in ridges, upon some clean dry spot, or convenient yard, for two or three days, where it should be regularly turned twice or*

thrice a day, and covered with mats at night; while this is preparing, let the flues of the house be well cleaned and the walls whitewashed; an operation necessary to be done every year in these departments, where strong fires are kept for such a length of time; likewise, let the flues be raised to the common way, with a pretty coarse sieve or riddle: some gardeners throw it entirely away, but the part sifted being mixed with the rest, prevents its heating so violently as it otherwise would when it is put in; it also tends to preserve a more regular heat in the other longer than it naturally would if used by itself; as it would be very violent at first, and consequently, like most other things that are worked together, a more regular heat is sooner exhausted in proportion to the first foundation.

6198. *Having sifted and got away all the refuse of the old tan, let the fresh, if well dried, be immediately carried in, and both well mixed together in the pit; still adding, until the bed is raised to the proper height; this done, let the wood and glass-work, karts, passages, &c., in short, every part of the house, be diligently washed; for the twofold purpose of endeavouring to clear it as much as possible from insects, as well as give it a cleanly appearance: being thus prepared, the plants may be removed from the green-house, observing to examine each of them diligently lest any of those plagues so often mentioned, should find their way back to the stove.*

6199. *The pots must not be plunged in the tan at first; as well on account of the danger of the violent heat injuring the roots, as because the early plunging would tend to retard their growth, which, at this late season, would not be at all to their advantage. They must, therefore, be set on the surface of the tan, or rather rather, where they may stand twelve or fifteen days, or perhaps longer; in this particular, the principal consideration of the atmosphere abroad, as well as the internal temperature of the heat in the pit; by the first week in October, the external air will be moderate, and the heat in the pit sufficiently moderate. The time for plunging being fixed on, observe to have it done in the most exact manner, placing the tall plants towards the back or centre, and the lower ones towards the front sides of the house, according to the form of the house, and the mode of arrangement adopted. If sawdust is used, it will contribute much to their cleanliness, and also make a more sensible appearance than the tan. All being set to rights, and the passages, &c., &c., very clean, give the plants a good syringing to wash off whatever dust they may have acquired during their removal, which will contribute to the business for this time, and the plants should be towards for a few weeks to give them a reasonable share of fresh air and water, according to the temperature of the weather; but it is more proper to perform the watering, syringing, and dusting, from this time, until the middle of May, in the forenoon, observing to do it while the rays of the sun fall so obliquely as to ensure the plants from being injured by it: it should be done in the evening, the air in the house would unavoidably get chilled, and exposed to the weather. It is even necessary that the water used for this purpose should be nearly of the same temperature as the air in the house.*

6200. *About the middle of October, it will be necessary to add a little fire-heat at night, beginning with slow fires at first, and regularly increasing them as the severities of the weather increase. Although a circulation of fresh air is still requisite to the health of plants, yet the heat of the external atmosphere will at this season be so much diminished that it will not be so convenient to admit it in any considerable quantity; in fact, none should be given, except on particularly fine days, when the front or end lights may be opened a few inches. They should be shut early in the day, seldom permitting them to remain open more than one hour, and thus giving the sun time to warm the fresh-admitted air before the chill of the night commences; even this little indulgence cannot be allowed from about the end of October until the beginning of November, as the strong cold, or the severe frosts during the winter months find of themselves but too many entrances.*

6201. *As to watering in the autumn, discontinue it to those plants plunged in the pit, as the moisture of the tan, added to that which proceeds from the syringing, will be found quite sufficient for most of them; on the contrary, those over the flues, or on the shelves or karts near the fire, will require an additional portion on account of the strong fire necessary to be kept when the weather happens to be severe. The use of the syringing and steam must also be stopped in the severest frosts, lest by that means the house should get over chilled; however, they may both be used freely when the weather proves moderately mild and fine; but by no means is it to be understood, that the house at this time is to be kept in a continual mist or fog, or the other hands, that the plants are not to be carefully examined as usual, and watered liberally when in want of it. It is necessary to notice that those plants which are inclined to be deciduous, and also some of the more tender ones, will be occasionally dropped, and if they are not to be carefully examined as usual, and watered liberally when in want of it. It is necessary to notice that those plants which are inclined to be deciduous, and also some of the more tender ones, will be occasionally dropped, and if they are not to be carefully examined as usual, and watered liberally when in want of it.*

6202. *Winter treatment.* When the plants are removed in November, it will be necessary to have the tan in the pit turned, and renovated with a little fresh well-dried kark to lighten the heat, as the severest part of the season is still to be expected; however, in performing this work, great care must be taken that the plants are not chilled or injured by being removed out of the tan-bed at this cold season; therefore, the mildest weather must be chosen for performing this operation. The pit being cleared, immediately proceed to turn over and mix the old and new tan well together, in which, as soon as it is completed and levelled it to receive the pots, they may be plunged without any delay, as it is not that certain, but that the winter heat ascending now as in the summer months, in which season the powerful action of the sun occasions it to ascend more violently.

6203. *Plunging the pots.* Should it not be convenient to have the whole plunged the same day, those left will require to be set on the surface of the tan during night; last, by being left on the surface, the plants, or extreme parts of the house, they might be severely injured ere the morning; and it is therefore, the more advisable to keep them as short a time as possible out of the tan at this season, they should without fail be plunged the next day at farthest, and if the weather is not so temperate to keep a pretty brisk fire-heat in the house, until the plants are out of the tan, and until the bottom heat in the pit has become

sufficiently strong; else they will be liable thereby to droop, and lose many of their leaves in consequence of being checked at this season. Should it happen that a series of clear fine weather follow, its operation, the action of the sun may possibly occasion the loss to the other violently in course of a few days after being renewed: to this particular attention must be paid; and if any such symptom should appear, it must be immediately remedied by lifting the pots out of their places, and throwing into the holes a small quantity of the surface tan, on which the pots may be again set in a loose manner: thus, by permitting the heat to pass freely off by the sides of the pots, it prevents its burning the earth or roots, which would be certain death to the plants: when its violence has subsided, let the pot be levelled, and pots properly replanted; but unless the weather, as already noticed, happens to be particularly clear, it will not be necessary, in all likelihood, to encounter this labour.

6204. *Watering and cleaning.* They will require, from this time until about the beginning of March, nothing more than the usual care of watering when necessary, and cleaning them from all dirt or insects as soon as they appear; also keeping the temperature of the enclosed air as near to its regular pitch as possible. To assist in compassing this object, when the weather sets in severe, it will be proper to use either shutters of canvas or best mats to cover all the lowest parts; and in particular those at the greatest distance from the entrance of the fire every night; otherwise the frost will easily enter these remote parts, and chill the whole house; the consequence of which may be very injurious: and farther, if

these precautions are not attended to, there will be a necessity of keeping up a very strong fire-heat, which will likewise be attended with pernicious effects.

6205. *The Red Spider.* It is in these intervals that the destructive insect the red spider makes the most rapid progress, on account of the necessity that exists of keeping the houses close, and supporting a dry warm air, both of which circumstances are particularly congenial to its nature; therefore on all fine mild mornings, observe to raise a powerful steam in the flues already directed, by the frequent repetition of which there will be a possibility of keeping it under control.

6206. *Refreshing the bark bed.* As the internal strength and heat of the tan will now be much on the decline, in consequence of the length of time it has been in use, it will be requisite to turn it more frequently, so that about the beginning of March, it should be again stirred to at least half its depth, which will afford a temperate heat, until the time in which the plants are usually shifted, when it is generally renewed. Some gardeners make it a practice to have merely the upper half of their tan-pits stirred, at any time throughout the year, when the heat happens to be on the decline; this is certainly a very proper method where there is plenty of time and hands to perform it, as there is no danger of a burning heat arising; it requires to be done so much the oftener, such heat seldom lasting above a month or six weeks; it consequently will not answer where these conveniences are not to be had. The plants being regulated in proper order as before, let them have the usual treatment until the time of shifting. (*Exotic Gard.*, p. 70.)

SECT. II. Climbing Bark-stove Plants.

CLIMBING BARK-STOVE PLANTS.

6207.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Bignonia grandifolia</i> <i>Poirae coman</i> , Afz. & B. <i>Paeffora alata</i> , rostrata, aphenocoma, harnesiana <i>Ipomoea indica</i> <i>Passiflora pinnatifolia</i> , pedunculata <i>Passiflora grandiflora</i> <i>Thunbergia alata</i> , angu- lata, coccinea, cordata, fragrans, grandiflora <i>Synedrella nodiflora</i>	<i>Besnoetia grandiflora</i> <i>Bignonia Chamberlainii</i> , and others <i>Chetocalyx vincentinus</i> <i>Ipomoea paniculata</i> <i>Passiflora floribunda</i> <i>Poirae coccinea</i> <i>Porrea velutilla</i> <i>Richkeia fragrans</i> <i>Passiflora grandiflora</i> <i>Vilmorinii multiflora</i>	<i>Clibria ternata</i> <i>Gloriosa superba</i> <i>Herreria parviflora</i> <i>Ipomoea alata</i> , insignis, poliantha, florifolia <i>Moronea grandis</i> , pinnata <i>Murculia ocellata</i> <i>Manisita glabra</i> <i>Oxalis coccinea</i> <i>Passiflora edulis</i> , glabra, pedata, petiata <i>Petroselinum</i>	<i>Apyrra cuneifolia</i> <i>Aristolochia latifolia</i> , cymbifolia <i>Banisteria filipes</i> <i>Bignonia patula</i> <i>Dalbergia Bercia</i> , Telf. <i>Dismantha Herbertiana</i> <i>Ipomoea alata</i> , rbb. co. <i>Ipomoea alata</i> , rbb. co. <i>Passiflora alba</i> , alata, coccinea, pallida, quadrangularis	<i>Apyrra splendens</i> <i>Banisteria coccinea</i> , crucigera <i>Bignonia venusta</i> <i>Clematis glycinoides</i> , grandiflora <i>Clibria Plumieri</i> <i>Poirae barbatula</i> <i>Jocotea scandens</i> <i>Passiflora picturata</i> <i>Thunbergia floribunda</i>

6208. *The propagation and culture* adapted for green-house climbers are equally so for those of the bark-stove, the dif-

ference of temperature being taken into consideration. (See 6125. and 6143.)

SECT. III. Bulbous-rooted Bark-stove Plants.

6209. *All bulbous-rooted stove plants* may, no doubt, be kept in the dry-stove; but if it is wished that they should flower in any degree of perfection, they must be plunged in the bark-bed when newly planted. The same remark will apply, indeed, to most of the dry-stove bulbs. (See an excellent paper by Sweet, in *Gard. Mag.*, vol. i. p. 131.)

6210.

BULBOUS-ROOTED BARK-STOVE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.
<i>Amaryllis reginae</i> <i>Betia hyacinthina</i> , Tan- kervillei, Shepherdii <i>Crimum scabrum</i> <i>Eucrobia bicolor</i> <i>Eulophia gracilis</i> , gul- bernia, streptopetala <i>Euryclia umbellata</i> , australasica, Cun- ninghamii <i>Griffithia hyacinthina</i> , intermedia <i>Hemanthus multiflorus</i> <i>Pancratium amomum</i> , Dyandrii, fragrans, littorale	<i>Amaryllis Colvilli</i> <i>Betia capitata</i> <i>Crimum amabile</i> , angus- tifolium, bracteatum, Broussaii, con- fertum, cruentum, distichum, peduncu- latum, revolutum <i>Isomene Andrieuxii</i> , An- sophora, calathinum, rubra <i>Pancratium declinatum</i> , expansum, guianense, speciosum, undulatum, verecundum, zealandi- cum	<i>Amaryllis calyptrata</i> , equestris <i>Betia florida</i> <i>Crimum amabile</i> , asiaticum, Broussaii, Careyanum, erule- um, formosum, mo- haccatum, speciosum, salsitum <i>Griffithia hyacinthina</i> intermedia, parviflora <i>Hemanthus multiflorus</i> <i>Pancratium mexica- num</i> , patens <i>Phyllis cyathoides</i>	<i>Aistromeria edulis</i> , Salsilla <i>Amaryllis crocata</i> , ignescens, imperialis, princeps, subulnata <i>Begonia heracleifolia</i> , and others <i>Crimum amabile</i> , aquat- um, deflexum, gigan- teum, submersum <i>Gloriosa superba</i> , viride <i>Hemanthus coc.</i> , orbis <i>Pancratium acutifolium</i> , amomum, fragrans, littorale, mexicanum, pedale	<i>Amaryllis campanulata</i> , compacta, crispifolia, equestris, fulva, glaucescens, Hodelii, lateralis, marginata, pallidula, quadricolor, reticulata, retiniva, spectabilis, tricolor, venosa <i>Crimum elegans</i> , indige- num, strictum <i>Hemanthus quadrival- vis</i> <i>Pancratium guianense</i> <i>Phyllis ignea</i>

SECT. IV. Perennial Herbaceous Bark-stove Plants.

6211.

HERBACEOUS BARK-STOVE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Alydes odoratum</i> <i>Cela perfoliata</i> <i>Catalpa lobata</i> <i>Commelina africana</i> <i>Oenothera bulbosa</i> , mini- mifolia <i>Guzmania tricolor</i> <i>Maria Northiana</i>	<i>Calandula bicolor</i> <i>Corydalis archibolides</i> <i>Maria Sabini</i> <i>Mentha longica</i> <i>Polemonium</i> , Taitii <i>Pleasantia sulphurea</i> <i>Ruellia formosa</i> <i>Troch. integrifolia</i>	<i>Aspidistra lurida</i> <i>Beta acida purpurea</i> <i>Campsis Zanone</i> <i>Ceratophyllum floribundum</i> <i>Helianthus surinamensis</i> fl. albo <i>Maria martinicensis</i> <i>Troch. pinnatifida</i>	<i>Cassia tridentatum</i> <i>Catalpa Forsteri</i> <i>Dichorandra azyr- tala</i> , thyrsoidea <i>Donnae mucipula</i> , bog <i>Pleasantia integrifolia</i> , latifolia, suaviscenta <i>Xiphidium album</i>	<i>Anasione erecta</i> <i>Colanthe hisida</i> <i>Oenothera aggregata</i> , Douglasii <i>Maria Sabini</i> <i>Pleasantia angustifolia</i> , flammea, straminea <i>Rensathra coccinea</i>

6212. *The propagation and culture* of these need not be entered on, being essentially the same as for hardy or green-house herbaceous plants, the difference of temperature being taken into consideration; as have tuberosa ones must be treated on the same principle as tubers in the open garden, as, for example, those of *Corydalis bulbosa*, *anemones*, &c., which have their regular seasons of rest.

6213. *The Gloriosa superba*, that grand, beautiful, tuberous-rooted stove plant, far want of attention to the nature of its roots and its habits of growth, seldom produces flowers in this country. "Its failure," John Sweet observes, "arises chiefly from the defective method in which its roots are preserved

during their inaction, and from the want of proper treatment, when they first vegetate in the spring. Injured at these periods, the plants generally continue through the summer, weak and unproductive, throwing up only a few small stems, which do not flower in sufficient strength and beauty." Under the following management Sweet has had perfect success, and has known a single root grow ten feet in the course of a season, with numerous blossoms upon it. When the stalks and foliage have decayed in the autumn, and left the root like a well-ripened potato, in a dormant state, the pot containing it must be removed from the bark-bed to the top of the hot-house fire, at some distance from the fire, all the warmth necessary at

this time being merely what is sufficient to keep the earth in the pot free from damp; and, to prevent the waterings of the house, or other moisture, falling on the earth in the pot, it should be covered, by inverting upon it another pot of the same size; or, if larger, it will hang over its edges and more effectually exclude the wet. If the tubs are small, two or three may be placed together in the same pot, whilst in their dormant state; but if they are thus shifted, the mould must be well shaken down in the pot, in order to prevent the access of air to them: the old mould in which they grew must also be used; for fresh earth or sand would stimulate them to move too early. About the second week in March, the roots must be planted, putting one or two, according to their size, into pots measuring six inches over. The best compost for them is fresh

loam, mixed with an equal quantity of bog-earth of good quality: the loam should be good, not over rich with dung, nor too heavy. The roots are to be covered about two inches deep, and care must be taken not to break them, unless some has shown where it is practicable to divide them easily. The pots, when filled, must be plunged into the bark-bed, where the heat should be equal to 50° of Fahrenheit's scale. Water is to be given very sparingly at first; and though, as they grow, they will require a more liberal supply, yet it is necessary, at all times, to be very moderate in giving it. The heat must be well kept up; and as the shoots extend they must be supported by sticks, or by means of any direction on wire or cords. (*Hort. Trans.*, vol. III. p. 125., and *Gard. Mag.* vol. III. p. 140.)

SECT. V. Annual Herbaceous Bark-stove Plants.

6314.

BARK-STOVE ANNUALS.

MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>A'rachis hypogæa</i> <i>Cleome scabra</i> <i>Celastrum coccinea</i> <i>Cleome pinnata</i> , <i>viscosa</i> <i>Gomphrena globosa</i> , <i>alabifera</i> <i>Gynandropsis pentaphylla</i> <i>Sauvagesia erecta</i> <i>Fouquieria splendens</i>	<i>Stachydione tenuifolia</i> <i>Cleome pinnata</i> , <i>viscosa</i> <i>Cleome monophylla</i> <i>Crotalaria fenestrata</i> , <i>lutea</i> , <i>retusa</i> , <i>exaltata</i> <i>Heliopsis integrifolia</i> <i>Ipomoea coccinea</i> , <i>cordata</i> <i>Solanum Malacotheca</i> , and varieties	<i>Stachydione americana</i> , <i>indica</i> <i>Balsamina coccinea</i> <i>Browallia demissa</i> <i>Celastrum coccinea</i> <i>Gynandropsis pentaphylla</i> <i>Convolvulus ochraceus</i> <i>Crotalaria purpurea</i> <i>Heliotropium indicum</i> <i>Ipomoea Bona nox</i> , <i>caribæa</i> , <i>denticulata</i> , <i>lacunosa</i> , <i>Nil.</i> , <i>Quesadilla</i> <i>Solanum tomentosum</i>	<i>Balsamina hortensis</i> <i>Browallia coccinea</i> , <i>fl. alb.</i> <i>Cyrtanthus cristatus</i> <i>Glottidium floridanum</i> <i>Indigofera purpurea</i> <i>Ipomoea</i> <i>perfoliata</i> <i>Mimosa pudica</i> , <i>sensitiva</i> <i>Rhæcia hypericifolia</i> <i>Sesbania caerulea</i> , <i>candelabra</i> , <i>vicia</i> , <i>punctata</i> <i>Solanum tomentosum</i>	<i>Stachydione hispidula</i> <i>Balsamina hortensis</i> <i>Celastrum argenteum</i> , <i>coccinea</i> , <i>cristata</i> , and varieties <i>Cleome pinnata</i> , <i>viscosa</i> <i>Crotalaria verrucosa</i> <i>Desferia fastuosa</i> <i>Heliotropium indicum</i> <i>Martynia proboscidea</i> <i>Peripetia phœnicea</i> <i>Scilla antherifera</i>

6315. *Propagation and culture.* They are all propagated from seeds, most of which ripen in this country; but some few sorts are continued by cuttings, for the sake of preserving particular variations. Sown in February or March in pots, to be plunged in a hotbed; prick out the plants, when they have attained one or two proper leaves, into the smallest-sized pots, and shift them once or twice into pots a size larger, in the manner re-

commended for the balsam (5946.); keeping the plants in hotbeds or pits till ready to blossom, when they may either be removed to such of the houses as are empty at the time, as the bulb-house, green-house, &c., or assembled in a house devoted to annuals. Some few of them, as the ice plant (*Mesembryanthemum crystallinum*) and egg plant (*Solanum Melongena*), may be plunged in a warm situation in the open garden.

SECT. VI. Aquatic Stove Plants.

6316.

HOT-HOUSE AQUATIC PLANTS.

MARCH TO MAY.	JUNE.	JULY.	AUGUST.	SEPT. OCT.
<i>Anethum affine</i> , <i>stenos</i> <i>Apocynon androsaemum</i> <i>Cyperus alternifolius</i> <i>Dionæa Muscipula</i> , <i>big</i> <i>Limnæa humboldtii</i> , <i>Flemingii</i> <i>Nymphaea pubescens</i> <i>Pontederia dilatata</i>	<i>Drosera binata</i> , <i>etc.</i> <i>Limnæa humboldtii</i> <i>Nymphaea pubescens</i> , <i>edulis</i> , <i>pubescens</i> , <i>pygmaea</i> , <i>rhiza</i> <i>Pontederia acuta</i> , <i>crispifolia</i> <i>Sagittaria lancifolia</i> <i>Vallisneria spiralis</i>	<i>Apocynon androsaemum</i> <i>Cyperus alternifolius</i> , <i>big</i> <i>Dionæa Muscipula</i> , <i>big</i> <i>Euryale ferox</i> <i>Nymphaea pubescens</i> , <i>edulis</i> , <i>pubescens</i> , <i>pygmaea</i> , <i>rhiza</i> <i>Pontederia acuta</i> , <i>crispifolia</i> <i>Sagittaria lancifolia</i> , <i>obtusifolia</i>	<i>Apocynon androsaemum</i> <i>Cyperus alternifolius</i> <i>Dionæa Muscipula</i> , <i>big</i> <i>Impatiens natioides</i> <i>Juncus grandiflorus</i> , <i>obtusifolius</i> <i>Nymphaea pubescens</i> , <i>edulis</i> , <i>pubescens</i> , <i>pygmaea</i> , <i>rhiza</i> <i>Pontederia acuta</i> , <i>crispifolia</i> <i>Sagittaria lancifolia</i> , <i>obtusifolia</i>	<i>Azolla carolinensis</i> <i>Euryale ferox</i> <i>Impatiens natioides</i> <i>Limnæa humboldtii</i> <i>Nymphaea pubescens</i> , <i>edulis</i> , <i>pubescens</i> , <i>pygmaea</i> , <i>rhiza</i> <i>Pontederia acuta</i> , <i>crispifolia</i> <i>Sagittaria lancifolia</i> , <i>obtusifolia</i>

6317. *Propagation and culture.* Being all herbaceous plants, they are to be propagated as those generally are. Some are raised from seeds, which in general should be sown as soon as ripe, and the pots plunged in shallow water; when the plants come up, they may be transplanted into other pots, and shifted as they advance in growth, till in a pot of sufficient size to admit their flowering, which will generally take place the same season. Instead of being kept in pots, the plants may be inserted in a bed of earth on the bottom of the aquarium. The most beautiful of the exotic aquatics are the nymphæas and nelumbiums; these, with other genera, have been cultivated to a high degree of perfection by Kent, formerly of Clapton, who instead of a regular aquarium, employs pens and small cisterns plunged in hotbeds. Where a regular aquarium is not formed to be heated by fires, we should suggest the idea of a cistern (Ag. 571.) to be placed on pillars in the open air. When the

871



season for forcing the nymphæas commences, it may be surrounded by a hotbed frame of the same diameter, and surrounded by linings of dung. By this means any required degree of heat might be produced during the flowering season; and if it were desired to continue any of the plants in a growing state during winter, the linings and frame could be continued; if not, the plants might be removed to a reserve-aquarium in the stove or propagation-house.

6318. *Mesopotamia, Nymphaea*, and *Euryale ferox* (an aquatic, with singularly constructed leaves, often of thirty inches diameter), Kent has proved to thrive best in a close heat. *Nymphaea* requires only to be fixed in April, and placed in a pan in a hotbed, where it will flower the whole summer. The nymphæas having tuberous roots he keeps through the winter, in small pots (sixteen), in a dormant state, in a small trough of water in the stove. Early in April, he prepares them for their summer culture, by placing them in small wooden cisterns, two feet long, fourteen inches wide, and six inches deep, and then placing them in any cucumbers or melon frames which may be then in use. "In about a fortnight or three weeks a number of offsets or runners will be thrown from the bulbs. These are then separated and put into small pots; and in the course of ten or twelve days a strong

plant of each species is selected, and placed in the cisterns for flowering. The tender aquatics, especially the *Nymphaea*, are grown in a brick three-light frame, thirteen feet long, and six feet broad; inside depth at back, five feet; and above the ground four feet; which is filled with tan. I have four wooden cisterns, lined with lead, four feet long, two feet six inches wide, and fifteen inches deep: they are plunged in the tan, and filled with strong rich loam, about six inches deep, the bottom part of which is rammed down; and the plants are placed in them, one or two in each, according to their mode of growth. The cisterns are then filled with water by degrees. As the plants advance in size, they must be replenished and cleared from *Confusum* as often as necessary; and if the plants are occasionally watered over their leaves, from a watering-pot, through a rose, their vigour will be greatly increased. It is important to keep them in a constant state of growth; for, if checked, they will form bulbs, and grow no more during the season. This will be caused by cold; but this year (1817), the heat in June produced the effect, although they were shaded from the sun's rays by misting; and the lights considerably raised. Where dung is used, there is little danger from being heated. After being planted out, they will show flowers in the course of a month, and some of them will continue blooming through the season. As soon as the plants have done flowering, and perfected their seeds, they disappear, and form bulbs in the mud. These, in the month of October, I put into small pots (sixty to the case), and place them in a trough of water in the stove, where they remain dormant until the ensuing spring. The seeds are most likely to vegetate, if sown at the same time, and treated in the same manner. *Nymphaea*'s cisterns will flower in the stove; but not so freely as in the frame. *Nymphaea*'s small seeds rarely live, but the root may be easily divide; indeed, it is best grown, when treated as an annual. *Euryale ferox* does well under similar treatment to that of the nymphæas; its seed should be sown about Christmas, and kept in the cistern of the stove." (*Hort. Trans.*, vol. III. p. 54.)

6319. *Nelumbium speciosum* "is easily raised from seed, which will retain its vegetative power for forty years, and with every advantage, in a fair season, produces blossoms the same mer. It is generally grown in large tubs, with a few inches depth of water over the surface of the mould, placed in the tan-bed of the stove. By these means I raised a fine specimen; the seed was sown in May, and the plant threw up several buds, which did not come to perfection, but most probably had have done so had the seed been sown two months earlier. The leaves produced were about two feet in diameter, but the plant went off in the winter, notwithstanding it was treated in the manner hitherto found the most successful; which has been, to allow the tub to remain in the tan, and become nearly

dry, giving it no more water than the other plants around it. At Canton, it seems, they drain the ponds wherein it grows, and use the roots for food; but whether fibrous if it are the parents of the growing crop, or the ponds are replenished by seedlings, does not appear. It is probable that both are, as the

roots, which have been kept nearly dry in our hot-houses, if but a very small piece has remained alive, have become vigorous blooming plants, as well as those from seed." (*Hort. Trans.*, vol. III. p. 36.)

SECT. VII. Scitamineous or Reedy Stove Plants.

6920.

MARSH OR REEDY HOT-HOUSE PLANTS.

MAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.
<i>Alpinia cernua</i> , malac- cerv., racemosa <i>Andropogon Afolia</i> <i>Calathia Rosai</i> , zebrina <i>Canna coccinea</i> , com- pacta, densata, flac- cida, gigantea, glauca, indica, iridiflora, latifolia, limbatia, lutes, occid. nalis, orientalis, pallida, pedunculata <i>Carnea aromatica</i> , caesia, elata, latifolia, rubescens, <i>Zedoaria</i> , <i>Zerumbet</i> <i>Heliconia Bihai</i> , hillea <i>Heliconia Allaghas</i> <i>Kempferia angustifolia</i> <i>Martiana bicolor</i> , glabra <i>Phrynium capitatum</i> oidium, parviflorum <i>Streititz angusta</i> , far- nosa, humilis, regina <i>Urania speciosa</i> <i>Zingiber rubens</i>	<i>Alpinia diffusa</i> , Ga- dinga, mítica, nitens <i>Andropogon grandiflorum</i> <i>Calathia flavescens</i> , violacea <i>Costus afer</i> , maculatus, Pictus, comosus, spiralis, spicatus, pictus <i>Coccoloba Amida</i> , longa <i>Gethya occidentalis</i> <i>Glossa Careyana</i> , pin- dula, sessiflora <i>Hedychium amita-</i> tum, angustifolium, aurantiacum, car- neum, coccineum, ellipticum, flavescens, flavum, glaucum, maximum <i>Heliconia humilis</i> <i>Heliconia caribaea</i> <i>Kempferia Galinga</i> <i>Mantisa silvestris</i> <i>Phrynium dichotomum</i> , grandiflorum <i>Zingiber capitatum</i> , chrysanthum, offici- nale, rubrum	<i>Alpinia racemosa</i> , spicata, magnifica <i>Canna discolor</i> , iridi- flora, Lambertii, latif- flora, pátens, speciosa <i>Calathia flavescens</i> , violacea, zebrina <i>Gethya punicea</i> , tubulosa <i>Glossa bulbifera</i> , Carey- ana, marantina, orientalis <i>Hedychium carneum</i> , ellipticum, flavum, Gardnerianum, hetero- mallum, thymifolium <i>Kempferia notata</i> <i>Martiana angustifolia</i> , arundinacea, comosa, indica <i>Phrynium capitatum</i> , lobatum, parvi- florum <i>Roscoeia elatior</i> , gracilis, purpurea, flavida <i>Streititz angustifolia</i> , fauca, parvifolia <i>Thalia dealbata</i>	<i>Alpinia Galinga</i> , mítica, nitens, racemosa <i>Canna coccinea</i> , edulis, gigantea, iridiflora, lutes, orientalis <i>Costus arabicus</i> , ne- palensis, speciosum <i>Curcuma aruginata</i> , longa <i>Glossa pindula</i> <i>Hedychium angustifo-</i> lium, coccineum, coramariu, ellipticu, heteromallum, maxi- mum, spicatum, spicatum <i>Heliconia Bihai</i> , deal- bata, hirsuta, pitta- cium, Swartziana <i>Kempferia Galinga</i> <i>Musa coccinea</i> , para- disiaca, sapientum <i>Phrynium dichotomum</i> , parviflorum <i>Roscoeia</i> <i>Streititz angustifolia</i> , fauca, parvifolia <i>Thalia dealbata</i>	<i>Alpinia calcarata</i> , mítica <i>Calathia discolor</i> <i>Canna compacta</i> , discop- lor, flaccida, gigantea, iridiflora, limbatia, lutes, orientalis, pallida, pátens, speciosa <i>Costus afer</i> , maculatus, speciosus <i>Hedychium angustifo-</i> lium, coccineum, ellipticu, Gardner- ianum, maximum, spicatum, spicatum <i>Heliconia Bihai</i> , deal- bata, hirsuta, pitta- cium, Swartziana <i>Kempferia Galinga</i> <i>Musa coccinea</i> , glauca, maculata, ornata, paradisica, sapientu- m, superia <i>Phrynium imbricatum</i> , dichotomum, parvifo- lium <i>Zingiber chrysanthum</i> , <i>Zerumbet</i>

6921. *Propagation and culture.* No plants are more easily propagated than those enumerated. In respect to culture, they may for the most part be considered as marsh or bog plants; for even the sugar-cane (*Saccharum officinarum*) and

ginger (*Zingiber officinale*) are found in a wild state by rivers and in moist woods, and thrive best in the stove when their roots are liberally supplied with water.

SECT. VIII. Selections of Bark-stove Plants for particular Purposes.

6922. *Selections of bark-stove plants for particular purposes* can be but few. A collection may be made of such as are, or have been, most used in the arts; of curious or botanists' species; of such as are highly odoriferous, as *Azalea*, *Bignonia*, *Clerodendrum*; or night-smelling, as *Cestrum nocturnum*, *Cereus grandiflorus*; of palms, as the sago-palm (*Cycas*), the coco-nut (*Cocos*), the date-palm (*Phoenix*), &c.; or of plants illustrative of any of the natural orders which it may be wished to illustrate. The following are some of the most remarkable of the economical tropical plants, used either in their native countries or imported into this country:—

Bengal guinea (<i>Egle Mitrata</i>). Sour sap (<i>Anona muricata</i>). Alligator apple (<i>Anona palustris</i>). Cabbage tree (<i>Ardis coccinea</i>). Bread-fruit tree (<i>Artocarpus incisa</i>). Jaca tree (<i>Artocarpus integrifolia</i>). Aloe tree (<i>Bilghia spida</i>). Bread-nut tree (<i>Heliconia allaghas</i>). Coccoloba tree (<i>Andropogon distans</i>). Star apple (<i>Chrysophyllum glaucum</i>). Coco-nut tree (<i>Cocos nucifera</i>). Coffee tree (<i>Coffea arabica</i>). Garlic pear (<i>Cordia alliodora</i>). Calabash tree (<i>Crescentia carucurita</i>). Sago palm (<i>Cycas circinalis</i>). Lee-chow (<i>Euphorbia litchi</i>). Smooth-fruited lee-chow (<i>Euph. longiana</i>). Date plum (<i>Diospyros kaki</i>). Malay apple (<i>Eugenia jambol</i>). Mangosteen (<i>Garcinia mangostana</i>). Anchor pear (<i>Garcinia cauliflora</i>). Eatable oak (<i>Hibiscus esculentus</i>). Ochetide chestnut (<i>Inocarpus edulis</i>). Barbados cherry (<i>Malpighia glabra</i>). Mammee tree (<i>Mammia americana</i>). Mango tree (<i>Mangifera indica</i>). Butter and tallow tree (<i>Pentadania butyrica</i>). Date palm (<i>Phoenix dactylifera</i>). Guava (<i>Psidium perflorum</i> , pomif. &c.). Lotus tree (<i>Zizyphus lotus</i>). Tamarind tree (<i>Tamarindus indica</i>). Chocolate-nut tree (<i>Theobroma cacao</i>). Sweet potato (<i>Ipomoea batatas</i>).	Granadilla (<i>Passiflora quadrata</i>). Melon thistle (<i>Melocotinus communis</i>). Serpentine gourd (<i>Peperomia acuta</i>). Black pepper (<i>Piper nigrum</i>). Sallia (<i>Alaternia salicifolia</i>). Eatable arum (<i>Colocasia esculenta</i>). Ochetide sago (<i>Zecca integrifolia</i>). Seced Indian bean (<i>Nelumbium speciosum</i>). Araucaria (<i>Agave Cardama</i>). Grains of Paradise (<i>Amomum Uratum paradisii</i>). Arrow-root (<i>Martiana arundinacea</i>). Plantain tree (<i>Musa paradisiaca</i>). Banana tree (<i>Musa sapientum</i>). Sugar cane (<i>Saccharum officinale</i>). Ginger (<i>Zingiber officinale</i>). Cow tree (<i>Galactodendron hille</i>). Mancina. Cashew nut (<i>Anacardium occidentale</i>). Arce-nut tree (<i>Ardis coccinea</i>). Ipacuanha (<i>Calliandra ipacuanha</i>). Papaw tree (<i>Carica papaya</i>). Jawoll's bark (<i>Cinchona officinalis</i>). Baleam of Copew (<i>Copewia officinalis</i>). Guava tree (<i>Psidium perflorum</i>). Canava (<i>Scaphium Mithat</i>). Cinnamon (<i>Cinnamomum verum</i>). Casala (<i>Cinnamomum Celsa</i>). Ginger (<i>Zingiber officinale</i>). Medicinal mimosa (<i>Acacia Catechu</i>). Gum-arabic tree (<i>Acacia arabica</i>). Pimento tree (<i>Pimenta vulgaris</i>).	Bitter of porter (<i>Quassia amara</i>). Poison nut (<i>Stychnos nuxvomica</i>). Wild licorice (<i>Astragalus officinalis</i>). Jalap root (<i>Ipomoea Jalapa</i>). Gum elastic (<i>Stychnos Catechu</i>). Vanilla (<i>Vanilla aromatica</i>). Contra-java root (<i>Dorstenia Contra-java</i>). Berberis. Balsam plant (<i>Justicia comata</i>). Jamaica ebony (<i>Amorinum Pimenta</i>). Bambu (<i>Bambusa arundinacea</i>). Silk-cotton tree (<i>Bombax Ceiba</i>). Tallow tree (<i>Stillingia sebifera</i>). Oily palm tree (<i>Elm's guineensis</i>). Olive wood (<i>Elmendorf orientale</i>). Indian-rubber tree (<i>Ficus elastica</i> , and Siphonia Catechu). Cotton tree (<i>Gossypium arboreum</i>). Logwood (<i>Hematosylon campechianum</i>). Machinist tree (<i>Hesperis fragrans</i>). Sandbar tree (<i>Hesperis fragrans</i>). St. Helena red-wood (<i>Melthia Erythroxylon</i>). St. Helena ebony (<i>Melthia Melandryl</i>). Sponge tree (<i>Acacia farnesiana</i>). Supple jack (<i>Paulinia polyphylla</i>). Ground rat (<i>Rhipha flabelliformis</i>). Japan sumach (<i>Rhus mucronata</i>). Sapberry (<i>Sapindus Saponaria</i>). Mahogany tree (<i>Swietenia Mahogoni</i>). Indian tea-tree (<i>Camellia grandis</i>). Lancwood (<i>Uyaria lanceolata</i>). Indian madder (<i>Oleandria umbellata</i>). berb.
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Some minds retain nothing that is not either immediately useful, or has some relation to utility; to such the foregoing list will be of some value, as pointing out plants of great importance to mankind in other countries. From our connection with these countries, and the number of young persons that annually leave Britain to pass great part of their lives in them, it is double their present value known here; and hence a rational object for the patriot, who has wealth and leisure, to display them in a conservatory attached to his dwelling.

6923. In selections of rare or curious plants, or such as are sought after chiefly by botanists, the air plants, the epiphytes, or crepidaceous epiphytes, and the exotic ferns will be included; and on the culture of these, we shall submit some remarks.

6924. The Palms are a natural order of plants of great interest by their utility, both as fruit trees, and as supplying other products; and of much grandeur of appearance. The coco, sago, and date palms are well known; upwards of fifty other genera have been introduced into this country, and are to be found chiefly at Messrs. Loddiges'. A number more remain

to be procured, of which the doom-palm of Upper Egypt (*fig. 872*) is one of the most remarkable; this and the *Phoenix* are the only palms known to have a dichotomous repeatedly divided trunk, a catalogue of the palms in the Hackney Nursery, amounting in number to upwards of 120, to which nearly a fourth part more has been since added, will be found in the *Gard. Mag.*, vol. I. p. 136: for a complete catalogue see our *Hort. Brit.*

6925. The culture of palms is less a matter of nicety than expense. They require a powerful moist heat, a large mass of loam, earth in the pot, rub, or bed, and ample space for the leaves. As they are of remarkably slow growth, a stove devoted to their culture does not require to exceed the common height at first; but, to admit the true palms to display their character, it would require to have the roof elevated by degrees to 60, 80, or 100 feet. It is much to be wished that some spirited man of wealth would, in these times of peace and plenty, distinguish himself by palm culture, and begeth Loddiges have, much to their honor, set the first example.

Stanhopea, *Zygopetalum*, *Maxillaria*, *Phajus*, *Calanthe*, and other genera. In the genera *Cypripedium*, *Bletia*, *Cypripedium*, *Cypripedium*, &c., most of the species are, when in flower, of considerable beauty and several of them fragrant, and they are easily cultivated. The species of *Cattleya*, *Dendrobium*, *Geopelia*, *Catasetum*, and *Oncidium* require a little more attention; their flowers are the most curious and beautiful of those of the *Orchidæ*; they are freely produced, and, in many of the species, are fragrant. The flowers, too, of many species of the genera *Epidendrum*, *Holcypodium*, *Isotria medeoloides*, &c., are powerfully fragrant, and are numerously produced; and the plants only require a little attention in watering, &c.

6252. "The best method of propagating the *Orchidæ* is discovering the connection between the new stem or plant and the old one, but allowing them to grow side by side for another season before transplanting the new one. Sound bulbs, or stems of *Catasetum*, &c., will, in a moist heat, soon begin to grow. (See *Gard. Mag.*, vol. vii. p. 541. and vol. viii. p. 88.)

6253. "One great cause of failure in the cultivation of the *tropical Orchidæ* is the bad specimens usually obtained to begin with. Many species, after surviving a long voyage, will grow very weakly for a time, and the scarcity of other species will tempt some cultivators injudiciously to divide their plants into small bits; for in this family a bulb, stem, or branch, with few roots (and often in a mutilated state), is called a plant, and when these divided portions linger and die, the fault is laid on the species, while the true cause is in the specimen. Messrs. Loddiges and Mr. Knight can supply plants of a collection of from 100 to 200 species." Messrs. Loddiges, in 1831, possessed above 300 species, and probably possess a greater number now. In our *Herbaria Britannica*, pp. 366-373, and the supplements to that work, most of the species, of which descriptions and names have been published, will be found enumerated. The reader who may desire to procure a collection of the species will find in the column in which their popular characters are given, guides to his selection.

6254. The *Rafflesia Arnoldii* is the most extraordinary parasite known to botanists. It was discovered by the late Dr. Arnold, in Sumatra, in 1818, in a jungle or thicket, growing close to the ground under the bushes, and attached to the roots of a species of *Cissus*. The plant consists of the flower only, having neither leaves, branches, nor roots; the flower is a yard across; the petals, which are minutely, being twelve inches from the base to the apex, and it being about a foot from the insertion of the one petal to that of the opposite one; the petals are from a fourth to three fourths of an inch thick, and the nectarium, it is supposed, would hold twelve pints. It appears to take its origin in some crack or hollow of the stem, and soon shows itself in the form of a round knob, which, when cut through, exhibits the infant flower enveloped in numerous bractheal sheaths, which successively open and wither away as the flower enlarges. A singular change takes place in the vessels of the root or stem on which it grows; their ramifications

are multiplied, and they take a direction so as to unite with and accommodate themselves to the base of the parasite to which they convey nourishment. The general appearance of the flower is that of *Stapelia*, and its smell is also fetid. It is dioecious, and supposed by Brown to belong to the natural order of *Asarines*. There are other species, the *R. Patra Elisea*, which much resembles *R. Arnoldii* Br., and the *R. Horsfieldii* with the flowers not above three inches in diameter. (See *Linn. Trans.*, vol. xiii. p. 201.; and *Gard. Mag.*, vol. viii. p. 708.)

6255. *Exotic ferns*. The tree-ferns, *Humboldtiformis*, are of singular beauty in their native sites. Only a few species of these, as *Dicksonia arborescens*, *Davallia pyxidata*, *Pteris aculeata*, &c., have been introduced; but the number of herbaceous ferns which are stove plants is considerable. They are propagated from seeds which generally ripen freely in this country, and such as are received from abroad generally grow, however long kept; they are also multiplied by dividing the roots. The best collection of exotic ferns is considered to be in the Liverpool garden: many of these have been raised from seed by Shepherd, the assistant curator; and the following are his directions for this purpose:—Having provided a common garden-pot, three inches and a half in depth, and three and a half wide, let the bottom part, to the height of one inch, be filled with fragments of broken pots by way of drainage. Over these should be spread a stratum of such soil as is commonly used for potting green-house plants, of the depth of two inches; the remaining half-inch should be filled with brown earth sifted through a hair sieve, the surface being made perfectly smooth, and on this the seeds are to be scattered as evenly as possible. Care must be taken that the wind be not suffered to blow the seeds away, leaving nothing but empty capsules. The seeds, when sown, require a regular watering, than a bell-glass, which should just fit within the rim of the pot, so as to exclude all air. The pot is then to be kept in a pan always half full of water, and set in a shady part of the stove or bell-house, being always regularly watered as it shows dryness. When the young plants have acquired their second leaf, it is proper to give them a little air by placing a small piece of wood under the edge of the glass, at one side. In a short time afterwards the glass may be entirely removed. (*Hort. Trans.*, vol. iii. p. 338., and *Gard. Mag.*, vol. iv. p. 1. and vol. v. p. 49.)

6256. The seeds come up in two or three months, and the plants flower the following year. It is not known how long these seeds retain their vegetative quality, but two plants of *Gymnogramma calomelanos* were raised from seeds brushed from a specimen of that fern in the herbarium of Foster, supposed to be nearly fifty years old. But the same success did not attend similar attempts with any other specimens from this herbarium. The soil for ferns should be of a soft fine texture to suit the very small fibres of their roots; it requires also to be kept constantly moist in imitation of the native habitations of these plants, which is generally under the shade of trees or rocks. Hence also they may be set in dark parts of the stove where nothing else will thrive. (*Gard. Mag.*, vol. vii. p. 109.)

SECT. IX. Selection of Dry and Bark stove Plants, for such as have only one Hot-house to contain them.

6257. *Woody plants*. *Ardisia paniculata*, *Astragalus Wallichii*, *Averrhoa bilimbi*, *Bambusa arundinacea*, *Barbingtonia speciosa*, *Brexia madagascariensis*, *Brugmansia suaveolens*, *Celastrus Piquetii*, *Catesbaea spinosa*; *Clerodendrum fragrans*, *Cuscuta*; *Coccoloba uvifera*, *Coccoloba nictitans*, *Coffea arabica*, *Corypha umbraculifera*; *Cissampelos circinalis*, *revoluta*; *Dillenia speciosa*, *Dracaena Draco*, *Franciscia confertiflora*, *Hibiscus Rosa-sinensis*, *Lycium coccineum*, *Lagerstræmia regina*, *Malpighia coccinea*, *Murraya exoniata*, *Pandanus candelabrum*, *odorastrum*; *Phlox*; *Phlox lactiflora*, *Phlox vulgaris*, *Portulandia grandiflora*, *Solanum grandiflora*, *Theophrasta cuneata*, *Tectonia grandis*, *Vincetoxicum*.

Climbing. *Amygdala spinulosa*, *narvosa*; *Passiflora* *Achillea*, *coccinea*, *complanata*, *barbata*; *Ipomoea insignis*, *Jalapa*; *Passiflora alata*, *phloxica*, *coccinea*, *receptaculata*, *terrestris*. *Succulents*. *Agave vivipara*, *Melocotene communis*, *Cereus Achermannii*, *grandiflorus*, *speciosissimus*, *phyllanthoides*; *Euphorbia clava*, *antennarium*; *Piper nigrum*, *Stapelia grandiflora*. *Bulbs*. *Amaryllis regina*, *Johnsonii*, *vittata*, *salicea*; *Ornithoglossum umbellatum*, *rubescens*, *latifolium*, *Lupinus Andromeda*; *Pancratium amœnum*, *speciosum*. *Herbaceous*. *Aërides odoratum*, *Blechnum Tankervillei*; *Celastrum bicolor*; *Cestrum tridentatum* and *varietates*; *Cestrya Forbsteri*, *Cypripedium venustum*, *Gloriosa superba*; *Gloxinia*

complanata, *speciosa*; *Polypodium adnatum*; *Polka grandifolia*, *Romantaria coccinea*.

Aroids. *Limnophora Plumieri*, *Euphorbia* *fraxi*; *Nelumbium speciosum*, *Nymphaea carulea*, *Lolus pulchellus*, *rubra*; *Papyrus antiquorum*; *Pontederia azizora*, *crispipes*; *Vallisneria spiralis*.

Woody. *Alpinia racemosa*, *magnifica*; *Canna indica*, *glauca triflora*; *Hedyotis angustifolia*, *coccineum*, *Gardenia*, *maximum*; *Heliconia* *Bibbi*; *Maranta arundinacea*, *bicolor*; *Musa paradisiaca*, *apiculata*; *Phrynium* *serotinum*, *Rondeletia purpurea*, *Rondeletia officinalis*; *Strelitzia regina*, *Zingiber officinale*.

CHAP. XV.

Monthly Catalogue of the leading Productions of Ornamental Horticulture.

6258. Our catalogue of monthly ornamental productions extends only to a few of the more generally known flowering plants and trees; what respects the hot-house department is to be understood as referring to flower-gardens which contain at least a bark-stove, a dry-stove, one green-house or more, and an adequate number of reserve-pits and frames. Those plants are marked (*) which may be produced from a small garden, where there is a green-house, flued-pit, and hotbeds; not in any quantity, but sufficiently to keep up a hope and a fear for every month. The keeping up of this sort of hope and fear, and the making changes in gardens, are much more conducive to the kind of happiness or interest which those who have small places, expect to derive from them, than a grand display of two or three species of flowers, occurring only once or twice in the year.

JANUARY.

FLOWER-GARDEN.	SHRUBBERY.	HOT-HOUSE DEPARTMENT.
The crocus, tulip, and some alliums, beginning to emerge from the ground. If mild weather, perhaps some choice plants in flower, as the Christmas rose, daisy, winter aconite*, but generally no flower is to be seen at this season. At this season it is that such species of plants as those enumerated in a 6011 prove of much interest, even in their foliage alone.	Evergreens display themselves to advantage, especially the holly* with its coral berries. <i>Chimonanthus fragrans</i> , and <i>fraxus grandiflora</i> , and <i>lauro-cistus</i> * in flower. The glossy leaves of the Portuguese laurel glaze in a lively cheering manner in the gleams of sunshine with which we are favoured even in this month: those of the common laurel do the same.	In the green-house, the camellias* in full bloom, and some heaths and Australian plants. In the stove, <i>Streptocarpus</i> * several species, and some other plants. From the pits and hotbeds in the reserve-garden, forced roses, hyacinths and other bulbs, mignonettes, &c., placed in the cooler vinery, plant-cabinets, or drawing-room.

FEBRUARY.

The snowdrop*, Christmas rose*, and winter aconite*, in flower; the crocus, crown imperial, and other bulbs, fast advancing, if the weather be favourable. The buds of the weeping willow* (<i>Salix babingtonia</i> L.) bursting or about to burst: a proof that this species has not yet become acclimated to Britain.	The male flowers of the hazel*, yew tree*, those of <i>Erica carnea</i> , and some shrubs, appear. The lark sings about the beginning of the month, and the thrush about the middle.	In the green-house, camellias* and heaths in great beauty, and also some species of <i>Oxalis</i> , <i>Fritsches</i> , &c. In the stove, <i>Streptocarpus</i> *, and some bulbs and succulents. Forced articles from the pits as before.
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MARCH.

Among florist's flowers, the crocus*, alliums*, some hyacinths*, and crown-imperials*, and also the primrose* and polyanthus* are in bloom in the latter half of the month; <i>Saxifraga oppositifolia</i> * among the alpine; and <i>Folia odorata</i> * in a warm border, or on rock-work; <i>Sedum album</i> , <i>Chrysanthemum oppositifolium</i> , <i>alternifolium</i> .	Some pines, poplars, and willows* show their catkins; the alce*, cornelian cherry*, meserose* different varieties, <i>Delphinium elatum</i> , collins, the <i>Leucostemum</i> nigra*, and rosemary, in flower. The ring-dove begins to coo in the first week.	In the green-house, some camellias* still in flower; numerous heaths* in great beauty; also <i>Aletris</i> *, <i>Lachenalia</i> *, <i>Oxalis</i> *, some <i>Geraniums</i> *, and some other genera. In the stove, some <i>Scitamineae</i> and tulips; <i>Solandra grandiflora</i> , <i>Eugenia</i> , and <i>Justicia</i> . Forced articles as before.
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APRIL.

The hyacinth*, narcissus*, arizula*, and polyanthus*, four of the most valued florist's flowers, are in perfection in the course of the month. Also, the scilla, fritillaria*, wallflower*, daisy*, <i>Pulsanaria officinalis</i> , <i>Omphalodes verna</i> *, <i>various saxifrage</i> , and other alpine. For an enumeration of many of these, see the lists of perennial border plants, and bulbous-rooted plants which flower in April, a 5973 and 5985.	Most of the wild fruit trees, as crabs*, pears*, cherries*, and their allied species, are now in flower; most of the willows, birches, elms, and oaks show their catkins. Among shrubs, the honeysuckle, some <i>robinias</i> *, <i>andromeda</i> *, <i>daphne</i> , <i>ericas</i> *, and <i>Xanthoxilia apiculata</i> are in flower. Most of the British summer birds of passage arrive during this month. For dates and remarks on the arrival of most of them in 1835, see <i>Mag. Nat. Hist.</i> , vol. vii. p. 335.	In the green-house, above thirty species of <i>Ericas</i> *, and nearly as many of the <i>Fritsches</i> family, with <i>Lachenalia</i> , <i>Oxalis</i> , <i>delicia</i> , and various other genera, in perfection. In the stove, <i>Dracopis</i> *, <i>Arum</i> *, <i>Kamperferia</i> , <i>Stapelia</i> , and some bulbs, in flower. Abundance of forced articles, including annuals, as sweet peas, larkspurs, &c., in flower.
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MAY.

The auricula-stage still a fine object in the first week; and the polyanthi narcissi are not yet over. The collections of tulips*, anemones*, and crocuses*, in full beauty from the middle of the month. Many showy herbaceous plants, as <i>Stilaxis</i> *, <i>Lycchnis</i> *, <i>Phlox</i> *, &c., coming into flower. Among the aquatics, <i>Botanica palustris</i> , and <i>Maritimus squillula</i> .*	The hawthorn*, hawthorn*, arbutus*, mesquias*, and snowdrop tree*, in great beauty. Among the American shrubs, several species of <i>Magnolia</i> *, <i>Azalea</i> *, <i>Kalmia</i> *, <i>Andromeda</i> , &c., and among common shrubs, the lilac*, <i>Spiraea</i> *, <i>Gaultheria</i> rose*, honey-suckle*, the cinnamon, Scotch, burnet-leaved, and monthly roses. Most of the singing-birds in full note.	In the green-house, a fine display of <i>Ericas</i> *, <i>Fritsches</i> *, and <i>Gladioli</i> *. Also several <i>Pelargoniums</i> , <i>Silvina</i> , <i>Prinos</i> , &c. In the stove, <i>Passiflora racemosa</i> *, and other species; <i>Justicia</i> , <i>Hedera</i> , and various genera. From the forcing department, <i>pelargoniums</i> many other green-house plants, <i>hydrangeas</i> *, <i>balanias</i> *, and other tender annuals.
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JUNE.

The collections of pomeis and anemones not yet faded; those of <i>Ranunculus</i> *, <i>Fritsches</i> *, <i>Andromeda</i> , and <i>aphelodes</i> ; and of the hardy <i>Gladioli</i> and <i>Fritsches</i> in full beauty. Assortments of pink* and sweet-william* in flower towards the end of the month; also <i>Hemerocallis</i> *, <i>Aquila</i> *, (<i>campidula</i>), <i>Perseus</i> *, and many showy herbaceous perennials; some biennials, as <i>Aquilegia</i> , <i>Alisma</i> *, &c.; annuals, as <i>Crepis</i> , <i>Silene</i> ; aquatics, as <i>Butenne</i> *, <i>Hydrocharis</i> , <i>Potamogeton</i> ; <i>Viola</i> , <i>Saxifraga</i> *, and various alpine. Heartseases are now in their greatest beauty.	The lime, laburnum, and fringe tree* in flower; towards the middle of the month a number of the roses* of American, <i>Andromeda</i> , <i>Magnolia</i> , <i>Rhododendron maximum</i> and <i>ponticum</i> , <i>Azalea</i> , &c. Of common shrubs, <i>Cistus</i> *, <i>Helianthemum</i> , <i>Erica</i> , dogwood, elder, <i>Cytisus</i> , <i>Spiraea</i> , <i>Lonice</i> , &c. The goatsucker or barn-owl (<i>Caprimulgus europaeus</i>), heard in the evening of the first week: it is sometimes heard as early as the middle of May. Most singing-birds leave off singing about the end of the month.	In the green-house, chiefly tender annuals from the reserve-garden; the proper biennials being in the open garden, and there the <i>heaths</i> , <i>Geraniums</i> , <i>Citrus tribe</i> *, <i>Dioscorea</i> , <i>Prinos</i> , &c., in great beauty. In the stove, <i>Amorphylla</i> *, and other bulbs, also, piper, and other succulents; <i>eugenia</i> , <i>epidendrums</i> , <i>cassia</i> , <i>estrup</i> , &c. The pits filled with tender annuals, or other plants, in the course of propagation and rearing.
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JULY.

The florist's flowers of this month are the pink* and carnation*; the white marigold* and the tiger lilies*; the Brompton stock*, larkspur*, lupines, and other biennials and annuals. More herbaceous plants are now in flower than in any other month, as <i>Chelone</i> *, <i>Delphinium</i> *, <i>Dictamnus</i> *, <i>Gentiana</i> , <i>Statice</i> *, <i>Phlox</i> *, <i>Silene</i> *, <i>Silvia</i> , <i>Perseus</i> , <i>Saxifraga</i> , &c. The most showy of the aquatics, as <i>Nymphaea</i> *, <i>Najas</i> *, <i>Vallisneria</i> , <i>Alisma</i> , <i>Gilia</i> , <i>Stratiotes</i> , <i>Myosotis</i> *, <i>Potamogeton</i> , <i>Amphibium</i> , &c., are now in flower, and various alpine; and several varieties of <i>Georgina</i> variabilis.	The tulip tree*, <i>Magnolia</i> *, <i>Kalmia</i> *, <i>Andromeda</i> *, <i>Azalea</i> *, <i>Erica</i> * several sorts, and some <i>rhododendrons</i> *, and other American or post-earth varieties. The rose, the commoner sort, the rose* are now in full splendour. The white jessamine*, honeysuckle*, <i>Clematis</i> *, <i>Spiraea</i> , <i>Gladiolus</i> , <i>Andromeda</i> , <i>clim</i> , and a great variety of others of less note. Showy butterflies and moths appear in the beginning, and the large dragon-fly towards the end, of the month.	The green-house is now filled with tender annuals, as <i>balanias</i> , <i>globe-amorphyllae</i> , <i>coronilla</i> , <i>fox-plants</i> , sensitive mimosa, &c., and probably with some of the more palatable. In the open air, the <i>Geraniums</i> will be in great beauty, and also <i>Erica</i> *, <i>Mesembryanthemum</i> *, <i>Melaleuca</i> *, <i>Metrosideros</i> , <i>Prinos</i> , and numerous other genera. There are numerous showy plants now in flower, as <i>Canna</i> *, <i>Pelargonium</i> , <i>Passiflora</i> , <i>Passiflora</i> , <i>Gladiolus</i> *, <i>Amorphylla</i> *, <i>Panacium</i> , <i>Cleome</i> , <i>Euphorbia</i> , <i>Hyssopus</i> , <i>Ipomoea</i> *, &c., <i>Justicia</i> , &c. The reserve hot-houses as before.
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AUGUST.

The florist's flowers of this month are the hollyhocks*, pyramidal bell-flowers*, lobelias, annual stocks*, and the poppies*, with <i>Lilium canadense</i> * and four other American species. Numerous herbaceous plants are now in flower that first appear in July, and <i>Aster</i> * various species, <i>Astrantia</i> , <i>Helianthemum</i> , <i>Nasturtium</i> *, <i>colicragum</i> , and <i>thymus</i> others, first bloom in this month. Among the aquatics may be mentioned <i>Lobelia Dortmanna</i> *, <i>Gilia palustris</i> and several species of <i>Potamogeton</i> .	Scarcely any trees are now in bloom; but of American shrubs there are various sorts of <i>Azalea</i> *, <i>Obolus</i> *, and <i>Magnolia</i> *, in perfection; and of select common shrubs, the <i>Silvina</i> *, with its numerous and beautiful varieties. The rose, the honeysuckle*, yellow jessamine*, <i>Clematis</i> *, <i>Spiraea</i> *, and dwarf <i>Pavia</i> , form a greater show in the shrubs and roseary than in any other month. Robin-redbreast (<i>Merula rubra</i>) sings about the last week; and butterflies, moths, and dragon-flies abound during the whole month.	The green-house as before. In the open air the plants growing vigorously; but except <i>Geraniums</i> *, <i>Ericas</i> *, and some succulents, not many species in flower. In the stove, <i>Aspidistra</i> , <i>Cardinalis</i> *, <i>Panacium</i> , <i>Lagotis</i> *, <i>Passiflora</i> *, <i>Plumbago</i> , and numerous other genera in flower. Tender annuals from the reserve hot-houses as before.
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SEPTEMBER.

FLOWER-GARDEN.	SHRUBBERY.	HOT-HOUSE DEPARTMENT.
The florists' flowers of this month are the <i>georginas</i>*, which flower also, when excited by artificial heat previously to planting in the open ground, in July and August; but planted in the usual way are now in perfection. Among the bulbs there are the <i>A'cis autumnalis</i>*, <i>Narcissus serotinus</i>*, and <i>Scilla autumnalis</i>; the China aster, in all its varieties, is now in perfection. Among the herbaceous perennials, <i>Aster</i>*, <i>Solidago</i>, <i>Helianthus</i>, <i>Gentiana</i>*, <i>Phlox</i>*, and <i>Asphodelus</i> are the chief sorts.	<i>Arbutus spinosa</i>, some <i>azaleas</i>*, and <i>Kalmia</i>*, Lord Macartney's rose, and another rose or two, are in flower during the greater part of this month. But the chief ornament of the shrubbery is the fruit of the mountain ash*, <i>Fibrium</i>*, <i>Crataegi</i>*, <i>Pyracantha</i>*, Siberian crab*, sort*, <i>Lonicera</i>, apple, rose*, elder, &c. Spiders, flies, and insects of all kinds, very numerous; few birds in song; but the scissure arrives about the end of the month.	The green-house plants, generally, returned to their winter habitation in course of this month; some heaths*, and pelargoniums*, and a few other species in flower. There are not many stove plants in flower at this season; <i>Amaryllis</i>*, <i>Pand-flora</i>, and some succulents may be mentioned. Tender annuals supplied from the forcing department of the reserve garden, for decorating the plant cabinet, conservatory, or drawing-room.
OCTOBER.		
The florists' flowers of this month are the Chinese <i>chrysanthemums</i>*, some of the hardier of which will now flower in the open air, and the others under a glass case or in the green-house; the <i>Colchicum</i>* autumnale, <i>Crocus</i>, <i>Cyclamen europæum</i>*, and <i>Sternbergia lutea</i>*. The principal herbaceous plants are <i>Aster</i>, <i>Solidago</i>*, <i>Helianthus</i>, <i>Helopais</i>, <i>Ceropeia</i>, <i>Actinoneura</i>, <i>Polymnia</i>, <i>Gentiana</i>*, and some other genera.	<i>Arbutus Unde</i>* is the only beautiful shrub in flower, and also in fruit, at this season, <i>Gordonia</i>, <i>Rhamnus</i>, <i>Euc-haria</i>, <i>Clematis</i>, and the common Ivy, are also in flower. The increasing coolness of the weather conduces to the retreat of a considerable proportion of the insects. Flies of various species, and the <i>Kristalis tenax</i>, which much resembles a drone bee, are very abundant in sunny days upon the flowers of the autumnal-flowering Composites.	Any spare room in the green-house is now occupied with <i>chrysanthemums</i>*, and some <i>georginas</i> raised in pots, and placed out of the reach of frost, to prolong their bloom. A few <i>erica</i>*, <i>Stachys</i>, and <i>pelargoniums</i> still in bloom. In the stove, <i>Vinca</i>*, <i>Staphis</i>*, <i>Ren-anthra</i>, and a few others. The reserve pits in preparation for forcing bloom and roses.
NOVEMBER AND DECEMBER.		
The remains of last month in greater or less beauty, according to the weather, and, perhaps, a few plants unseasonably in bloom. In the mild and humid winter of 1821, when this page of the first edition of this work passed through the press there were in bloom, in many gardens about London, stocks of several sorts, lark-sprays, violets, Indian pinks, pot-marigolds, polyanthes, primroses, gentians, monthly roses, yellow <i>amaryllis</i>, daisies, and various other plants. In the winter of 1833-4, similar plants were in flower, and the spring was from ten days to a fortnight earlier than usual, but only about London and Edinburgh, not in most parts of Europe.	The remains of last month, according to the weather. <i>Clematis calycina</i>*; and, perhaps, a few plants unseasonably in bloom. Some of the associations which January induces, especially those which relate to evergreens, may be participated in these months. (See under that month.) The winter birds of passage are now a source of interest to the naturalist; as are numerous meteorological phenomena connected with winter.	<i>Dryandra</i>*, <i>Erica</i>*, <i>Lantana</i>, and <i>camellias</i>*, about the middle of December, in the green-house. In the stove, all the species of <i>Streptitris</i>*, also <i>staphis</i>, <i>Amorpha</i>*, <i>Adonis</i>, and one or two other bulbs. <i>Astrape</i>'s <i>Wallchii</i>. From the forcing department, <i>hyacinths</i>*, <i>Persian iris</i>*, and other bulbs; monthly roses*, and, about Christmas, the <i>Provins</i> rose*, and other shrubs and flowers, such as sweet briar, <i>Persian lilac</i>, crabs of different sorts, pinks, sweet-williams, &c.

BOOK III.

ARBORICULTURE, OR PLANTING OF TREES.

6239. A TREE is an object which has at all periods been held in a certain degree of admiration by mankind, from its grandeur, its beauty, and its use: a few trees have accordingly been associated with the dwellings of civilised nations in every country. The Persians, Greeks, and Romans were particularly attached to trees: some of their greatest men were proud to acknowledge that they had made plantations with their own hands; and fine specimens, whether planted by nature or art, were held sacred, or specially protected. The Romans, besides the ornamental plantations of their villas, planted occasionally for useful purposes; they had live hedges, osier plantations, and rows of poplars and elms as props for their vines. The planting of extensive tracts for timber or fuel, however, does not appear to have been practised by them, or by any other people, till the beginning of the sixteenth century, when the insufficiency of the natural forests, which had hitherto supplied civilised society in England with timber and fuel, rendered planting a matter of necessity. In the century succeeding, the improved practice of agriculture created a demand for hedges and strips for shelter; and the fashion of removing from castles situated in towns or villages, to isolated dwellings surrounded by verdant scenery, led to the extensive employment of trees both as objects of distinction and value. For these combined purposes planting is now universally practised: what relates to the effect of plantations, as parts of rural scenery, belongs to landscape-gardening; and what relates to their use and culture is the subject at present under consideration. We must, however, keep both objects in view, as well in contriving what shall be most profitable, as in designing what shall be most ornamental and picturesque. We shall therefore consider the uses of trees and plantations with a view both to profit and ornament; the kinds of plantations, their formation, their management, the formation of a tree nursery, and the surveying and valuing of trees and plantations; and we shall add a catalogue of timber trees and hedge plants.

CHAP. I.

Uses of Trees and Plantations, and the Profits attending their Culture.

6240. *The purposes for which plantations are made, may be reduced to those which respect the actual consumption or application of the tree or shrub individually; and those which respect their collective influence relatively to surrounding objects. For the first of these purposes, trees may be considered as producing timber, fuel, bark, and other products; and for the second as affording shelter, shade, fences, ornament, or otherwise conferring value on territory.*

SECT. I. *Uses of Trees individually, as Objects of Consumption.*

6241. *A tree is employed after it has attained a certain age, bulk, or dimension, either in civil, military, or naval architecture; in the construction of machines, implements, and utensils; as fuel; or as affording tannin or dyeing matter; as food or medicine for men or animals; or as poison for vermin.*

6242. *For civil architecture* the matured timber of the pine and fir tribes is in greatest demand, and foreign deal is generally preferred to British produce, as being of larger growth, and more resinous and durable in quality and texture. That species of British timber which approaches the nearest to the pine and fir timber of the north, is the Scotch pine (*Pinus sylvestris*); when grown in the north highlands, and the larch fir (*Larix europæa*), when grown in hilly or poor districts; resinous timber of the species indigenous to cold countries, when grown on rich soils, and in warm climates, being found deficient in durability. Oak and elm are also used in buildings, especially the former, as being of great durability, and as being suitable for wooden bridges, breakwaters, joists in damp situations or on ground floors, sills, wall plates, staircases, door and window frames, sashes, &c. Elm is not much used in building, of magnitude, as being apt to twist, and not very durable; but it makes curiously variegated floors and steps of stairs, and very good weather-boarding for sheds and agricultural buildings. It is also much used for pumps and water-pipes. Besides timber and timber-like trees for the general purposes of civil architecture, there are some departments of rural construction, as the formation of fences, drains, embankments, trelliswork, arbours, and the supporting of plants in gardens, which consume branches, spray, thinnings of young plantations, and even shoots of a year's growth. Almost any species of tree may be used for these purposes; but the branches and spray of the oak, elm, and beech, the *weavings* of ash or larch plantations, the shoots of a few years' growth of the oak, sweet chestnut, ash, and hazel, and of one year's growth of certain species of willow, are greatly preferred.

6243. *Monteath recommends* home-grown pine and fir timber to be used generally in the construction of cottages and other small buildings; oak and Spanish chestnut for windows, doors, and floorings even to the best buildings; ash and elm for joists and roofing; beech for joists, flooring, and stairs; lime and poplar for window shutters, inside doors, linings, and finishing of all kinds. (*Trans. Highland Soc.*, vol. ix. p. 361.)

6244. *For military architecture*, by which we mean chiefly the outworks of fortifications, any tree is taken; but the pine and fir tribes are greatly preferred, as requiring less labour in cutting and preparing. Besides those of a timber size for constructing bridges, portals, and others of less dimensions for palisades, chevaux de frise, &c., branches, spray, and shoots are used for fascines, and fixed works *en saie*, *en corbelle*, &c.

6245. *In naval architecture* the oak is chiefly used. According to Marshall, "the keels are now pretty generally laid with elm or beech, and part of the upper decks of men of war is deal; but these woods bear no proportion, in respect of the quantity used, to the oak. The timbers of a ship are principally crooked, but the planking is cut out of straight pieces. In a seventy-four gun ship, the crooked and straight pieces used are nearly equal, but the planking under water is of foreign oak; therefore, of English oak, the proportion of crooked to straight pieces is almost two to one. Masts and yards are of deal. The blockmakers use elm, lignum vite, box, and other hard woods. Upon the whole, it may be said, that in the construction of a ship, oak is the only English wood made use of; and that of this English oak, nearly two thirds are requisite to be more or less crooked." (*Planting and Rural Ornament*, vol. i. p. 49.)

6246. *In the construction of merchant vessels*, Monteath, in 1820, states, that "the out-keel commonly used is of beech or elm, and made generally of two or three trees or pieces joined together to whatever length is required; these require to be nearly straight. The keel-stone, or inner keel, requires trees of nearly the same description, but chiefly oak. Floor timbers are sometimes used of elm and beech, and are a little crooked. First crooks are a good deal crooked towards the one end, as they begin to ascend up the vessel, and are more valuable than the floor timbers, but are also used sometimes of elm and beech. Upright timbers are always made of oak, and are considerably crooked, for elm or beech is seldom put into a good vessel except the lower part, where the vessel is always under water when light. Top timbers are also of oak, but not so valuable, as they are mostly straight. Beams go under the deck of the vessel, and are also all oak, and have but a small crook, but require trees of considerable length. Knees are always of oak, and are the principal crooks in the vessel. The stem piece is a very particular crook. Breast hooks also have particular crooks. Stern posts and windlasses are straight pieces. Trees that will cut up for planking are used of as great a length as they can be got, and are the better for having a considerable crook or curve one way; these are used of elm or beech for planking under water, but four planks of oak are required for one of beech or elm for this purpose." (*Forester's Guide*, p. 111.)

6247. *Straight timber is best in any form by the use of steam*, and other improvements in ship-building; and thus the larch or any sound resinous timber may be employed, and is so to a certain extent for commercial ships. Sir A. Grant, an experienced planter, is of opinion, that "the larch will, in a short period, instead of the oak, bend the thunder of Britain on her element, the ocean." (*Gen. Rep. of Scot.*, vol. ii. p. 270.) In a communication to the President of the Board of Agriculture, by Wilson, of London, dated in 1797, the idea is suggested of *combining* small timbers for all the purposes of shipbuilding. He suggests, that oak of only thirty-three years' growth, by this mode of combining, may be employed where trees of a hundred years old would be requisite by the old method: and he maintains, that ships so built sail faster, and are less liable to accident. (*Gen. Rep.*, vol. ii. p. 199.) The use of timber of small growth has been already introduced in the construction of masts for the largest vessels, either by splicing pieces properly adapted together; or, by forming hollow masts from small timber, which, uniting strength with lightness, have advantages which solid ones do not possess. (*Perring and Money on Ship-building*.)

6248. *Matthew, in 1831, has a valuable chapter on the different descriptions of timber employed in the construction of vessels. Sippings' improvements in naval architecture, by which knees and crooked timber might be nearly superseded, have not yet come into general use, and, according to Matthew, are not likely soon to do so in private building-yards. Nearly two thirds of the timber of all vessels, he says,*

consists of curves and bends, but which curves and bends all require to be straight to the plane of their sides. The two grand divisions of the timber used in ship-building are the plank, or outside and inside lining, and the ribs or frames, commonly called timbers, which support the plank. Trees for the production of planks ought to be trained so as to produce tall, straight, and clean trunks; trees for the production of timbers ought to be trained in a variety of curves; or left unpruned and at irregular distances, so that these curves may be produced naturally. (*On Naval Timber and Arboriculture*, p. 5.)

6249. *In the construction of machines*, the millwright's chief material is oak, beech, and crab-tree for cogs; alder, and sometimes willow, for float-boards; and fir and oak for shafts and framework. The wheelwright uses oak and ash for bodies, axles, and spokes; elm for nave, felles, and linings; sometimes also the softer woods for linings, as poplar, willow, lime, and horsechestnut. The coachmaker uses more ash than any other sort of timber. Gates are made of oak and deal, and their posts of oak or larch; the soft woods are sometimes used, but are far from being durable. The sides of ladders are formed chiefly of deal, or of poplar and willow, as being light; and the steps or rounds of oak, as being strong and durable. Pumps and water-pipes generally of elm and alder; beech and sycamore are used in making calendars and cheese-presses, &c. For all these purposes the timber must be full grown, with some exceptions, as young or root-cut ash is in general use for the handles of such as require to bear great stress, as of the spade, fork, mattock, forge hammers, &c.; willow or deal of the lighter tools, as the hoe, rake, scythe; beech and sycamore for the common tools and instruments of carpenters; box, holly, elder, &c., for the more select tools of artisans, and for mathematical and gaugers' instruments.

6251. *For furniture*, under which is included household furniture, the chief British wood used by the cabinet-maker is beech for bed frames, chairs, and sofas; next, birch and broad-leaved elm for the same purposes; oak for Gothic furniture; the cherry, plum, holly, yew, box, walnut, lime, poplar, and a great variety of woods for occasional purposes; and deal, which last enters more or less into the construction of almost every thing he makes. The musical-instrument maker uses lime, box, yew, holly, plum tree, and poplar. The carver uses chiefly lime, and, next, pine deal; the cooper uses oak, and some chestnut for large casks and vessels, corn-measures, &c.; birch and alder for herring-barrel staves, and sycamore for herring-barrel ends; these woods, since a law passed authorizing herrings to be put into barrels made from British timber, have been in great demand (*Mosses*); ash for dairy utensils, butter firkins, flour barrels, &c.; oak for well-buckets and water-pails, and, in some places, for milk-pails and other dairy utensils; beech is occasionally used for the same purposes, and for scap firkins; and willow, oak, ash, and hazel for hoops. The brushmaker uses beech, sycamore, birch, some holly and box, and also poplar and lime tree; locksmiths, the soundest oak, from the root-cut or best-end of the trunk; the block-maker, for printing and bleaching works, uses sycamore; the turner, beech, sycamore, box, and holly; trunk and packing-case makers, deal, poplar, elm, or whatever soft wood may be cheapest at the time; coffin-makers use chiefly elm, sometimes oak; basket-makers the root shoots of the willow, and sometimes of the hazel; bee-hive and straw utensil makers use the bramble and willow; besom-makers the spray of the birch, brown, and heath; last and patten makers, alder and birch; the toy-maker, lime, and other soft woods, and also box, holly, and yew; the gunstock-maker uses the wood of the walnut tree. For most of these purposes, the trees must have attained a timber size, and for some of them, they should be full grown.

6252. *For fuel*, any ligneous vegetable may be used at any age, and either the body or trunk and root of the plant, or its branches and spray. Resinous trees, except the larch, afford most flame, and may be used the soonest after being cut; the ash next in order; then the birch, whose dry bark burns clear; oak and elm burn the slowest; and the roots of trees are generally of more slow combustion than their tops. The most rapid-growing tree for fuel is the common tree acacia (*Robinia Pseud-Acacia*). Charcoal, as fuel, is prepared by subjecting roots, or the more ligneous parts of branches, to a smothering combustion.

6253. *For affording the tanning principle*, the bark of the oak is chiefly used; but that of the common white, or Huntingdon willow (*Salix alba*), larch, black poplar, birch, chestnut, hazel, thorn, and some other trees, is found to afford it in such quantities as renders it worth while to disark them for that purpose. (*La Chimie appliquée à l'Agriculture*, p. 89, and *Com. to Board of Agr.*) The bark is most powerful when taken from the tree at an early age, and hence the oak is cut down before it attains a timber size, for that purpose, as in copsewoods; but the bark of old trees is also used.

6254. *For dyeing*, the bark of several trees was formerly in use, as of the crab-apple, pear, ash, alder, &c. The bark of the querciton (*Quercus tinctoria*) is used for dyeing yellow in North America; but in this country, foreign materials, indigo, logwood, madder, &c. have superseded the use of indigenous or home-grown vegetables. The berries of some trees, as of the elder, and berry-bearing alder; and the leaves of others, as of the walnut and sloe, have also been used for dyeing.

6255. *In various arts and manufactures* some of the products of trees are used, as the charcoal (of the dogwood principally) in that of gunpowder; the pitch of the pine, the resin of the spruce fir, and the turpentine of the larch, for a great variety of purposes. The ashes of the burnt branches of all trees, but especially of the ash, afford alkali for the laundress; the spray of the beech and other trees affords, on distillation, the pyroligneous acid, an excellent preservative of timber, and, when purified, a substitute for salt in preserving butcher meat; the bark of the holly affords birdlime; and the leaves of all trees, except the *resinous kinds*, rot into excellent manure for the field, and highly prized mould for the garden.

6256. *For food to man*, in his present state, the timber trees afford but little resource; but nuts of the sweet chestnut, walnut, and hazel are still esteemed, and our ancestors used the acorn, beech-mast, haw, roan, hip, and bramble. A very agreeable drink is made from the sap of the birch tree in Sweden, Russia, and some parts of Britain; and, in America, sugar is obtained from the sugar-maple (*Acer saccharinum*) in sufficient quantities to be used in domestic economy. Mast and acorns are esteemed excellent food for swine, haws for deer, and the leaves and spray of many sorts of trees are, or may be, eaten during winter both by domestic and wild animals. Game, which, in every cultivated country, is one of the greatest luxuries of the table, is localised by plantations, in which both birds and quadrupeds find at once shelter, security from their enemies, and food.

6257. *For medicine*, the product of scarcely any British tree is in use: but the bark, blossoms, and berries of the elder; the fruit of the sloe and crab, and the leaves of the walnut, were formerly in considerable repute, and are occasionally used: the bark of *Salix alba* is used in cases of ague, instead of the bark of Cinchona.

6258. *As poisons for vermin*, the leaves of the walnut, elder, and ash are used by infusion for destroying, or rather annoying, worms by their bitter acrid quality; a glutinous snare for entrapping birds is obtained from the holly and mistletoe.

6259. *General result*. From the above outline it may be inferred, that the timber trees in most general demand as such, are the oak, pine, and fir tribes; and next the ash, elm, beech, poplar, willow, birch, sycamore, &c. In the greater number of cases, other things being equal, the oak, larch, Scotch pine, ash, beech, poplar, and willow, will be found the most profitable trees that can be planted with a view to timber or bark produce.

SECT. II. Uses of Trees collectively as Plantations.

6260. *Trees collectively in a growing state* may be useful by affording shelter and improving the local climate, improving bad soils, and producing shade; also by separation, seclusion, distinction, appropriation, concealment of disagreeable objects, heightening the effect of agreeable objects, creating beauty, and adding value prospectively.

6261. *Shelter and climate.* The umbrageous roof of the forest afforded shelter, and a secure retreat to our savage forefathers; and their civilised descendants still resort to the nearest tree as a place of shelter during a casual storm. Considered agriculturally, "the advantages to be derived from subdividing extensive tracts of barren country by plantations, are evidently great, whether considered in the light of affording immediate shelter to the lands, or in that of improving the local climate. The fact that the climate may be thus improved, has, in very many instances, been sufficiently established. It is, indeed, astonishing how much better cattle thrive in fields even but moderately sheltered than they do in an open exposed country. In the breeding of cattle, a sheltered farm, or a sheltered corner in a farm, is a thing much prized; and, in instances where fields are taken by the season for the purpose of fattening cattle, the fields most sheltered never fail to bring the highest rents, provided the soil be equal to that of the neighbouring fields which are not sheltered by trees. If we enquire into the cause, we shall find that it does not altogether depend on an early rise of grass on account of the shelter afforded to the lands by the plantations; but likewise, that cattle which have it in their power, during cold seasons, to indulge in the kindly shelter afforded them by trees, feed better, because their bodies are not pierced by the keen winds of spring and autumn, and because the tender grass is not destroyed by the frosty blasts of March and April." (*Plant. Nat.*, p. 121.) In gardening, shelter is not less important than in general economy.

6262. *Climate.* An Italian author (G. Gautieri) has enumerated and illustrated the advantages, in point of climate, which entire tracts of country derive from extensive woods and forests. "These are," he says, "arresting the progress of impetuous and dangerous winds; maintaining the temperature of the air; regulating the seasons; lessening intense cold; opposing the formation and increase of ice; moderating intense heats; producing abundance of rain and snow; giving origin to springs, and producing abundance of water in the rivers; discharging the electricity of the atmosphere; dispersing hail, snow, and watery clouds; preserving from inundations; lessening the width and depth of torrents; opposing a barrier to the undermining of banks, and the formation of precipices; preserving the soil on mountains, by which their external figure is maintained; and, finally, retaining within bounds, or preventing the formation of avalanches, or accumulations of snow." He illustrates each of the propositions by references to what has taken place in Italy and Germany, in consequence of alterations that have been made in the woody surfaces of these countries. (*Dello Infusso de' Boschi*, &c. Milano, 1817.) Williams, an English author, has endeavoured to show that the climate of Britain is deteriorating by the increase of plantations. These, whether in masses or even in hedgerows, increase the evaporating surface, and consequently render the atmosphere more humid: an open country, he says, would be more dry, airy, and wholesome. This is, no doubt, correct; and, perhaps, some valleys and plains are more thickly studded with hedgerows and strips, than a strict regard to the culture of corn, or to the salubrity of the atmosphere, would justify; but the same objection will not apply to elevated situations and bleak hilly tracts, which every one allows are greatly improved by planting, both in climate, agricultural produce, and general effect.

6263. *Improving bad soils.* It certainly is not one of the least recommendations of planting," observes Poutey, "that it may be made to contribute essentially to the improvement of a bad soil, as is the case with sterile heaths and commons, where these masses, the consequences of the planting, set together in promoting such improvement. The first is, the shade of the trees, which, by decomposing the vegetable matter on the surface soil, renders it at once more fertile, and more easily penetrable by the roots. The second is, that by the decomposition of the annual fall of leaves, an addition is made to the vegetable soil, and that of the very best description. The third circumstance is, that as the roots collect a great deal of their support from a depth much lower than field vegetables usually reach, they convert the useless into useful. In short, instances are not wanting, where land previously producing little besides heath, has, after bearing a crop of trees, more especially firs, proved without further means very tolerable pasture." (*Practical Planter*, p. 231.) In the *Agricultural Report for Perthshire* (p. 243.), a heathy tract is referred to, between Cupar and Perth, containing 2000 acres, which, after being twenty years under a crop of Scotch firs, was profitably subjected to aridation.

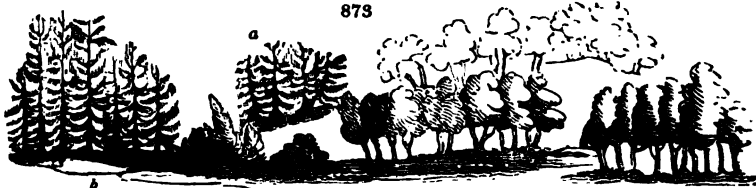
6264. *The shade of trees* is highly grateful to man, whether reposing under a single tree, or walking under the shade of a row, or in an avenue, grove, or woodland path. "Shelter," Sang observes, "is not more useful in cold seasons, than the shade of trees is gratifying to cattle in hot ones. In an exposed open field, under a burning sun, the torture which cattle often endure is truly distressing." (*Plant. Nat.*, p. 122.) In garden culture, shade is of great value; but walls are occasionally preferred to trees for this purpose; and next to walls, hedges or trees cut in the hedge manner.

6265. *The separation* produced by ligneous vegetables, in the form of hedges, is of long use in gardening, and of great and acknowledged importance in agriculture. In the latter art it may be considered as a criterion of improved culture; for when land lies intermixed, and is cultivated in what is called the common field manner, the want of sufficient individual interest precludes all extraordinary exertion, and the country so cultivated has the same appearance now, that it had many centuries ago. Even on entire properties lying open, the want of the power of separating and classing cattle, and regulating their mode of grazing, and protecting particular fields for particular purposes, &c., is found so great a disadvantage as to be quite incompatible with the practice of improved farming.

6266. *The seclusion* afforded by trees, either as hedges, rows, strips, or groups, to dwellings of limited surrounding territory, may be desired from taste, or rendered necessary by personal infirmity, political, local, or pecuniary circumstances. Trees, by their elevation and foliage, shut out external objects, and obstruct the gaze of the over-curious; while they leave the occupant in the centre of a little world of his own, in which he may enjoy himself in his own way.

6267. *The distinction* any sort of trees afford to a dwelling in a naked solitary country, or exotic species in one already wooded, is often desirable, as conveying cheerful and social ideas to the passing stranger, and procuring for the owner that applause for improvement which he feels to be his due. In extensive demesnes, the outlines or prominent parts of them may be indicated by particular sorts of trees; so as, from the house, or from a prospect tower, in a central part of the estate, to render the contour of the whole distinguishable. Where common, or any one kind of trees abound, uncommon or exotic kinds may be made use of; or a common tree, pruned in a particular way, will have an adequate effect.

6268. *To appropriate*, harmonise, or render apparently a part of a near estate, distant woody territory which does not belong to it, may be considered as a selfish principle under the disguise of a social one;



but it is, at all events harmless in a moral point of view, and is valuable as a device in improving the beauty of real landscape. Whatever may be the kinds of trees, or the forms in which they are planted in the distant or adjoining property, which we may wish to appropriate (*fig. 873. a a*); the

principle is, to plant the same sorts of trees in corresponding forms (§ 8), in the property which we can call our own.

6269. *The concealment of disagreeable objects by trees* is too obvious, useful, and universal an improvement to require being enlarged on. This is one of the most important uses to which they are applied in small demesnes in a populous country, or near large towns. The desire of shutting out the houses of others, and especially of our poorer neighbours, does not so much arise from dislike either to the objects or the inhabitants, as from a love of verdant scenery, and from a wish to have a country seat as much like the country as possible. The desire of shutting out manufactories, steam-engines, coal works, work-houses, &c., is still greater, because these objects excite ideas by no means in harmony with rural quiet; but no one ever thinks of shutting out a distant farm-house, solitary cottage, church, water-mill, bridge, monument, or ruin; for these are all interesting and agreeable objects, which are either characteristic of the country, or very generally occur there.

6270. *Trees heighten the effect of agreeable objects by associating or grouping with them; and thereby forming a more perfect whole.* Every whole consists of a number of parts, and the more varied the parts, provided they are allied among themselves, and not confused or redundant, the greater must be the effect of the whole. Trees contribute to the beauty of objects already beautiful, by lending to them new forms, new colours, and also varied light and shade; by their own motion; by inviting birds; and even by their smell. All these qualities are interesting to the moral and picturesque observer, and of great importance to the improver, whether he displays water, erects buildings, or harmonises rocks and mountains. A country house without trees is felt by every one to be but a part of a whole.

6271. *Trees may direct the eye to objects* that would otherwise escape notice, or whose beauties would be lost in a general view. By employing them in the foreground of a scene to shut out uninteresting distance or mere sky, the eye may be led to repose on some agreeable near, or interesting distant object, which it had before wandered over unnoticed. By this sort of indication, accompanied by a seat, the dome of St. Paul's at London, of St. Peter's at Rome, and the cupola of the Iwan Wilika of Moscow, are seen from the grounds of residences at twenty or thirty miles distant from those capitals; and in this way that poet of the feelings Shenstone pointed out the Wrekin, and church-spire of Halesowen, from the rustic path of the Leasowes.

6272. *Trees render indifferent objects interesting* when judiciously grouped with them, so as to seem to conceal, by accident, that which we should desire or imagine to be there. Thus, a fragment of a wall, or of a tower, emerging from a thicket, may, by imagination, be considered as an index to the main body of the ruined mansion or castle concealed by the wood. A broken Gothic arch emerging from a thick wood may seem the commencement of a cloister or the aisles of a ruined abbey. A large stone lying on a naked surface is an object of little interest in a picturesque point of view, but surrounded by a few trees and bushes, it may be taken for part of a stratum of rock. A few yards of brick wall, standing naked and bare in a field, would be considered as a deformity; partially cover it with ivy, which may first ascend and then mantle over its top, and add a holly or thorn, a briar, and an oak or ash, and a beautiful group is produced. In scenery, where great deformities or featureless extent is mixed with beauty or grandeur, trees will conceal the latter, and display the former to advantage. Ranges of naked mountains often present this kind of mixture of feature, dullness and want of grouping, which no improvement but planting could ameliorate and render tolerable. Glipin, in his *Tours to the Lakes and Highlands*, &c. has some excellent observations on this subject; and there are various instances in the Pentland and Grampian ranges of hills where improvements of this sort have been executed with the happiest effect.

6273. *Beauty may even be created by trees independently of all other objects.* A dull flat surface will be rendered more interesting by scattering a few trees over it, of any sort, and in almost any manner: but it may be grouped or massed by one, a few, or by many sorts; or laid out in avenues, stars, platoons, and other modern or ancient forms of planting, so as to become a scene of positive beauty. Every species of trees has its particular form, bulk, mode of growth, flowering, &c., which constitute its character; this character varies with the age of the tree, and its situation relative to other trees, or to soil, climate, &c. Now, as every tree may be grouped, or combined with those of its own species, or with any or all of the others, in an endless variety of ways, the beauty that may thus be created by trees alone can only be limited by the extent of surface on which they are to be grown.

6274. *The value of landed property containing plantations is enhanced prospectively by the various properties of trees.* "It is very generally known," Bang observes, "that such estates as have a quantity of well-arranged, healthy timber upon them, when brought to sale, bring an extra price, according to the quality and value of the wood, not only at the time of sale, but, counting forward on its value, to the period of its perfection. Thus, supposing the half-grown timber on an estate to be valued at ten thousand pounds at the time of the sale, instances are to be found where thirty thousand pounds have been given, over and above the valuation of the lands. The purchasers of such estates wisely foresee the increase of value which will arise from healthy timber growing where it may not only be cherished till of full maturity, but where, probably, it can then be turned to the best advantage by reason of its local situation. But, besides the real value of grown timber, there is most generally an ideal value attached to it, namely, that of its ornamental appearance" (*Plant. Ed.*, p. 124.) A landed proprietor, who is a parent, looks on a thriving plantation as capital laid out at compound interest, and on the most undoubted security, for the benefit of his offspring; and he values it in this respect the more, because no man can determine the ratio in which, from the progress of the trees, and the future prosperity of the country, it may increase in value. It does not happen to many to plant trees, and cut them down at a mature age; but this only renders planting a more interesting performance to the man who is in secure enjoyment of an estate; for in his full-grown trees he finds a link which connects him with his ancestors, and in his young plantations another which carries him down with his posterity to the next age.

SECT. III. Profits of Planting.

6275. *From the seemingly distant advantages of planting* has arisen the practice, by authors, of presenting statements of the profits, pleasures, and honours attending it, with a view to excite the selfish or patriotic feelings of their readers.

6276. *The profits of planting*, says Marshall, "are great, when properly executed, and this idea adds solidity to the enjoyment. Pleasure alone may satiate; but profit and pleasure united seldom fail of producing a lasting gratification." Every one who has the least taste for country matters must be alive to the agreeable and satisfactory feelings with which plantations are formed; and certainly there is something disinterested and respectable in incurring a present expense for what in most cases is to benefit a future generation; but as to the extraordinary profits, either of a near or far distant period, they are by no means to be depended on. With respect to the absolute profit to be derived from trees or plantations, considered independently, it is easy, by a calculation founded on seemingly very moderate data, to make the clear gain attending the raising of any crop appear considerable; and, accordingly, almost every speculative cultivator, whether of corn or trees, calculates on making a fortune in a very few years, as soon as he can get possession of a farm or a tract of waste. The truth is, however, that, though accidental circumstances may render it more profitable to cultivate one kind of crop, either of trees or corn, at one time and place rather than another; yet, on the whole, the profits of capital employed in any way in agriculture or planting must, on the general average, be nearly the same. The certain lapse of time which

must ever intervene between the planting of trees and their attaining a disposable size, must alone render any calculation made at the time of planting, extremely problematical. In planting, as in every other branch of culture, extraordinary profit is attended by extraordinary production, which soon sinks the market value of the article; add also, that, in a commercial, free, and highly-taxed country, whenever any article attains a very high price, substitutes are found at home, or imported from abroad; so that no particular crop should be considered as exclusively the best to cultivate, and no extraordinary profits ever calculated on from any crop. Plantations should be made with a joint view to all or part of the advantages which we have shown to be attendant on them; but no more ultimate profit calculated on, from the disposal of the trees, than what is expected from capital laid out on any other territorial improvement; indeed, the safest principle on which to act, is to consider capital employed in planting as on a par with that laid out in the purchase of landed property.

6277. *With respect to the value of trees as plantations, or in masses, that is entirely relative; and must be sought for in the additional value conferred on the adjoining lands by the improvement of their climate, or their beauty.* This sort of value cannot easily be subjected to any general rules of estimation; but unquestionably capital employed in planting and cultivating trees for such purposes, especially for the former, or when they are both united, may be considered as likely, in the end, to yield a greater interest than that employed in the ordinary routine of tree or corn culture. In bleak exposed situations, the advantages which have arisen from screen plantations have in some cases been so great as to be estimated at a third of the value of the land, and in every case where shelter is wanted they must be considerable. These, however, should be looked on by the prudent man rather in the light of extraordinary cases, attended by unforeseen risks, and, though depending chiefly on skill, yet in some degree also on chance.

CHAP. II.

Different Kinds of Trees and Plantations.

6278. Having considered the different objects for which trees and plantations are cultivated, our next step shall be to arrange *trees and plantations, according to their qualities, for fulfilling these objects.*

SECT. I. *Classification of Trees relatively to their Use and Effect in Landscape.*

6279. *Timber* is the grand object for which trees are cultivated, and it is either straight or crooked in form, large or small in dimension, hard, soft, or resinous in quality, brittle or flexible in texture, smooth or rough grained, and plain-coloured or variegated in appearance.

6280. *Straight timber* is chiefly produced by the pine and fir tribes, and such other trees whose lateral branches do not generally acquire a timber size, as the Lombardy poplar, hornbeam, deciduous cypress.

6281. *Crooked timber* may be produced by any branching tree; but chiefly by the oak, sweet chestnut, broad-leaved elm, walnut, &c.

6282. *Timber of large dimensions*, in regard to length, is produced by the spruce fir, larch, Lombardy poplar, ash, narrow-leaved elm; in regard to diameter by the oak, sweet chestnut, and elm; magnitudes in both dimensions is united in the narrow-leaved elm, beech, oak, and larch fir.

6283. *Timber of small dimensions* is produced by the yew, holly, thorn, ash, maple, laburnum, &c.

6284. *Timbers, hard in quality*, or, what are called the hard woods, are the oak, chestnut, sycamore, ash, beech, plane, walnut, box, holly, yew, &c. *Softer timbers*, or the soft woods, are the poplar, willow, lime, horsechestnut. *Resinous timbers* are the pine and fir tribes. *Brittle timber* is exemplified in acacia, hornbeam, and spindle tree; *flexible*, in the ash, broad-leaved elm, and chestnut; *smooth-grained*, in the lime, poplar, willow, hornbeam; *coarse-grained*, in the ash, oak, and chestnut; *plain-coloured*, in the willow, lime, holly; and *variegated*, in the yew, thorn, walnut, elm, plum, and many others.

6285. *Charcoal*, which contains the tannin principle, is an important product of trees. That which affords it in greatest quantity is the oak; and next, as far as chemists have yet ascertained, the Leicester willow (*Salix alba* var.), Spanish chestnut, ash, sloe, Lombardy poplar, hazel, elm, common willow, sycamore, beech, horsechestnut, birch, and larch. (*La Chém.*, &c., p. 68.)

6286. *Charcoal*, which is made from either branches, trunk, or roots, has been afforded by different trees at the following rates per cent. Laburnum, 24.5; chestnut, 23.2; oak, 22.6; walnut, 20.6; holly, beech, maple, 19.9; elm, 19.5; Norway pine, 19.2; willow, 18.4; ash, 17.9; birch, 17.4; Scotch pine, 16.4. (*La Chém.*, &c., p. 105.) Proust found the greatest proportion of charcoal to be afforded by the ash.

6287. *Ashes* have been afforded by the oak at the rate of 18; elm, 39; beech, 13; and poplar, 7 parts in 10,000. (*La Chém.*, &c., p. 113.)

6288. *For fuel and fencing.* The tendency of trees to produce lateral branches, and renew them when topped off, is an important quality, and exists in an eminent degree in the ash, elm, oak, willow, poplar, lime, &c.; but not at all in the pine and fir tribes, and but slightly in the plane, walnut, and some others. Those which grow most rapidly are also to be desired as fuel-trees, as the acacia, poplar, willow, in moist soils; and the larch fir, Scotch pine, and birch, on such as are dry. The *Adiantum glandulosa* may also be mentioned as a bulky and rapid-growing tree. On the chalky hills at Mererville (before the revolution one of the most extensive parks and magnificent seats in France), this tree thrives, and attains a considerable size, where few others will grow.

6289. *For hoops, basket-willows, besom-sprays, implement-handles, poles, &c.*, the renewal of trees or shrubs which have been cut down, or, technically speaking, their tendency to *stole* or shoot out from the collar, is an important consideration. This quality does not belong to the pine and fir tribes; and only slightly to the beech, sycamore, alder, plane, &c.; but liberally to all those mentioned above, and, indeed, to most trees not resinous. For the same objects, the tendency of trees to *send up suckers* or root-shoots, also deserves the attention of the planter. This never takes place with the resinous trees, and seldom with the oak, beech, chestnut, ash, plane, &c.; but it is general with the elm, poplar, acacia, prunus, pyrus, crataegus and some others.

6290. *For shelter*, rapid-growing and evergreen trees are desirable, as the Scotch pine; and such as are at the same time clothed with branches from the ground upwards, as the spruce fir; the best of all trees for shelter, unless the situation is very elevated. Among the deciduous trees, the fast-growing branchy sorts are most desirable, as the larch, birch, poplar, willow; in very elevated situations, the birch, mountain ash, and Scotch pine; exposed to the sea-breeze, the elder and sycamore. To maintain a branchy leafy screen from the ground upwards, intermix trees and shrubs which *stole*; or such as grow under the shade and drip of others, as the holly, hazel, dogwood, box, yew, &c. To produce shelter, and yet admit of the growth of grass below the trees, prune any sort to single stems, and use chiefly deciduous sorts. For an enumeration of the effects of sea breezes on trees, and of the kinds of trees and shrubs which best endure them, see *Gard. Mag.* vol. ix. p. 543-550, 715.

6201. *For shade*, close plantations are seldom desirable, a free circulation of air being necessary to coolness; therefore use trees with lofty stems and large heads, and prune them to single stems a certain height, as the oak, elm, chestnut, and beech, for thick shade; the plane, acacia, and poplar, for lighter shade; and the birch, balm of Gilead fir, and lime, for odoriferous shade; and avoid the walnut, elder, and laburnum, the atmosphere under which is reckoned deleterious.

6202. *For improving bad soils*, and for all the purposes of planting, the soil and situation, affected by or natural to trees, is an important study for the planter. Some are aquatic, or delight in moist situations near water, as most of the willow and poplar tribes, the alder and elder; others are mountain trees, as the Scotch pine, larch fir, mountain ash, sorb; some delight in valleys or plains, as the narrow-leaved elm, horsechestnut, plane, lime, oak; others, in craggy steepes and dells, as the ash, silver and spruce fir, most of the pines, and many more; some on chalky soils, as the beech; others on clays, as the oak; on sand, as the Scotch pine; and a few trees will grow in the most opposite situations and soils, as the alder, which is found on mountain tops and on the sea-shore; the birch on the highest mountains, on dry rocks, and on marshes. For the poorest soils, whether high or low, choose the birch, larch, and Scotch pine; and for the richest, the ash, elm, oak, chestnuts, limes, poplars, and willows.

6203. *For the purposes of the separation of, or defence from, the inferior animals*, the plantations called hedges, or close rows of shrubs, are adopted; when these are to be low, such shrubs as send out numerous branches from the root upwards, and are of great durability, are most desirable; as the holly among evergreens; and the hawthorn, sloe, crab, beech, buckthorn, and hornbeam, among deciduous sorts. For moist situations, the alder, elder, birch, and willow, are to be preferred; and for dry upland sites, the juniper, whin, birch, and elder: avoid poisonous trees, as the yew. For tall or tree hedges, such trees as the elm, beech, hornbeam, lime, birch, and spruce fir, are desirable; but the holly excels all other plants for a hedge, whether low or tall, and is liable to no other objection than its slow growth, which occasions a considerable expense in protecting it till it is able to serve for defence.

6204. *For seclusion and concealment*, branchy leafy trees, a number of which have been mentioned in § 6200, are obviously desirable; and, for distinction, either sorts different from what are already there, or ordinary sorts pruned and made to assume extraordinary forms.

6205. *For the various purposes of ornament, beauty, or effect*, in landscape, the hardy trees may be arranged as to magnitude, form, mode of growth, duration, and expression.

6206. *Magnitude*. Trees of great height are, the English elm, ash, larch, Carolina poplar, &c.; but the laburnum, mountain ash, and evergreen oak, are very low trees. A medium in height may be found in the maple, pine, and birch. Some trees exceed in breadth, as the oak, sweet chestnut, and Scotch elm; others of different heights are very slender, as the Lombardy poplar, cypress, and bird-cherry.

6207. *Form*. The oak and sweet chestnut afford the most irregular and picturesque shapes, with round heads; the English elm and ash have long narrow forms, and round heads; the beech and horsechestnut, compact ovate forms, with obtuse heads; the spruce and pine tribes, in general, have conical shapes, and pointed spire tops; the Lombardy poplar, cypress, and most willows, have long narrow shapes, and oblong tops.

6208. *Colour*. The Scotch pine, yew, and horsechestnut, are dark green; the larch and elm, a yellow-green; the albe, Huntington willow, a silvery green, &c.

6209. *Moss and time of growth*. The nature of some trees is to lose their lower branches as they increase in height, as the fir tribe; and others have a tendency to retain them, as the wych elm. In some the branches descend, and often recline on the ground, as the lime tree and platanus. Some are very compact in their foliage, as the horsechestnut; others very open, as the ash and acacia. Some have drooping spray, as the weeping willow; that of others tend upwards, as in the Lombardy poplar; horizontally, as in the oak; and obliquely, as in the Scotch pine. Some grow with rapidity, as the Carolina and Athenian poplars; others very slowly, as the oak, and the stone pine.

6200. *Duration*. The most durable of European trees is the oak; the least so, some of the poplar and fir tribes. A medium is to be found in the elm and lime.

6201. *Expression*. Some trees convey ideas of utility in the arts, and mark the attention and industry of man, as having planted them for this purpose, as the oak, ash, elm, &c. Others are known, or supposed, to be of little use, and convey ideas of neglect or of wildness, as the hornbeam, sorb, trembling poplar, &c. Some indicate general improvement and artificial plantations, as the larch, and spruce fir; others, garden-scenery or plantations near a house, as the cedar, stone pine, and platanus. Some indicate rich deep soil, as the oak; and rich thin soil, as the elm; others, chalk or gravel, as the beech; rocky ground, as the ash; marshy ground, as the alder; the proximity of water, as the willow. There are also natural expressions belonging to trees, partly from general, and partly from accidental association; as strength and stability to the oak, ease and elegance to the birch, sweetness to the lime, gloom to the cypress and yew, melancholy to the weeping-willow, &c.

6202. *The common hardy shrubs* may be similarly arranged; but it will be sufficient to class them according to magnitude, mode of growth, evergreen, deciduous, native, naturalised, and exotic.

6203. *Magnitude*. Some shrubs are high, approaching to the character of trees, as the crataegus and common holly; others very low, as the butcher's broom and dwarf-birch.

6204. *Mode of growth*. Some are creepers, as the ivy; climbers, as the virgin's bower; trailers, as the bramble; compact forms, as that of the arbor vite; open airy branches, as in the tamarak; and singular branches, as those of the stagbhorn-sunach. Some, as shrubs, soon acquire picturesque shapes, as the thorn, holly, and elder. Some are evergreens, as the holly, laurel, yew, laurustinus, arbutus, &c.

6205. *Deciduous*, as the guelder-rose, lilac, syringa, &c.

6206. *Native*, as the holly, privet, hazel, thorn, briar, &c.

6207. *Naturalised*, as the rose, syringa, lilac, laburnum, &c.

6208. *Exotic*, or foreign, as the rhododendron, azalea, &c.

6209. These arrangements as to the effect of trees and shrubs in landscape, as far as form, magnitude, mode of growth, and expression are concerned, refer to plants growing detached from other trees, and as nearly full-grown. It is less intended to comprehend every characteristic distinction than to suggest to the garden artist, as such, the principal light in which he ought to view trees and shrubs. Nor could he with confidence attempt planting, with even such a knowledge as could be obtained from the above arrangement, completed by inserting all the names under their proper heads; for unless he has seen the majority of the full-grown trees himself, both singly and connected in groups and masses, and is acquainted with the comparative rapidity of their growth in different climates and soils, he cannot well foresee the result of his labours, or look forward "with the prophetic eye of taste" to certain beauty. Of this there are numerous proofs, arising from the unjust preference given to exotics of unknown shapes and duration, in situations where the general form and situation of the tree, or even of one or two trees, is of the utmost consequence to the effect of a whole. How frequently on a lawn, or in a plantation near a house, do we see acacias, cut-leaved alders, variegated sycamores, &c., where the oak, cedar, platanus, beech, lime, or chestnut would have produced a much more impressive general effect!

SECT. II. Classification of Plantations, or Assemblages of Trees.

6310. *Assemblages of trees*, whether natural or artificial, differ in extent, outline, disposition of the trees, and kind of tree.

6311. In regard to *extent*, the least is a group (§ 874. e and d), which must consist at least of two plants; larger, it is called a thicket (b c); a round and compact, it is called a clump (a); still larger, a

mass; and all above a mass is denominated a wood or forest, and characterised by comparative degrees of largeness. The term wood may be applied to a large assemblage of trees, either natural or artificial; forest, exclusively to the most extensive or natural assemblages.



6312. *With respect to the outline, or ground-plan of a plantation, the simplest disposition is that of a row or line, which may be either straight or crooked, as in hedges, or lines of trees; next that of any determinate shape, as round, exemplified in the clump; square, in the platoon; oblong, in either clump or platoon, and in stripes, screens, or belts; irregular or indeterminate, in thickets, masses, and all larger plantations.*

6313. *With respect to the disposition of the trees within the plantation, they may be placed regularly in rows, squares, parallelograms, or quincunx; irregularly in the manner of groups; without undergrowths, as in groves; with undergrowths, as in woods; all undergrowths, as in copsewoods. Or they may form avenues, double avenues, avenues intersecting in the manner of a Greek cross, of a St. Andrew's cross, of a star, or of a duck's foot (patte d'oie.) They may form regular glades, or irregular glades; glades, as niches or cabinets, as open squares; glades, as squares en berceaux, or as squares en salons and en allée.*

6314. *With respect to the character of tree plantations, they may be as various as there are species; but for general effect and designation, woody plants are classed as large or small, trees or undergrowths, deciduous or evergreen, round-headed or spiry-topped; and plantations of every form and disposition may be planted with these, either separately or mixed. Thus we have groups of shrubs, groups of high and low growths, and of trees; plantations of round-headed and spiry-topped trees mixed; of trees and undergrowths; or of low growths only, as in copsewoods and osier plantations.*

CHAP. III.

Formation of Plantations, in which Utility is the principal Object.

6315. *The formation of useful plantations embraces the situation, soil, form, species of tree, fencing, and other considerations.*

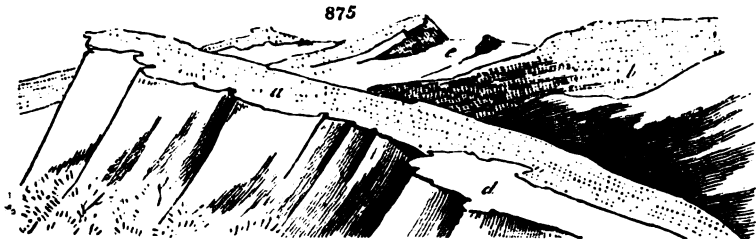
6316. *A sheltered situation and deep rich soil would be the most proper, if the object of the planter was to obtain the greatest bulk of timber in the shortest time; but this would not be profitable planting, for such a soil would, in all probability, have made greater returns under common farming. The profits of planting do not depend on the absolute quantity of timber produced, but on that quantity relatively to the value of the soil for agricultural purposes. Such situations and soils as can be profitably subjected to aration or permanent pasture, will rarely be found to yield an equal profit if planted with trees. Suppose a piece of ground to let at 20s. per acre for pasture or arable, to be planted at an expense of only 10s. per acre; then, in order to return the rent, and 5s. per cent. for the money expended, it ought to yield 30s. a year; but as the returns are not yearly, but say at the end of every fifteen years, when the whole may be cut down as copse, then the amount of 30s. per annum, at 5s. per cent. compound interest, being 53s. 4s. every fall of copse made at the interval of fifteen years, ought to produce that sum per acre clear of all expenses. Hence, with a view to profit from the fall of timber or copsewood, no situation capable of much agricultural improvement should be planted, unless a certain part is done so with a view of sheltering the rest; or for the purposes of separation and fencing.*

6317. *Whatever may be the nature of the soil, the subsoil ought to be rendered dry if the plants are intended to thrive. Large open drains may be used, where the ground is not to undergo much preparation; but where it is to be fallowed or trenched, under-drains become requisite. It is true, these will in time be choked up by the roots of the trees; but by that period, as no more culture will be requisite, they may be opened, and left open. Many situations, as steep sides of hills and rocky irregular surfaces, do not admit of preparing the soil by commination previously to planting; but wherever that can be done, either by trenching, digging, or a year's subjection to the plough, it will be found amply to repay the trouble. This is more especially requisite for stripes for shelter or hedgerows, as the quick growth of the plants in these cases is a matter of the utmost consequence. The general mode of planting hedges by the side of an open drain renders preparation for them, in many cases, less necessary; but for stripes, wherever it is practicable, and there is at the same time no danger of the soil being washed away by rains or thaws, as in some chalky hilly districts; or blown about by the wind, as in some parts of Norfolk, and other sandy districts, preparation by a year's fallow, or by trenching two spits deep, cannot be admitted without real loss, by retarding the attainment of the object desired. There are instances stated of promising oak plantations from oaks dibbled into soil altogether unimproved; and of plantations of Scotch pine, raised by merely sowing the seeds on a heath or common, and excluding cattle (*Gen. Rep. of Scot., vol. ii. p. 369.*); but these are rare cases, and the time required, and the instances of failure, are not mentioned. The practice is obviously too rude to be recommended as one of art. The best situations for planting, without any other culture but inserting the seeds or plants, are surfaces partially covered with low woody growths, as broom, furze, &c. "The ground which is covered, or rather half covered, with juniper and heath," says Buffon, "is already a wood half made."*

6318. *Osier plantations are an exception to these remarks, as to the value of the situation and soil; they require a deep, strong, moist soil, but one not springy, or continually saturated with water; and it will be in vain to plant them without trenching it two or more feet deep.*

6319. *The form of plantations for profit or shelter must be determined jointly by the situation and the objects in view. In rocky abrupt sites (*fig. 875.*), the plantation will consist of a number of masses (*a, b, c.*), of forms determined by the rocks and precipices, among which some of the most valuable pasture may be left as glades (*d, e.*), for use, effect, and for the sake of game. Strips and hedges for sheltering or separating arable lands, should be formed as much as possible in straight and parallel lines, in order not to increase the expense of tillage by short and irregular turnings. Straight parallel stripes, on irregular surfaces, have a more varied appearance at a distance, than stripes ever so much varied on a flat surface; for, in the former case, the outline against the sky is varied as much as that on the earth. In extensive hilly pastures, in which it is often desirable to produce shelter, and at the same time to plant only the most rocky and unproductive spots, the forms may be of the most irregular description; and by planting chiefly on the eminences and slopes (*fig. 875.*), shelter will be most effectually produced, the pasture improved, the least*

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valuable ground rendered productive in copse or timber, and the greatest richness and picturesque beauty conferred on the landscape. There are some fine examples of this on the hilly districts of Fifehire; there, on many estates where nothing was sought for but profit and shelter, the greatest beauty has been produced; and the picturesque tourist now passes through glades and valleys, pastured by well-fed cattle and sheep, enlivened by rocks, thickets, hanging woods, and occasional hills and lakes. Fifty years ago, scarcely a tree was to be seen, and only the most inferior descriptions of live stock.

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paling, or line of posts and rails (a), the plant the bottom of the drain, backed by the earth, thrive, and scarcely ever require cleaning from

6320. *The enclosing of plantations is too essential a part of their formation to require enlarging on.* In all those of small extent, as hedges and strips, it is the principal part of the expense; but to plant in these forms, or any other, without enclosing, would be merely a waste of labour and property. The sole object of fencing being to exclude the domestic quadrupeds, it is obvious, that whatever in the given situation, is calculated to effect this at the least expense, the first cost and future repairs or management being taken into consideration, must be the best. Where stones abound on the spot, a wall is the best and cheapest of all fences as such; but, in the great majority of cases, recourse is obliged to be had to a verdant fence of some sort, and generally to one of hawthorn. This being itself a plantation, requires to be defended by some temporary barrier, till it arrives at maturity; and here the remark just made will again apply, that whatever temporary barrier is found cheapest in the given situation will be the best. Hedge fences are in general accompanied by an open drain, which, besides acting in its proper capacity, furnishes, at its formation, a quantity of soil to increase the pasturage of the hedge plants; and an excavation (Fig. 877. a), and an elevation (f), to aid in the formation of a temporary fence. A hedge enclosing a plantation requires only to be guarded on the exterior side; and, of the various ways in which this is done, the following may be reckoned among the best and most generally applicable. By an open drain and

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a temporary hedge of furze sown on its summit, and the permanent hedge of thorn or holly within (d); and an open drain but on the inside, the exterior being protected by a steep bank sown with furze (e). (See *Gard. Mag.*, vol. v. p. 42, 43; and 270.) The first of these modes is the most general, the second the best, and the fourth the cheapest, where timber is not abundant. Separation fences are commonly formed in the first, second, or third manner, but with a paling on both sides.

6321. *Shelter.* Many situations are so exposed that it is extremely difficult to rear trees without some mode of procuring shelter for them during their early growth. This is obtained either by walls, the extent of whose influence is only limited; by thick planting, or by planting the more hardy and rapid-growing species, to nurse up and protect such as are more tender, but ultimately more valuable. The proportion of nurses to principals is increased according to the bleakness of the site. Pontey says, "both authors and planters are in the habit of erring egregiously, in regard to the proportion of principals and nurses; as they generally use as many, or more, of the former than the latter; though it is very easy to show, that they ought to use three times as many of the latter as the former. For instance, when trees are planted at four feet apart, each occupies a surface of sixteen feet; of course, four of them will occupy sixty-four, or a square of eight feet; and therefore, if we plant three nurses to one principal tree, all the former might be displaced gradually, and the latter would still stand only eight feet apart. Nurse plants should, in every possible case, be such as are most valuable at an early period of growth. The larch and spruce fir should be used liberally, in every case where they will grow freely; still it is not intended that they should exclude all others, more particularly the birch, which has most of the properties of a good nurse, such as numerous branches and quick growth, on any tolerable soil or situation. It is not, however, like the others, a wood of general application." (*Profitable Planter*, p. 113.) Sang also adopts the proportion of three nurses to one principal, and employs chiefly the resinous tribe, and looks to them for reimbursement till the hard timber has attained to a foot in diameter, under which size hard timber is seldom of much value. His principals are planted at from six to ten feet apart, according to the soil and situation. (*Plant. Kal.*, p. 166.)

6322. In procuring shelter, much depends on the mode of commencing and continuing plantations on bleak sites. Sang, who has had extensive experience on this subject, observes, that "every plain, and most fields and situations for planting, in this country, have what may be called a windward side, which is more exposed to the destructive blast than any other. It is of very great importance to be apprised of this circumstance; and to be able to fix upon the most exposed side of the proposed forest plantation

top of the elevation (c); no open drains, but the soil being a loam, the surface-turfs formed into a narrow ridge, to serve as a paling,

Fix, then, upon the windward side of the plain which is to be converted into a forest; mark off a horizontal stripe, or belt, at least a hundred yards in breadth. Let this portion of ground be planted thick, say at the distance of thirty inches, or at the most three feet, with a mixture of larch, sycamore, and alder, in equal quantities, or nearly so, if the soil be adapted for rearing these; but if it be better adapted for Scotch pines, then let it be planted with them at the distances prescribed for the above mixture. We have no other kinds that will thrive better, or rise more quickly in bleak situations, than those just mentioned. When the trees in this belt, or zone, have risen to the height of two feet, such hard-wood trees as are intended ultimately to fill the ground should be introduced, at the distance of eight or ten feet from each other, as circumstances may admit. At this period, or perhaps a year or two afterwards, according to the bleak or exposed situation of the grounds, let another narrow belt, or zone, of nearly equal breadth, be added to the one already so far grown up, and so on, till the whole grounds be covered. It is not easy here to determine on the exact breadth of the subsequent belts or zones: this matter must be regulated by the degree of exposure of the grounds, by the shelter afforded by the zone previously planted, and by such like circumstances." (*Plant. Kal.* p. 29.)

6322. *In situations exposed to the sea breeze* a similar plan may be successfully followed, and aided in effect by beginning with a wall: the first belt having reached the height of the wall, plant a second, a third, and fourth, and so on till you cover the whole tract to be wooded. In this way the plantations on the east coast of Mid-Lothian, round Gosford House, were reared; and in Sang's manner, the mountains of Blair and Dunkeld were clothed; and examples, we are informed, might be drawn even from the Orkney and Shetland Islands. In France the planster is very generally employed on the sea shore, either as a nurse for other trees, or as the principal or sole tree planted. Mr. Rusger recommends the same tree to be employed in the most exposed parts of the British coast. After ploughing or digging the ground, he would plant the plansters in rows five feet apart, and in three years after insert the timber trees between them. If these timber trees were planted at the same time as the plansters, they would soon become stunted and good for nothing. (*See Gard. Mag.*, vol. x.)

6324. *The species of tree to be planted* must ever depend chiefly on the situation and soil, but partly also on the sort of product desired as the most profitable, and on the importance attached to shelter. As a general principle it may be observed, that the tree which will thrive the best, will turn out the most profitable: for, though its timber may not be of the highest-priced kind, yet there will be quantity as compensation for inferior quality. In rocky irregular surfaces there is generally great variety of situation and depth of soil; and here a corresponding variety of trees may be introduced, and the more valuable sorts, as the oak, ash, elm, poplar, &c., will nowhere thrive better than at the foot of precipices, and in narrow dells and other situations, where there is at once shelter and a good depth of soil. The thriving of trees and plants of every kind, indeed, depends much more on the quantity of soil available, and its state in respect to water and climate, than on its constituent principles; moderately sheltered, and on a dry subsoil, it signifies little whether the surface stratum be a clayey, sandy, or calcareous loam; and all the principal trees will thrive nearly equally well in either so circumstanced; but no tree whatever in these, or in any other soil saturated with water, and in a bleak exposed site. For hedgerow timber, those kinds which grow with lofty stems, which draw their nourishment from the subsoil, and do least injury by their shade, are to be preferred. These, according to Blakie, are oaks, narrow-leaved elm, and black Italian poplar; beech, ash, and fir, he says, are ruinous to fences, and otherwise injurious to farmers. (*On Hedges and Hedgerow Timber*, p. 10.)

6325. The common practice in planting is to mix different species of trees together, which is unavoidable where nurse or shelter plants are introduced: where these are not wanted, the opinions of planters are divided on the subject. Mixing different sorts is most generally approved of. Marshall advises mixing the ash with the oak, because the latter draws its nourishment chiefly from the subsoil, and the former from the surface. Nicol is an advocate for indiscriminate mixture (*Practical Planter*, p. 77.); and Ponsy says, "both reason and experience will fully warrant the conclusion, that the greatest possible quantity of timber is to be obtained by planting mixtures." (*Prof. Planter*, p. 119.)

6326. Sang is "clearly of opinion, that the best method is to plant each sort in distinct masses or groups, provided the situation and quality of the soil be properly kept in view. There has hitherto been too much random work carried on with respect to the mixture of different kinds. A longer practice, and more experience, will discover better methods in any science. That of planting is now widely extended; and improvements in all its branches have been introduced. We, therefore, having a better knowledge of soils, perhaps, than our forefathers had, can, with greater certainty, assign to each tree its proper station. We can, perhaps, at sight, decide, that here the oak will grow to perfection, there the ash, and here again the beech; and the same with respect to the chestnut, the walnut, or the sweet chestnut, as the place of such a quality, that it may be said to be equally adapted for the oak, the walnut, or the sweet chestnut, it will be proper to place such in it, in a mixed way, as the principals; because each sort will extract its own proper nourishment, and will have an enlarged range of pasturage for its roots, and consequently may make better timber trees. Although by indiscriminately mixing different kinds of hard-wood plants in a plantation, there is hardly a doubt that the ground will be fully cropped with one kind or other, yet it very often happens, in cases where the soil is evidently well adapted to the most valuable sorts, as the oak perhaps, that there is hardly one oak in the ground for a hundred that ought to have been planted. We have known this imperfection in several instances severely felt. It not unfrequently happens, too, that even what oaks, or other hard-wood trees, are to be met with, are overtopped by less valuable kinds, or perhaps such, all things considered, as hardly deserve a place. Such evils may be prevented by planting with attention to the soil, and in distinct masses. In these masses are insured a full crop, by being properly nursed, for a time, with kinds more hardy, or which afford more shelter than such hard wood plants. There is no rule by which to fix the size or extent of any of these masses. Indeed, the more various they be made in size, the better will they, when grown up, please the eye of a person of taste. They may be extended from one acre to fifty or a hundred acres, according to the circumstances of soil and situation: their shapes will accordingly be as various as their dimensions. In the same manner ought all the resinous kinds to be planted, which are intended for timber trees; nor should these be intermixed with any other sort, but be in distinct masses by themselves. The massing of the larch, the pine, and the fir of all sorts, is the least laborious and surest means of producing good, straight, and clean timber. It is by planting, or rather by sowing them in masses, by placing them thick, by a timely pruning and gradual thinning, that we can, with certainty, attain to this object." (*Plant. Kal.* p. 163, 166.)

6327. *Our opinion* is in perfect consonance with that of Sang, and for the same reasons; and we may add, as an additional one, that in the most vigorous natural forests one species of tree will generally be found occupying almost exclusively one soil and situation, while in forests less vigorous, on inferior and on watery soils, mixtures of sorts are more prevalent. This may be observed in comparing New Forest with the natural woods round Lochlomond, and it is very strikingly exemplified in the great forests of Poland and Russia.

6328. *Whether extensive plantations should be sown or planted*, is a question about which planters are at variance. Miller says, transplanted oaks will never arrive at the size of those raised where they are to remain from the acorn. (*Dict. Quercus*.) Marshall prefers sowing when the ground can be cultivated with the plough. (*Plant. and Rev. Orn.*, vol. i. p. 123.) Evelyn, Emmerich, and Speeschy are of the same opinion; Ponsy and Nicol practise planting, but offer no arguments against sowing where circumstances are suitable. Sang says, "It is an opinion very generally entertained, that planted timber can never, in any case, be equal in durability and value to that which is sown. We certainly feel ourselves inclined to support this opinion, although we readily admit that the matter has not been so fully established, from experiment, as to amount to positive proof. But although we have not met with decided

evidence, to enable us to determine on the comparative excellence of timber raised from seeds, without being replanted, over such as have been raised from replanted trees, we are left in no doubt as to the preference, in respect of growth, of those trees which are sown, over such as are planted." (*Plant. Kal.*, p. 43.) He particularly prefers this mode for raising extensive tracts of the Scotch pine and the larch (p. 430.), and is decidedly of opinion, "that every kind of forest tree will succeed better by being reared from seeds in the place where it is to grow to maturity, than by being raised in any nursery whatever, and from thence transplanted into the forest." (p. 344.) Dr. Yule (*Calcd. Hort. Mew.*, vol. II.), in a long paper on trees, strongly recommends sowing where the trees are finally to remain. "It is," says he, "a well-ascertained fact, that seedlings allowed to remain in their original station will, in a few seasons, far over-top the common nursed plants several years older."

6329. *The opinion of Dr. Yule, and in part also that of Sang, seems to be founded on the idea that the tap-root is of great importance to grown-up trees, and that, when this is once cut off by transplanting, the plant has not a power of renewing it.* That the tap-root is of the utmost consequence for the first three or four years is obvious from the economy of nature at that age of the plant; perhaps for a longer period; but that it can be of no great consequence to full-grown trees, appears highly probable from the fact, that when such trees are cut down, the tap-root is seldom to be distinguished from the others. The opinion that young plants have not the power of renewing their tap-root, will, we believe, be found inconsistent with fact; and we may appeal to Sang and other nurserymen, who raise the oak and horsechestnut from seed. It is customary, when these are sown in drills, to cut off their tap-roots without removing the plants at the end of the second year's growth, and when at the end of the third or fourth year they are taken up, they will be found to have acquired others, not indeed so strong as the first would have been had they remained, but sufficient to establish the fact of the power of renewal. We may also refer to the experiment recorded by Forsyth, which at once proves that trees have a power of renewing their tap-roots, and the great advantages from cutting down trees after two or three years' planting. Forsyth "transplanted a bed of oak plants, cutting the tap-roots near to some of the side roots or fibres springing from them. In the second year after, he headed one half of the plants down, and left the other half to nature. In the first season, those headed down made shoots six feet long and upwards, and completely covered the head of the old stem, leaving only a faint cicatrix, and produced new tap-roots upwards of two feet and a half long. The other half of the plants that were not headed, were not one fourth the size of the others. One of the former is now eighteen feet high, and fifteen inches in circumference, at six inches from the ground: one of the largest of the latter measures only five feet and a half in height, and three inches and three quarters in circumference, at six inches from the ground." (*Ty. on Fruit Trees*, 4to edit. p. 144.) The pine and fir tribes receive most check by transplanting; and when removed at the age of four or five years, they seldom arrive at trees afterwards; those we should, on most occasions, prefer to sow, especially on mountainous tracts. But for all trees which stole, and in tolerable soils and situations, planting strong plants, and cutting them down two or three years afterwards, will, we think, all circumstances considered, be proved preferable to sowing.

6330. *On the subject of disposing the plants in plantations, there are different opinions; some advising rows, others quincunx, but the greater number planting irregularly.* According to Marshall, "the preference to be given to the row, or the random culture, rests in some measure upon the nature and situation of the land to be stocked with plants. Against steep banks, where the plough cannot be conveniently used in cleaning and cultivating the interspaces, during the infancy of the wood, either method may be adopted; and if plants are to be put in, the quincunx manner will be found preferable to any. But in more level situations, we cannot allow any liberty of choice: the drill or row manner is undoubtedly the most eligible." (*Plant. and Rur. Orn.*, p. 123.) Pontey considers it of much less consequence than most people imagine, whether trees be planted regularly or irregularly, as in either case the whole of the soil will be occupied by the roots and the surface by the shoots. Sang and Nicol only plant in rows where culture with the horse-hoe is to be adopted. In sowing for woods and copes, the former places the patches six feet asunder and in the quincunx order. "It has been demonstrated (*Farmer's Mag.*, vol. vii. p. 408.), that the closest order in which it is possible to place a number of points, upon a plain surface, not nearer than a given distance from each other, is in the angles of hexagons with a plant in the centre of each hexagon. Hence it is argued, that this order of trees is the most economical; as the same quantity of ground will contain a greater quantity of trees, by 15 per cent., when planted in this form, than in any other." (*Gen. Rep.*, vol. II. p. 287.) It is almost needless to observe, that hedge plants should be placed at regular distances in the lines, and also the trees, when those are introduced in hedges. Osler-plantations, and all such as, like them, require the soil to be dug every year, or every two years, during their existence, should also be planted in regular rows.

6331. *Planting in rows at regular distances between the rows, and in the row, ought in our opinion to be adopted in all plantations where the main object is profit; unless there be something in the soil, surface, or locality which renders this impracticable.* It is only by planting in rows that a master can give instructions to common workmen for managing a plantation systematically. By planting a certain proportion of nurseries, or of temporary trees, alternating in any given manner in each row with those trees which are to be permanent, instructions can be laid down, when the plantation is formed, how it is to be managed during the whole period of its existence. (See *Lawrence in Gard. Mag.*, vol. x. p. 26.)

6332. *The distances at which the plants are placed must depend on different circumstances, but chiefly on the situation and soil.* Planting thick, according to Nicol, is the safer side to err on, because a number of plants will fall, and the superfluous ones can be easily removed by thinning. "For bleak situations," he observes, "that from thirty to forty inches is a good medium, varying the distance according to circumstances. For less exposed situations, and where the soil is above six inches in depth, he recommends a distance from four to five feet. For belts, clumps, and strips, of a diameter of about one hundred feet; the margin to be planted about the distance of two feet, and the interior at three feet. In sheltered situations of a deep good soil, he recommends a distance of six feet, and no more." (*Pract. Plant.*)

6333. *According to Sang, "the distances at which hard timber trees ought to be planted are from six to ten feet, according to the quality of the soil, and the exposed or sheltered situation.* When the first four oaks are planted, supposing them at right angles, and at nine feet apart, the interspaces will fall to be filled up with five nurseries, the whole standing at four feet and a half asunder. When sixteen oaks are planted, there will necessarily be thirty-three nurseries planted; and when thirty-six oaks are planted, eighty-five nurseries; but when a hundred principal trees are planted in this manner, in a square of ten on the side, there will be two hundred and sixty-one nursery plants required. The English acre would require five hundred and thirty-six oaks, and one thousand six hundred and ten nurseries." (*Plant. Kal.*, p. 163.) Pontey says, "In general cases, a distance of four feet is certainly close enough; as at that space the trees may all remain till they become saleable as rails, spars, &c."

6334. *The number of plants which may be planted on a statute acre = 160 rods, or poles, = 4840 yards = 43,560 feet, is as follows:—*

Feet apart.	No. of Plants.	Feet apart.	No. of Plants.	Feet apart.	No. of Plants.
1	43,560	6	1,210	15	193
1 1/2	19,500	7	869	16	170
2	10,890	8	680	17	149
2 1/2	6,959	9	537	18	134
3	4,940	10	435	19	120
3 1/2	3,556	11	360	20	108
4	2,722	12	302	21	98
4 1/2	2,151	13	257	22	89
5	1,742	14	222	23	81

6335. *The site of the plants depends jointly on the site and the kind of tree; it is universally allowed that none of the valuable tribes succeed well when removed at four or more years' growth; but if the soil is of tolerable quality, prepared by digging or summer pitting, and the site not bleak, plants of such hard woods as stole may be used whose stems are an inch or more in diameter.*

6336. *Nicol is of opinion "that, generally, trees three, or at most four, years old from the seed, and which are from twelve to twenty-four inches high, will, in any situation or soil, outgrow those of any size under eight or ten feet, within the seventh year."* (*Pract. Plant.*, p. 130.)

6337. *Sang observes, "The size of plants for exclusive plantations must, in some measure, depend on their kinds; but it may be said, generally, that the plants being transplanted, they should be from a foot to eighteen inches in height, stiff in the stem, and well rooted. Plants for this purpose should seldom be more than three years from the seed; indeed, never, if they have been raised in good soil. Many of them may be sufficiently large at two years from the seed; and if so, are to be preferred to those of a greater age, as they will consequently be more vigorous and healthy. The larch, if properly treated, will be very fit for planting out at two years of age. A healthy seedling being removed from the seed-bed at the end of the first year, into good ground, will, by the end of the second, be a fitter plant for the forest, than one nursed a second year. The next best plant for the purpose is that which has stood two years in the seed-bed, and has been transplanted for one season. This is supposing it to have risen a weakly plant, for, if the larch rise strong from the seed the first season, it should never stand a second in the seed-bed. The ash, the elm, and the sycamore, one year from the seed, nursed in good soil for a second season, will often prove sufficiently strong plants. If they be weakly, they may stand two years in the seed-bed; and then being nursed one season in good soil, will be very fit for planting out in the forest. The oak, the beech, and the chestnut, if raised in rich soil, and well furnished with roots at the end of the first year, and having been nursed in rows for two years, will be very fit to be planted out. But if they be allowed to stand two years in the seed-bed, and be planted one year in good ground, they will be still better, and the roots will be found well feathered with fine small fibres. The silver fir and common spruce should stand two years in the seed-bed. If transplanted into very good soil, they may be fit for being planted out at the end of the first year; but, more generally, they require two years in the lines. Scotch pines should also stand two years in the seed-bed, and should be nursed in good ground for one year; at the end of which they will be much fitter for being planted, than if they were allowed to stand a second year in the lines. They are very generally taken at once from the seed-bed; and in hard bare of heath or herbage, they succeed pretty well; nevertheless, we would prefer them one year nursed. The above are the hardy and most useful forest trees; and from the observations made, whatever respects the age or size of other kinds, may easily be inferred."* (*Plant. Kal.*, p. 136.)

6338. *According to Poutey, "the best general rule is, to proportion the size of the plants to the goodness of the soil; the best of the latter requiring the largest of the former. Still on bleak exposures this rule will not hold good, as there the plants should never be large, for otherwise the greater part would fall from the circumstance of wind-waving, and of those that succeeded, few, if any, would make much progress for several years; firs of a foot, and deciduous trees of eighteen inches, are large enough for such places. As in extensive planting, soils which are good and well sheltered but seldom occur, the most useful sizes of plants, for general purposes, will be firs of a foot, and deciduous trees of eighteen inches, both transplanted. None but good-rooted plants will succeed on a bad soil, while on a good one, sheltered, none but very bad-rooted plants will fail; a large plant never has so good a root, in proportion to its size, as a small one; and hence we see the propriety of using such on good soils only. Small plants lose but few of their roots in removal; therefore, though planted in very moderate-sized holes of pulverized earth, soon find the means of making roots, in proportion to their heads. It should never be forgotten, that, in being removed, a plant of two feet loses a greater proportion of its roots than a tree of one, and one of three feet a greater proportion than one of two, and so on, in proportion to its former strength, and height; and thus, the larger the plants, so much greater is the degree of languor or weakness into which they are thrown by the operation of transplanting."* (*Prof. Plant.*, p. 161.)

6339. *The seasons for planting are autumn and spring; the former, when the soil and situation are moderately good, and the plants large; and the latter, for bleak situations. Necessity, however, is more frequently the guide here than choice, and in extensive designs, the operation is generally performed in all moderately dry open weather from October to April inclusive. "In an extensive plantation," Sang observes, "it will hardly happen but there will be variety of soil, some parts moist and heavy, and others dry and light. The lightest parts may be planted in December or January; and the more moist, or damp parts, in February or March. It must be observed, however, that if the ground be not in a proper case for planting, the operation had better be delayed. The plants will be injured, either by being committed to the ground when it is in a sour and wet, or in a dry parched state. At a time when the soil may be termed neither wet nor dry, the operation of planting is most successfully performed. The mould does not then adhere to the spade, nor does it run in; it divides well, and is made to intermingle with the fibres of the plants with little trouble; and in treading and setting the plant upright, the soil is not worked into mud, which it necessarily must be, if in a wet state, evidently to the great detriment of the plants. It is therefore improper to plant on a retentive soil in the time of rain, or even perhaps for some days afterwards, or after a fall of snow, until it has for some days disappeared. Whereas, on a dry absorbent soil, it may be proper to plant in the time of gentle showers, immediately after heavy rains, or as soon as the snow is dissolved."* (*Plant. Kal.*, p. 137.)

6340. *Poutey is a decided advocate for autumn preparation of the soil, and spring planting. "Autumn planting," he says, "is advisable only in few cases, while spring planting may properly apply to all."*

6341. *According to Sang, the proper time for planting the pine and fir tribes, and all evergreens, is April, or even the first fortnight in May. "Attention should be paid, that no greater number of plants be taken up from the nursery than can be conveniently planted on the same day. Damp weather is the best. When very dry, and the plants rise destitute of earth at their roots, their roots should be dipped in mud (puddle), so as to be coated over by it. In all cases, care should be taken not to shake off any adhering earth from plants at the time of planting."* (*Plant. Kal.*, p. 341.)

6342. *M^r Nob, in his excellent hints on planting evergreens, chooses indifferently either winter or spring, fixing on a dull day for winter planting, and a moist day for spring and autumn planting; the grand object being to prevent the roots from becoming dry while they are out of the earth. "If the roots of evergreens," he says, "be allowed to dry when out of the ground in spring, it is scarcely possible to prevent them from suffering considerably, and showing the effects of this injury for a long period after they are replanted."* (*Hints, &c.*, p. 6.)

6343. *The operation of inserting the plants in the soil is performed in various ways; the most general mode, and that recommended by Marshall and Nicol, is pitting; in which two persons are employed, one to operate on the soil with the spade, and the other to insert the plant and hold it till the earth is put round it, and then press down the soil with the foot. Where the plants are three feet high or upwards, this is the best mode; but for smaller plants modes have been adopted in which one person performs the whole operation.*

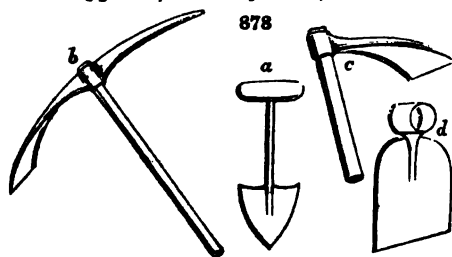
6344. *Sang describes three kinds of manual operation employed by him in planting, and in part in sowing trees: by pitting, by sifting simply, or by cross or T sifting; by the diamond dibber; by the planting mattock; and by the planter. In sifting an area with plants, he first plants those intended as the final trees, and afterwards the nurses, or one set of operators plant the former, while another follow with the latter, unless the time for removing the nurses, as in the case of evergreen pines and firs, should be later than that for planting the principals. "The plants, if brought from a distance, should be shrouded, i. e. earthed in, or, in common garden language, laid in by the heels; or they may be supplied daily from the*

nursery, as circumstances direct. All the people employed ought to be provided with thick aprons, in which to wrap up the plants; the spademen, as well as the boys or girls; the latter being supplied by the former as occasion may require. All of them should regularly fill their aprons at one time, to prevent any of the plants being too long retained in any of the planters' aprons. One man cannot possibly set a plant so well with the spade, unless in the case of *laying*, as two people can; nor, supposing him to do it as well, can he plant half as many in the same space of time as two can. A boy ten years of age is equal, as a holder, to the best man on the field, and can be generally had for less than half the money. Hence this method is not only the best, but the least expensive." (*Plant. Kal.*, p. 167.)

6345. *By pitting.* "The pit having been dug for several months, the surface will therefore be incrustated by the rains, or probably covered with weeds. The man first strikes the spade downwards to the bottom, two or three times, in order to loosen the soil; then chops it up, as if mixing mortar for the builder; he next lifts out a spadeful of the earth, or, if necessary, two spadefuls, so as to make room for all the fibres, without their being anywise crowded together; he then chops the rotten turf remaining in the bottom, and levels the whole. The boy now places the plant perfectly upright, an inch deeper than when it stood in the nursery, and holds it firm in that position. The man *friddles* (sprinkles) in the mould gently; the boy gently moves the plant, not from side to side, but upwards and downwards, until the fibres be covered. The man then fills in all the remaining mould; and immediately proceeds to chop and mix together the earth in the next pit, leaving the boy to set the plant upright, and to tread in the mould about it. This in stiff wet soil he does lightly; but in sandy or gravelly soil he continues to tread until the soil no longer retains the impression of his foot. The man has by this time got the pit ready for the next plant, the boy is also ready with it in his hand, and in this manner the operation goes on. On very steep *hangs* (banks) which have been pitted, the following rule ought to be observed in planting: to place the plant in the angle formed by the acclivity and surface of the pit; and in finishing to raise the lower margin of the pit highest, whereby the plant will be made to stand as if on level ground, and the moisture be retained in the hollow of the angle, evidently to its advantage." (*Plant. Kal.*, p. 167.)

6346. *The slit method*, either simply or by the T method, is not recommended by Sang; but necessity may justify its adoption occasionally. "We would not recommend planting by the slit, unless where there is no more soil than is absolutely occupied by the fibres of the herbage which grows on the place. Except on turf, it cannot be performed; nor should it be practised, if the turf be found three or four inches thick. By pitting in summer, turf is capable of being converted into a proper mould in the space of a few months; and the expense of pitting, especially in small plantations, can never counterbalance the risk of success in the eyes of an ardent planter. The most proper time to perform the operation of slitting in the plants, is when the surface is in a moist state. On all steep the plant should be placed towards the declivity, that the moisture may fall to its roots; that is to say, in planting, the spademan should stand highest, and the boy lowest on the bank; by which arrangement the plant will be inserted at the lower angle of the slit." (*Plant. Kal.*, p. 170.)

6347. *Planting with the diamond dibber*, he says, "is the cheapest and most expeditious planting of any we yet know, in cases where the soil is a sand or gravel, and the surface bare of herbage. The plate of the dibber (*fig. 878. a*) is made of good steel, and is four inches and a half broad where the iron handle is



son, while its plate remains within the ground: by this means a vacancy is formed between the back of the dibber and the ground; into which the planter, with his other hand, introduces the roots of the seedling plants, being careful to put them fully to the bottom of the opening: he then pulls out the dibber, so as not to displace them, and gives the eased turf a smart stroke with the heel; and thus is the plant completely firm. The greatest error the planter with this instrument can run into, is the imperfect introduction of the roots. Green or unpractised hands are apt to double the roots, or sometimes to lay them across the opening, instead of putting them straight down, as above directed. A careful man, however, will become, if not a speedy, at least a good planter, in one day; and it is of more importance that he be a sure hand than a quick one. A person who is of a careless or slovenly disposition should never be allowed to handle a dibber of this kind."

6348. *Planting with the planting mattock* (*fig. 878. b*) is resorted to in rocky or other spots where pitting is impracticable. "The heave or handle is three feet six inches long; the mouth is five inches broad, and is made sharp; the length from it to the eye, or heave, is sixteen inches; and it is used to pare off the sward, heath, or other brush that may happen to be in the way, previous to easing the soil with the other end. The small end tapers from the eye, and terminates in a point, and is seventeen inches long." By this instrument the surface is skimmed off "six six or eight inches in diameter, and with the pick end dug down six or eight inches deep, bringing up any loose stones to the surface; by which means a place will be prepared for the reception of the plant, little inferior to a pit. This instrument may be used in many cases, when the plants to be planted are of small size, such as one-year larch seedlings, one year nursed; or two-year Scotch pines, one year nursed; and the expense is much less than by the spade." (*Plant. Kal.*, p. 168.)

6349. *Planting with the forest planter* (*fig. 878. c*). "The heave or handle is sixteen inches long, the mouth is four inches and a half broad, and the length of the head is fourteen inches. The instrument is used in planting hilly ground, previously prepared by the hand mattock. The person who performs the work carries the plants in a close apron; digs out the earth sufficiently to hold the roots of the plant; and sets and firms it without help from another; it is only useful when small plants are used, and in hilly or rocky situations." (*Plant. Kal.*, pref. xxiv.)

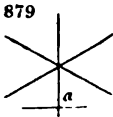
6350. *Pontey prefers planting by pitting*, in general cases; the holes being made during the preceding summer or winter, sufficiently large, but not so deep into a retentive subsoil as to render them receptacles for water. When the plants have been brought from a distance he strongly recommends puddling them previously to planting; if they seem very much dried, it would be still better to lay them in the ground for eight or ten days, giving them a good soaking of water every second or third day, in order to restore their vegetable powers; for it well deserves notice, that a degree of moisture in soil sufficient to support a plant recently or immediately taken from the nursery, would, in the case of dried ones, prove so far insufficient, that most of them would die in it. The puddling here recommended may also be of great service in all cases of late planting where small plants are used; Pontey's method is (after puddling) to

tie them in bundles, of two or three hundreds each; and thus send them, by a cart-load at once, to where wanted; where such bundles, being set upright, close to each other, and a little straw carefully applied to the outside of them, may remain without damage, in a sheltered situation, any reasonable time necessary to plant them. Where loose soil happens to be at hand, that should be substituted in the place of straw.

6351. *A puddle for trees* is made by mixing water with any soil rather tenacious, so intimately as to form a complete puddle, so thick that when the plants are dipped into it enough may remain upon the roots to cover them. The process of puddling is certainly simple, and its expense too trifling to deserve notice: its effects, however, in retaining, if not attracting, moisture, are such that, by means of it, late planting is rendered abundantly more safe than it otherwise would be. It is an old invention, and hence it is truly astonishing that it is not more frequently practised. "If we could but persuade people to adopt it generally in spring planting," says Mr. Pontey, "I believe the prejudice in favour of autumn practice would soon be done away." (*Prof. Plant.*, p. 167.)

6352. *Powley's methods of planting* are in general the same as those of Sang: he uses a mattock and planter of similar shape; and also a two or three pronged instrument, which we have elsewhere designated the *planter's hack*. (9110, *fig.* 303.) "This instrument," he says, "has been introduced of late years as an improvement on the mattock and planter (*fig.* 878, *b, c*), being better adapted to soils full of roots, stones, &c.: they are likewise easier to work, as they penetrate to an equal depth with a stroke less violent than the former: they are also less subject to be clogged up by a wet or tenacious soil. The length of the prongs of both should be about eight inches, and the distances between them, when with three prongs, one and a half, and with two prongs, about two inches; the two-pronged hack should be made somewhat stronger than the other, it being chiefly intended for very stony lands, or where the soil wants breaking, in order to separate it from the herbage, &c. These tools are chiefly applicable to plants of any size up to about two feet, or such as are generally used for great designs, where they are used as a substitute for the spade, in the following manner:—The planter being provided with a basket holding the plants required (the holes being supposed prepared, and the earth left in them), he takes a tree in one hand, and the tool in the other, which he strikes into the hole, and then pulls the earth towards him, so as to make a hole large enough to hold all its roots; he then puts in the plant with the other, and pushes the earth to its roots with the back of the planter; after which, he fixes the plant, and levels the soil at the same instant with his foot: so that the operation is performed by one person, with a degree of neatness and expedition which no one can attain to who uses the spade. It is known to all planters, that but few labourers ever learn to plant well and expeditiously in the common method, without an assistant: this method, however, requires neither help nor dexterity; as any labourer of common sagacity, or boy of fifteen, or even a woman, may learn to perform it well in less than half an hour. The facility with which these tools will break clods, clear the holes of stones, or separate the soil from herbage, the roots of heath, &c. (the former being previously mellowed by the frost), may be easily imagined." (*Prof. Plant.*, p. 173.) The adoption of a small mattock for inserting plants, we recollect to have seen recommended in a tract on planting in the Highlands, by MacLaurin, a nurseryman, published at Edinburgh about the year 1802. The under foot-spade (*fig.* 307), and the perforator (*fig.* 810.), are implements that may be advantageously used in slit planting, or in planting by perforation. (2108, 2109., and *Gard Mag.*, vol. iii. p. 215.)

6353. *An expeditious mode of slit planting* is described in the *General Report of Scotland*, as having been practised for many years on the Duke of Montrose's estate. It is as follows:—"The operator, with his spade, makes three cuts, twelve or fifteen inches long, crossing each other in the centre, at an angle of sixty degrees, the whole having the form of a star. (*fig.* 879.) He inserts his spade across one of the rays (*a*), a few inches from the centre, and on the side next himself; then bending the handle towards himself, and almost to the ground, the earth opening in fissures from the centre in the direction of the cuts which had been made, he, at the same instant, inserts his plant at the point where the spade intersected the ray (*a*), pushing it forward to the centre, and assisting the roots in rambling through the fissures. He then lets down the earth by removing his spade, having pressed it into a compact state with his heel; the operation is finished by adding a little earth, with the grass side down, completely covering the fissures, for the purpose of retaining the moisture at the root, and likewise as a top-dressing, which greatly encourages the plant to push fresh roots between the swards." (Vol. ii. p. 263.)

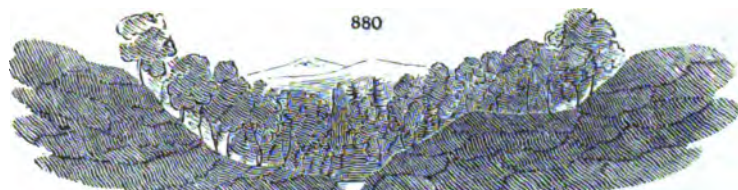


CHAP. IV.

Formation of Plantations, in which Ornament or Effect is the leading Consideration.

6354. In designing *ornamental plantations*, the situation, form, the disposition of the trees, and the kinds employed, are the principal considerations.

6355. *The situations* to be planted, with a view to effect, necessarily depend on the kind of effect intended: these may be reduced to three—to give beauty and variety to general scenery, as in forming plantations here and there throughout a demesne; to give form and character to a country residence, as in planting a park and pleasure-grounds; and to create a particular and independent beauty or effect, as in planting an extensive area or wood, unconnected with any other object, and disposing of the interior in avenues, glades, and other forms. In the first two cases, the choice of the situation must always be relative to other objects; as, for example, in ornamenting general scenery, to fields and enclosures, buildings, roads, &c.; and to the mansion-garden and other parts of a residence, in laying out a country seat: but in forming independent plantations the choice may be absolute, and guided by no other consideration than the effect to be produced. One of the greatest beauties produced by planting, either on general scenery, or on the grounds of a residence, is that of varying the form of the surface of the country, or increasing the variations already existing. To do this with most effect, it is an obvious and long-established principle, that other circumstances being the same, the hills are to be more generally planted than the hollows, or even the plains. By planting a hill, or the least rise of ground, that hill or rise is increased in effect; but by planting the low grounds between hills or protuberances, their effect is destroyed. It is to be observed, however, that the latter practice is often what we observe in natural scenery. In hilly tracts in a state of nature, and under the dominion of no other animals than cattle or sheep, the vales or dells (*fig.* 880.) are generally filled with wood and the tops of the hills bare, which, however agreeable to those who view or study nature chiefly in detail, yet to the general observer it tends to confound form, and introduce monotony of surface. Art, therefore, when planting for general effect, or for heightening the character of surface, adopts a contrary practice (*fig.* 881.) to what is general in wild nature; for few things in a wild state are suitable to the views of man in a state of civilisation and refinement; and when he admires rude scenery, it is from views of its novelty or rarity in cultivated countries; or with reference to some other art object, or some different state of the same object. At the same time, a hill crowned



with wood occurs in nature occasionally, both with and without naked hollows or plains at its base, and never fails to excite a superior degree of satisfaction or pleasure in the spectator. To plant hills, therefore, in preference to valleys, may justly be designated an imitation of one of the more interesting features of nature; but it does not follow from this that all hills are to be planted. (See *Gard. Mag.*, vol. viii. p. 486.)

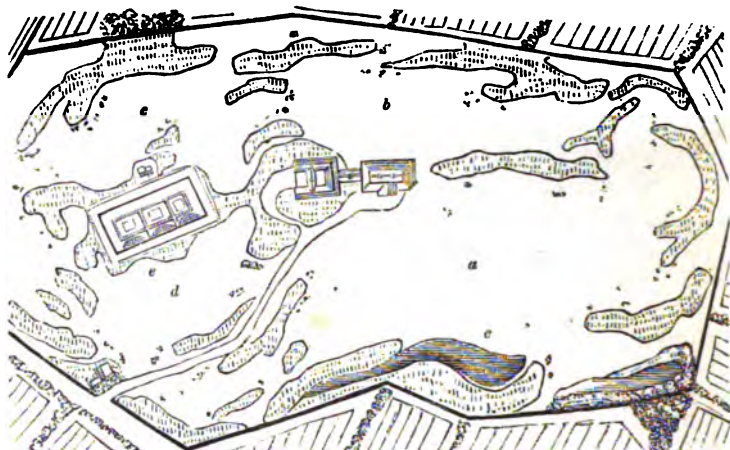


6356. *With respect to form*, it may be absolute, or independent of every consideration but the taste of the designer; or it may be relative. It is absolute in plantations intended to create particular beauties within themselves; as in labyrinths, woods pierced with avenues, stars, &c., in the geometric style; or in compositions and groups, thickets and glades in the interior of a wood, laid out in the modern manner. It is relative to the shapes of the ground and to existing objects in the forms adapted for improving general scenery; and to these considerations, and to the situation and form of the mansion, gardens, waters, &c., in laying out the grounds of a country-residence. For either of these objects the general principles of operation are to heighten beauties already existing; to conceal defects; if possible, to create beauty; and to connect detached objects, either in reality or appearance, so as the scenery, from whatever point it may be viewed, may appear a whole; in short, the end is a harmonious and expressive whole, and the means are the grouping and connecting of the parts. Some tracts of country, or those parts of a demesne exterior to the park, may be deficient in woodiness; there trees may be introduced in masses on elevated sites, or the sites of hills; in groups connected with buildings; in thinly scattered trees, in pastures, and by brooks; and in rows in hedges, and by other fences or roads. Where disagreeable objects are to be concealed, the course is evident; and where nothing is interesting, attempts must be made to create interest. A road through a dreary country may often have much of its dullness taken away by one or two rows of trees on each side, the stems of which will break and vary the distant scenery. The lines may vary in form and direction, may swell into strips, or clumps, or thickets; form recesses, or be interrupted, according to circumstances. The route through some of the most dreary tracts in Germany and Russia, and the well-known Strada di Campagna, in Italy, are in this way rendered tolerable. In all this, though the main object may be beauty, yet utility must never be lost sight of. All plantations by arable lands should, as much as possible, be bounded by straight, or at least not very irregular lines, and connected with the hedges or other fences already existing; few single trees or groups should be planted in the area of such fields. In pastures, the worst soils and most exposed situations should be chosen, and such forms adapted as may shelter the stock from all quarters, but especially from the storms and winds which more generally prevail. In planting near cottages and villages, care should be taken not to render the atmosphere unhealthy by stagnating the air, or to lessen the value of their yards and gardens by curtailing their extent, or by excess of shelter and shade. Roads or lanes should on no account be injured, nor the water of streams and ponds rendered dark, discoloured by leaves, and unwholesome to men or cattle. In short, the planter, for effect, should never lose sight of utility, or plant in opposition to it; for though he may produce particular sorts of beauty, and especially that lately so fashionable and justly admired disposition of objects, called picturesque, which may be admired by a number for a time; yet there is a much more elevated and universal beauty, that of moral relation, or, in short, refined utility, which, while men retain their social feelings, must ever be the most interesting to mankind in general, and will therefore finally prevail.

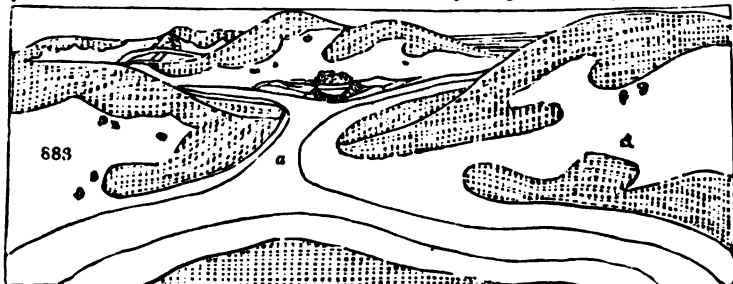
6357. *The outline of plantations*, made with a view to the composition of a country-residence, is guided by the same general principles; whether the trees are to be disposed in regular forms, avowedly artificial; or in irregular forms, in imitation of nature. (*fig. 882.*) The first thing is, in both modes, to compose a principal mass, from which the rest may appear to proceed; or be, or seem to be, connected. In common cases, it answers best to include or connect with this mass the house, kitchen and flower gardens (*c*); from these other masses and groups should proceed, either connected, or, better, only seemingly so when viewed horizontally. Their forms should be such, and so disposed, relatively to the ground and other objects, and to each other, as to throw the pasture surface into broad masses (*a, b, c, d*), which become wholes in their turn, and their connection and variation is heightened by the variety in the glades between the masses and groups of plantation. Such would be the mode of procedure on a flat to be formed into a modern park; regard being had to exclude or admit the view of certain parts of the distant scenery; never to shut in, or leave without a third distance (as is the term in landscape-painting), any of the scenes within the boundary of the park; and to other laws of perspective, optics, and composition, which will be more fully entered on in treating of landscape-gardening.

6358. *In the pleasure-ground*, which, as far as respects the form or ground outline of plantations, is to be considered as a part of the park, the same principles are applicable. In neither the artificial nor natural style should their width be great; but their form may be varied at pleasure, subject to general principles. Where the ground is irregular (*fig. 882.*), only the modern style can be adopted with good effect; and there, by conducting the walks, or forming the water chiefly in the hollows (*a*), and planting the eminences (*b*), varying the manner in which the outlines of these masses embrace the declivities, the happiest effects may be produced. Deviations from these general principles can only be justified by extraordinary circumstances.

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6359. With respect to the extent, or area, occupied by ornamental plantations, as such, that need seldom be great. They are generally seen only in profile, and therefore a circuitous outline (Ag. 884. a) may on most occasions be contrived to have the same effect as planting a solid mass, which will occupy



much more ground (b), show less exterior variety, and none within. The case is different, however, where the upper surface of a plantation is to be met by the eye, at a large angle, say upwards of 39°. In that case, to produce a grand and imposing effect, real extent is wanting.

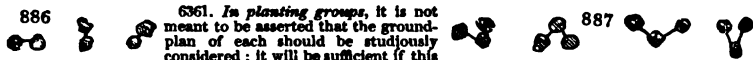
Examples occur in planting the steep sides of high hills, to be seen from below; or valleys or plains to be seen from great elevations. It must be confessed that these are among the grandest circumstances in which wood can be viewed; profiles of outlines, varied both as respects the sky and the ground, are beautiful and interesting; and avenues and long rows of trees form imposing perspectives; but the side of a range of mountains clothed with wood, seen at a certain distance, from a plain below, or opposite hills, is one of the most magnificent of rural prospects.

6360. With respect to the disposition of trees in a plantation where art is avowed or purposely displayed, the more regularly the plants are placed the better is the end attained; but, where nature is to be imitated, irregularity will best sustain the character. This should be studied in the larger as well as the smaller plantations, in the natural style; but more especially in detached groups, which operate so powerful an effect in laying out the grounds of a residence. The greatest beauty of a group of trees, as far as respects their stems, is in the varied direction these take as they grow into trees (Ag. 885.); but as that is for all practical purposes beyond the influence of art, all we can do is to vary as much as possible the ground-plans of groups, or the relative position which the stems have to each other, where they spring from the earth. This is considerable, even where a very few trees are used, and of which any person may convince himself by placing a few dots on paper. Thus, two trees (Ag. 884.), or a tree and shrub, which is the smallest group, may be placed in three different positions with reference to a spectator in a fixed point: if he moves round them they will first vary in form separately, and next unite in one or in two groups, according to the position of the spectator. In like manner three trees (Ag. 887.) may be placed in four different positions; four trees may be placed in eight different positions (Ag. 888.); five trees may be grouped in ten different ways as to ground-plan (Ag. 889.); six may be placed in twelve different positions (Ag. 890.); and so on. Excellent rules, deduced from first principles, for the disposition of single trees, will be found given at length in the *Gardener's Magazine*, vol. vii. p. 402.



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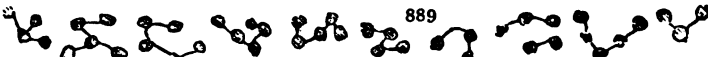
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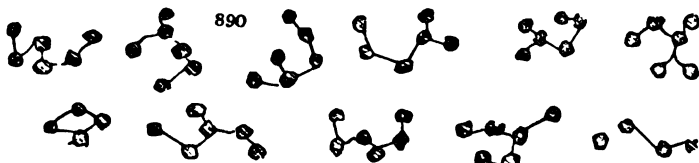
6361. In planting groups, it is not meant to be asserted that the ground-plan of each should be studiously considered; it will be sufficient if this be done in conspicuous situations, by the sides of walks and roads, and in such places as require for shelter, or shade, or to exclude some disagreeable object, a series of groups of nearly the same number of trees. For the ordinary purposes of grouping, such as varying the apparent outline of masses, connecting the scattered objects, adding parts to such objects as are incomplete wholes, &c., it will be sufficient to in-



troduce large and small groups; never to put two trees at exactly the same distance from each other; three in the angles of an equilateral triangle; four in those of a square; five in those of an octagon and so on.

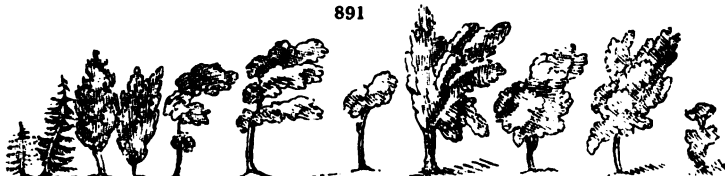


6362. *Scattered trees.* It has been a very common practice among planters to introduce, in parks, great numbers of detached single trees (in vulgar technology, dotting), with a view of effecting by them what can only be done by groups. Except the clump, there is not a greater deformity in the grounds of British country-residences. Supposing these trees, planted on a level surface, all of the same sort, and all growing equally well, their insipid sameness of form and position must be evident to the mind's eye



of every one. Suppose them on the same character of surface, but all, or chiefly, of different sorts (*Ag.* 891.), it is equally evident they will grow with different degrees of vigour, and assume different characters of stem and head; and consequently produce an appearance of the most discordant kind. It is only necessary to analyse a group, to be convinced of the variety of general form produced, even by trees of one species, but more especially by two kinds, and this, even by specimens that would be most unsightly apart; and to observe a portion of the scattered woody scenery, in the openings or glades of a natural forest, to be convinced how much more variety is produced by that manner of planting, than by distributing over a surface great numbers of single trees. It is observed by Uvedale Price, that in the numerous landscapes

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which compose the *Liber Verstat* of Claude, there is not more than one single tree; so highly did this artist value the principle of connection. A single tree, however, is not always to be condemned, even as such; for its form, age, or blossom, or some other accidental circumstance, may compensate for its isolated situation; and it may often exist singly as a tree, and yet in connection or grouped with other objects, as buildings, rocks, &c.; and in these cases it is not to be condemned, because the grand object of grouping, connection, is maintained by the co-tangent object.

6363. *Placing the groups.* Another practice in the employment of groups, almost equally reprehensible with that of indiscriminate distribution, is that of placing the groups and thickets in the recesses, instead of chiefly employing them opposite the salient points. The effect of this mode is the very reverse of what is intended; for, instead of varying the outline, it tends to render it more uniform by diminishing the depth of recesses, and approximating the whole more nearly to an even line. The way to vary an even



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or straight line or lines, is here and there to place constellations of groups against it (*Ag.* 892. c); and a line already varied is to be rendered more so, by placing large groups against the prominences (a) to render them more prominent; and small groups (b), here and there in the recesses, to vary their forms and conceal their real depths

6364. *In all plantations in the natural style* above the size of a group, the same general principles are to be followed in the disposition of the trees; the plants, whatever be their kinds, and whether the mass is finally to assume the character of a wood, grove, or copse, should be placed irregularly; here thick, and there thin, as if they had sprung up from the accidental semination of birds or winds. "The effect of this arrangement will not be that composition of low and high, oblique and upright stems, and young and old trees, and low growths, which we find in forest scenery; but it is all that can be done in imitation of it at the first planting; and subsequent thinning, pruning, and cutting down, moving, *reversing*, planting, and sowing, must be used from time to time to complete imitation or allusion, unless the owner will rest satisfied with an inferior degree of beauty."

6365. *The general form of tree employed* materially influences the effect of plantations. The capacities of different trees for producing effects in landscape, and the general division of trees into round-headed, oblong-headed, and spiry-topped, have been already pointed out. It has also been observed, that the greater number of plantations are seen chiefly in profile; and hence, that the outline which the tops of the trees form against the sky or the background, is the most conspicuous feature in their aspect. The difference between this outline, when formed of *spiry-topped trees*, as the firs, pines, &c. (*fig. 893*); or

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oblong-headed trees, as most of the willows, alders, poplars (*fig. 894, b*); and the *round-headed* sorts, as the oak, ash, elm, and most trees (*fig. 894, a*), is so considerable, as to merit the particular attention of the planter. Nothing can be more harsh and unvaried than the serrated outline of the fir tribe, whether

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planted in rows, strips, or masses; whereas the round-headed trees, even in single rows, produce some variety of sky outline. The difference is equally great between the face or front surface of a row or mass of spiry and round-headed trees; for the great regularity and similarity of the branches of the former,

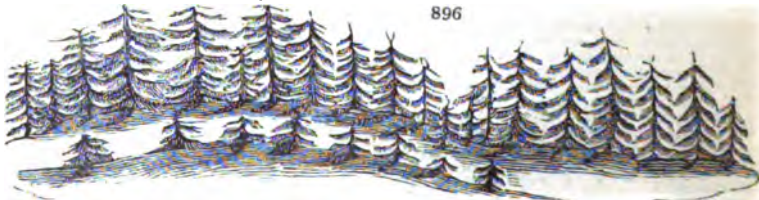
precludes the possibility of breaks in form, or light and shade, and presents one uniform surface of verdure, not unlike the side of a high hedge. The front surface of a row or mass of round-headed trees, on the contrary, from opposite qualities in the branches, produces prominences and recesses of different degrees of magnitude, and of different forms and relative positions. If we look on the upper surface of a plantation of each class, we shall find the difference equally great.



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Mag. vol. ix. p. 579.), and when a number of them are kept low, where the whole are of different ages. (*fig. 896.*) But the variety produced, even by this disposition, is still far short of what would be effected

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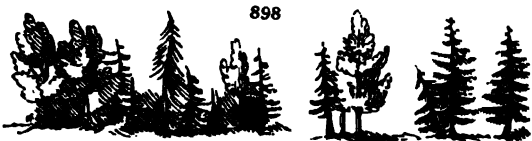


by a similar arrangement of round or oval headed trees (*fig. 897.*), of different ages, or mixed with shrubs or low growths. The most suitable situation for spiry-topped trees, in ornamental scenery, is as single

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objects or in small groups (fig. 898), sparingly introduced in the margin of thickets or strips, or



or sprinkled along the bottoms of dells or dingles. In plantations which comprise masses of all the different species of hardy trees, they may come in also in their proper place; and in mountain and rocky scenery they are in the places which nature seems to have intended for them.

6367. *The oblong-headed trees* may be introduced much more frequently than the spiry-topped sorts; the more obtuse summits blend well with the round-headed trees, and the more acute-topped sorts, which terminate in flexible flame-like shapes, as the Lombardy poplar, and cypress, form excellent contrasts to the round trees, and serve as transition forms to the spiry tribes. The round-headed trees, it need hardly be observed, are the most general in nature, at least in temperate climates, and are the most universally applicable in ornamental planting. These considerations on the forms of trees refer to them chiefly as in independent plantations; in connection with buildings, the choice, as to form, may often be influenced by that of the building, and also by the effect intended to be produced by planting them.

6368. *With respect to magnitude*, the grand division of woody plants is into trees and shrubs. The bulk and heights of the common trees and shrubs of the country being generally known, the eye estimates the magnitude of other objects by theirs; consequently, extraordinary magnitudes, whether large or small, should only be used under extraordinary circumstances. The apparent size, proportion, and distance of objects might otherwise be deranged, and a discordant effect produced. Shrubs, which have the form of trees; and low trees, as the mountain ash, the apple and pear, often produce this effect, when planted as single objects; and, unless their fruit is prized above every thing else, they should, when introduced for the sake of their flowers, either be planted in the margins of plantations, or grouped with trees of the ordinary size. The finest small groups are of this description, or composed of common deciduous timber trees and hardy shrubs, as oaks, chestnuts, hollies, thorns, &c.

6369. *The choice of species* must be made subservient to general effect, and to the particular purposes for which different species are calculated. These have been already pointed out (chap. II.), as well as their uses (chap. I.), and both should be continually present in the mind of the planter. For the more general purposes of planting the standard trees of the country, native or naturalised, are mostly to be preferred, as growing freely and preserving harmony; for the purpose of distinction, foreign trees are more likely to answer the end. Foreign trees also contribute greatly to variety and interest, and therefore are indispensable in pleasure-grounds, or other scenes of much resort. "Any number of species may be admitted into improved grounds; commencing with the rare sorts near the house, as the centre of art and refinement, and ending with the common trees of the country, at such distances as the extent and style of the whole may suggest. The proportions of such trees as are only ornamental, and such as are valuable as timber, must be in some degree determined by the character of the place, but chiefly by the taste and view of the owner. Beauty alone, without utility, will not long please; and a few single groups and plants of the rare species, in the grounds more immediately consecrated to man, will generally afford more satisfaction than a lavish display of exotics: the former will always present a more luxuriant and thriving display of scenery than the latter, and sooner attain the maturity of beauty." (*Edm. Encyc., art. Landscape-Gardening.*)

6370. *Whatever number of species are used, one only should prevail in one place*; or if there be high or low growths, then one of each kind should prevail. Great attention should be had that the species which compose the groups and thickets, or other scattered woodinesses which border on masses, should consist almost entirely of the species which prevail in the masses: if this precaution is neglected, instead of these appendages producing connection and harmony, they will have a tendency directly the reverse. Thickets may next be considered in regard to their form, that is, the form of their ground-plan; and with groups and single trees in regard to the choice of species. Thickets are produced by nature, by the inroads of cattle, or other animals, grazing or cropping the herbage, and with it the young trees in forest scenery. On levels and sheltered situations, we find their form comparatively regular, because there appears no permanent or general reason to occasion their encroachment on one side more than on the other. But on varied surfaces and soils a preference is given by depasturing animals to certain natural plants, and the side on which they abound is penetrated more deeply than the other. The plan of the thicket, therefore, varies accordingly. In elevated grounds, exposed to a particular wind, the thickets will exceed in length, which will be found generally to be in the direction of the storm. The cause is too obvious to be pointed out; but this effect, and every other observed in the groups and thickets of natural scenery, always merit study, and most frequently deserve imitation in creations of landscape-scenery. The species of trees ought obviously to be those of the part of the mass to which they belong; for thickets, groups, and single trees ought to resemble disjointed and broken fragments from those masses. But in particular cases, for rendering a prominence still more prominent, or increasing the depth of a recess, a few plants of similar, or not discordant growths, but of darker or lighter greens, may, at a distance, add to the effect of each. By the same process, with more contrasted species, where no other mode can be put in execution, the formality of a single row may in some degree be varied in its situation and contour. (*Ed. Encyc., art. Landscape-Gardening.*)

6371. *The arrangement of the species*, to effect variety, must evidently be by grouping or collecting them in masses; for if all the species made use of were intimately mixed together in every part of a plantation, it is evident the eye would meet everywhere the same species; so that, as far as variation from that source was sought for, it would be entirely wanting. Uvedale Price has treated this subject with much ingenuity; and, in reprobating the common practice of mixing as many different sorts as can be procured, in order to produce variety, observes, that "variety, of which the true end is to relieve the eye, not to perplex it, does not consist in the diversity of separate objects, but in the diversity of their effects when combined together, so as to form a difference of composition and character. Many think, however, that they have obtained that grand object, when they have exhibited in one body all the hard names of the Linnæan system; but when as many plants as can be well got together are exhibited in every shrubbery, or in every plantation, the result is a sameness of a different kind, but not less truly a sameness that would arise from there being no diversity at all; for there is no having variety of character, without a certain distinctness, without certain marked features on which the eye can dwell." (*Essays on the Picturesque*, vol. I.)

6372. *Repton* observes, "there is more variety in passing from a grove of oaks to a grove of firs, than in passing through a wood composed of a hundred different species, as they are usually mixed together. By this indiscriminate mixture of every kind of tree in planting, all variety is destroyed by the excess of variety, whether it is adopted in belts, or clumps, as they have been technically called: for example, if ten clumps be composed of ten different sorts of trees in each, they become so many things exactly similar; but if each clump consists of a distinct kind of tree, they become ten different things, of which one may hereafter furnish a group of oaks, another of elms, another of chestnuts or of thorns, &c. In like manner, in the modern belt, the recurrence and monotony of the same mixture of trees of all the different kinds, through a long drive, make it the more tedious in proportion as it is long. In part of the drive at Woburn, in which evergreens alone prevail, which is a circumstance of grandeur, of variety, of novelty, and, I may add, of winter comfort, that I never saw adopted in any other place on so magnificent a scale, the contrast

of passing from a wood of deciduous trees to a wood of evergreens must be felt by the most heedless observer; and the same sort of pleasure, though in a weaker degree, would be felt in the course of a drive, if the trees of different kinds were collected in small groups or masses by themselves, instead of being blended indiscriminately." (*Inquiry into Changes of Taste, &c.*, p. 32.)

6373. *Chambers and Price* agree in recommending the imitation of natural forests in the arrangement of the species. In these, nature disseminates her plants by scattering their seeds, and the offspring rise round the parent in masses or broadths, depending on a variety of circumstances, but chiefly on the facility which these seeds afford for being carried to a distance by the wind, the rain, and by birds or other means. So disseminated, they spring up, different sorts together, affected by various circumstances of soil and situation; and arrive at maturity, contending with other plants and trees, and with the browsing of animals. At last, that species which had enjoyed a maximum of natural advantages is found to prevail as far as this maximum extended, stretching along in masses and angular portions of surface, till circumstances changing in favour of some other species, that takes the prevalence in its turn. In this way it will generally be found, that the number of species, and the extent and style of the masses in which they prevail, bears a strict analogy to the changes of soil and surface; and this holds good, not only with respect to trees and shrubs, but to plants, grasses, and even the mossy tribe.

6374. *The most perfect arrangement of species in regard to variety would be to employ every kind of tree and shrub that will grow freely in the open air, and arrange them according to the natural system.* We have already suggested that a residence might be wooded in this way, so as in the smallest extent to obtain a maximum of variety and beauty. In most cases, where grouping, or any systematic plan of arranging the species, is to be adopted, the form of the groups (*fig. 899, a, b, c, d, e*) should be marked on the plan of the plantation, and the kinds for each form written down in a corresponding list; the small detached masses intended as thickets (*f*) should be similarly marked, the situation of groups indicated either by letters simply (*g*), or by figures (*5, 1, 3*) referring to a list of kinds; and where shrubs are to be introduced in the groups, two figures may be used (*3, 3*), one of which shall indicate the kind of tree, and the other the species of low growth or shrub. This mode we have always adopted in furnishing plans for ornamental planting, and find it enables gardeners to execute them with perfect accuracy.

6375. *The size of the plants used in ornamental planting should be as large as the soil and situation will admit.* For two reasons: first, because an early effect is always desirable; and, secondly, because, in planting detached groups, large and small plants, and a varied inclination of their stems (*fig. 898*), may be introduced, in imitation of nature. Small groups on pastured lands, indeed, cannot be formed without trees whose stems are sufficiently high to raise their heads out of the reach of cattle, without enclosing so considerable a space round every tree as to render this mode at once tedious, unsightly, and expensive.

6376. *The removal of large trees, with their heads and branches entire, has lately engaged a good deal of the public attention, in consequence of a work published on the subject, by Sir Henry Stuart.* The practice is of considerable antiquity, having been well known, in England, in Evelyn's time, and in France in the time of Louis XIV. The mode of operation is to cut a trench round the tree intended to be removed, at the distance of 6 or 8 or more feet from the trunk, according to the size of the tree; a year after which the tree is removed with its head entire. This trench was, by the early practitioners as well as by Sir Henry Stuart, filled up with fine mould, to encourage the production of fibres from the extremities of the roots, during the twelve months which elapsed between the cutting of the trench and the removal of the tree. As these fibres are generally much injured in removal, some eminent practical men, such as M^r Nab, of the Edinburgh Botanic Garden, and Munro, of the Brechin nursery, consider their production in the mould of the trench as of but little use, believing that the grand object attained by shortening the roots of the tree is that of stunting its growth, and preparing it, by a previous check, for the still greater check of removal; this cutting round being in both cases performed a year previously to transplanting. Mr. M^r Nab's very judicious observations on this subject will be found in the *Quarterly Journal of Agriculture*, vol. ii. p. 823., and Mr. Munro's in the *Gardener's Magazine*, vol. ix. p. 217. Much has been said on the advantage, in a physiological point of view, of keeping the head of the tree entire; but, in our opinion, the advantages of this practice have been greatly overrated. With the exception of the pine and fir tribe, and, perhaps, the beech, and one or two others, no advantage whatever, in a physiological point of view, appears to be gained. (*See Gard. Mag.*, vol. ix. p. 711.) This may be proved by trying an experiment on two trees of the same kind, age, and size, and, indeed, in all respects similarly circumstanced. Cut round the roots of both trees at the same distance from the stem; and, after these trees have stood a year in that situation, lop off the entire head of the one, and leave untouched the head of the other; if both trees be then removed with equal care, and to equally favourable situations, the lopped tree will, in a very few years, attain the size of the other. This result is consistent with the experience of every gardener who has attended to the subject, and with the practice of transplanting large trees for the roadsides, common on the Continent. (*See Gard. Mag.*, vol. ii. p. 236.) In transplanting orange trees, in the neighbourhood of Genoa, the same mode is pursued. Suppose the stem of the tree to be an inch in diameter, the strong roots are cut off about six inches from the stem; and the stem itself is cut over at the height of four, five, or six feet from the ground. The fibres, in this last case, as in those of all the others above mentioned, are understood to be so withered by the taking up of the tree, as to have lost their functions, and, consequently, the future growth of the tree must depend entirely on its power of sending out fibres in consequence of the accumulated sap and vital energy concentrated in its main roots and trunk. (*See Gard. Mag.* vol. x. p. 7.)

6377. *The main advantage of transplanting trees with their heads entire, is that of producing an immediate effect; and, when this is desired, we are of opinion that the practice recommended by M^r Nab and Munro, is preferable to that practised by Lord Fitz-Harding, and revived by Sir Henry Stuart.* (*See Gard. Mag.* vol. vi. p. 413. and vol. ix. p. 711.)

6378. *Where large trees are required for groups in a park, or for thickets, or plantations, to produce a speedy effect, we would recommend cutting round the roots a year before removal; leaving the trench open a whole summer; removing the tree the following winter, so as to injure the fibres formed within the ball of earth as little as possible, and either shortening in all the branches of the head, or lopping them off entirely, according to circumstances.* If the trees to be removed were not of very large size, or of kinds which are difficult to transplant, we should not require the roots to be cut round a year before; we would, in such a case, take them at once from where they stood; preserving as great a length as possible of ramose roots, and cutting off entirely, or severely shortening in, the branches, or head. If planted in suitable soil, we should have no fear of their success. The saving of expense by this mode of transplanting large trees must obviously be very considerable; but what is not quite so obvious is, that the saving of life would probably be still greater. In all climates, not naturally moist, it is hardly possible that a large tree, removed with its head entire, can withstand the heat and evaporation of the first succeeding summer; and, accordingly, we find that a large portion of transplanted trees of this description linger and die. This, we are informed, has been the case even in the moist climate of Allanton, and under the immediate care of Sir Henry Stuart. Two other causes are very unfavourable to the durability of trees transplanted when they are of a large size. The first of these causes is the supply-

ing the newly-transplanted trees with too rich food by means of the composts made to insure their growth; which treatment throws the sap of the tree into an unnatural state, producing a disease which we may suppose is something analogous to what in animals is called a surfeit; the second cause is making choice of trees too old for the increased action required. (See McNab, in *Quar. Journ. Agr.*, and Gorrie in *Gard. Mag.*, vol. vi. p. 43, and Sinclair, *Ibid.*, vol. iv. p. 326.) On the subject of this and the three preceding paragraphs, we recommend the reader to consult a series of papers which he will find indicated in the contents under the head of Arboriculture, in vols. iv., v., vi., and ix. of the *Gardener's Magazine*. He will also find some valuable matter, on the same subject, in our *First Additional Supplement to the Encyclopædia of Agriculture*.

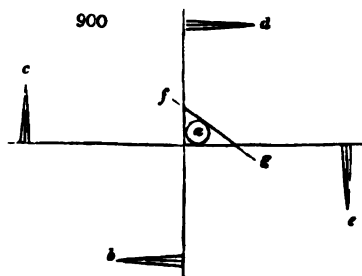
6379. Various machines for aiding in the removal of large trees will be found figured or described from 12112 to 12116; also in *Gard. Mag.*, vol. iv. p. 117; vol. v. p. 423; and vol. vii. p. 29, 30, and 686; and in *Encyc. of Agr.*, 2d edit. § 2667.

6380. Fences. Masses, in the ancient style of planting, were generally surrounded by walls or other durable fences. Here the barrier was considered as an object, or permanent part of the scene, and for that reason was executed substantially, and even ornamentally. It generally consisted of walls architecturally finished, and furnished with handsome gates and piers. The rows of avenues, and small clumps or platoons, intended to be finally thrown open, were enclosed by the most convenient temporary fence.

6381. In planting in the natural style, a regular fence, either of verdant or masonic materials, can never be the final part of perfect imitation, since no such thing is to be found in nature. But in planting in farm-lands, or for the purpose of improving the general scenery, some permanent fence is requisite; and all that can be said is, that which promises in the end to be the most efficient and economical, will almost always be the best. The hedge, sunk fence, common wall, and wide watercourse where it will be constantly nearly full of water, here present themselves as the most general kinds. Any fence, however, of which a large excavation, without water, forms a part, as the sunk fence, should be used with great caution; as there are none of this class but what look ill from at least one point of view, that is, when seen lengthwise.

6382. In planting to form a park or residence, with the exception of the boundary fence, and that which separates the lawn or mown surface from the grazed scenery, no permanent barrier of formal nature should ever be admitted. In very bleak situations, walls or mounds of earth, however unsightly, may be necessary for a time to shelter and draw up the plants; but the final removal of these, and all fences in parks, should be looked to as certain. Light palings, the rails coated over with tar or pyroligneous acid, and the posts charred by burning at the lower end, to render them durable, may be used in the greater number of cases; and in many, where the plants are larger, and the soil and other circumstances favourable to their growth, hurdles, or other movable rails or palings, may be used. "The present improved state of the manufacture of iron offers a very desirable accommodation in this respect, affording the best guards for single plants and groups; and iron hurdles, or lines of cast-iron standards and half-inch wires, as rails for masses, have a light and temporary appearance, highly congenial to the idea of their speedy removal. The lines of the fences conforming to the irregular shapes of the masses will not be disagreeable to the eye, if those of the latter are arranged with any regard to apparent connection; for any objects, whether lines or forms, however deficient in beauty of themselves, acquire a degree of interest, and even character, when connected and arranged in such a way as to form a whole. When a plantation is finally to be composed both of trees and undergrowths, thorns, aloes, hollies, berries, and briars may, in many cases, prevail in the margin; which, when the fence is removed, will form a picturesque phalanx, and protect the whole. Partial broads, formed by cattle, will only heighten the variety and intricacy of such masses." (*Edin. Encyc.*, art. *Landscape-Gardening*.) In this way, as Price observes (*Essays*, vol. i.), the planter may plant as thickly as he chooses, and never think of thinning or future management, only taking care to introduce no more trees than what he intends to remain finally as timber. The great majority of the plants, being shrubs, will soon be overtopped by the timber trees, which, having abundance of head-room, will grow up in free and unconstrained shapes. The future care of plantations is so generally neglected, that this suggestion, under certain circumstances, well merits adoption; though it certainly can have no pretension to be called a scientific or profitable mode of planting: it is, what it pretends to be, a picturesque mode.

6383. Transplanted single trees require to be kept upright by props and stakes; at least, when they are

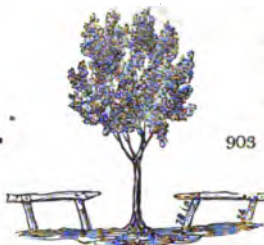
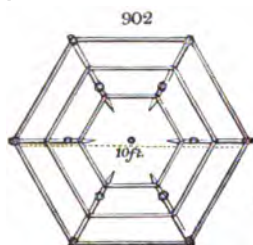


and *f, g*, a cross bar, confining the tree absolutely and immovably within the angle of the cross. The tree is thus firmly pressed, and made fast at three points of contact, and is therefore prevented from receiving the smallest degree of motion from wind, whatever may be its direction. These stakes, and horizontal pieces of wood being completely covered by the surface soil, the tree will appear to stand without any support whatever. (See *Gard. Mag.*, vol. vii. p. 452.) Ropes have been used in the manner of guys, or braces, for holding transplanted trees upright; but as these are liable to continual changes in their length, from the changes in the weather, they cannot be recommended. In some situations, where small stones or flints abound in the soil, a coating of these, six or eight inches in depth, forming a circle of three or four feet in diameter round the stem of the tree, has been found advantageous, both as a substitute for props, and as a covering for retaining moisture. Where slaty stones, or stones of large size, are abundant, this circle has been extended to eight or ten feet in diameter, and found to serve at once as a mulch to retain moisture, a prop to keep the tree upright, and a guard against cattle; the latter being as effective as, and not more unsightly than, the dendrophylacton, described in the succeeding paragraph.



6384. Fences for single trees of the cheapest kinds are formed by tying round the trunk of the tree a few branches of thorns, furze, or any prickly shrub; slightly clothing the stem with these branches to such a height as will be out of the reach of the animals which are expected to graze around it. Instead of thorns, thin laths or strips of wood are sometimes tied round the tree; or smooth hazel rods, or reeds,

or bark. Three wooden posts, connected together by horizontal rails, are often used as a protection; as are various arrangements of iron rods and wires. (*fig. 901.*) A single-tree fence, of recent invention, is, perhaps, one of the most complete ever made use of, and is, at the same time, neither expensive nor unsightly. This invention has been termed a dendrophylacton.



The vertical profile of this description of tree-guard is shown in the hexagon, in *fig. 902*, and its elevation in *fig. 903*. The rails of this fence consist of hurdle-poles, or any similar material, and the stumps or short posts of larch or oak branches. It is to be observed that the posts are to be driven into the ground, inclined a little, as in *fig. 902*, and so far as that the rails, when nailed to them, may be from fifteen to eighteen inches in height. These fences were invented at Ashted Park, in Surrey, about the year 1838: they have been used there successfully ever since. (See *Gard. Mag.* vol. vi. p. 47. and vol. x. p. 482.)

CHAP. V.

Culture and Management of Plantations.

6385. On the management of plantations, Pontey and Sang observe, that it is too common a case to consider a tree, when once planted, as done with; though, as every one knows, the progress and products of trees, like those of other plants, may be greatly increased or modified by cultivating the soil, pruning, and thinning.

6386. With respect to culture of the soil, it is evident that young plantations should be kept clear of such weeds as have a tendency to smother the plants; and though this is not likely to take place on heaths and barren sites, yet even these should be looked over once or twice during summer, and at least those weeds removed which are conspicuously injurious. In grounds which have been prepared previously to planting, weeding, hoeing by hand, or by the horse-hoe, and digging or ploughing, become necessary according to circumstances. The hoeings are performed in summer to destroy weeds, and render the soil pervious to the weather; the ploughing and diggings in winter for the same purpose, and sometimes to prepare the soil for spring crops. These, both Pontey and Sang allow, may be occasionally introduced among newly planted trees; though it must not be forgotten that, relatively to the trees, the plants composing such crops are weeds, and some of them, as the potato, weeds of the most exhausting kind.

6387. In preparing land for sowing woods, Sang ploughs in manure, sows in rows six feet apart, and crops the ground between, with low-growing early potatoes, turnip, lettuce, or other green crops. He does not approve of cropping the intervals with young trees, as a sort of nursery, as they prove more scouring crops than esculent vegetables; nor with grain, as not admitting of culture, and being too exhausting for the soil. Marshall, and some other authors, however, approve of sowing the tree-seeds with a crop of grain, and hoeing up the stubble and weeds when the crop is removed.

6388. Pontey observes, that "wherever preparing the soil for planting is thought necessary, cultivating it for some years afterwards will generally be thought the same; for where quick growth is essential, cleanliness of appearance is usually of consequence. Slight crops of potatoes, with short tops, or turnips, may be admitted into such plantations with advantage for two or three years, as they create a necessity for annually digging or stirring the surface, and tend very materially to accelerate the growth of the plants. It may be objected, that such crops must impoverish the soil, and no doubt such is the fact, so far as common vegetables are concerned; but, as to the production of wood, its support depends, in a great measure, on a different species of nutriment; and hence, I could never observe that such cropping damaged it materially." (*Profr. Plant.*, p. 183.) Osier plantations for basket-willows and hoops, require digging and cleaning during the whole course of their existence; and so do hedgerows to a certain extent, and some ornamental plantations.

6389. Filling up blanks is one of the first operations that occur in the culture of plantations next to the general culture of the soil, and the care of the external fences. According to Sang, a forest plantation after pitting, either in the mass form or ordinary mixture, should remain several years after planting, before filling up the vacancies, by the death of the hard-wood plants, takes place. Hard-wood plants, in the first year, and even sometimes in the second year after planting, die down quite to the surface of the ground, and are apparently dead, while their roots, and the wood immediately above them, are quite fresh, and capable of producing very vigorous shoots, which they frequently do produce, in order to stand in their places. If a tree, such as that above alluded to, be taken out the first or second year after planting, and the place filled up with a fresh plant of the same kind, what happened to the former may probably happen to the latter; and so the period of raising a plant on the spot may be protracted to a great length of time; or it is possible this object may never be gained.

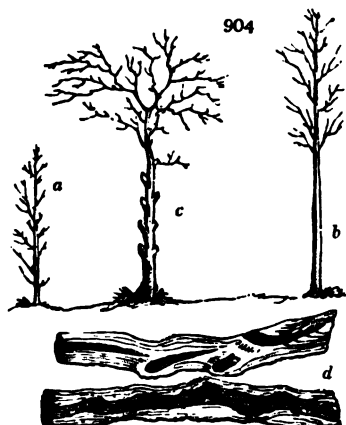
6390. The filling up of the hard-wood kinds in a plantation which has been planted after trenching, or summer-fallow which has been kept clean by the hoe, may be done with safety at an earlier period than under the foregoing circumstances; because the trees, in the present case, have greater encouragement to grow vigorously after planting, and may be more easily ascertained to be entirely dead, than where the natural herbage is allowed to grow among them.

6391. But the filling up of firs and pines may take place the first spring after the plantation has been made; because such of these trees as have died are more easily distinguished. In many cases when a fir or a pine loses its top, either by dying down, or the biting of hares and rabbits, the most vigorous lateral branch is elected by nature to supply the deficiency, which by degrees assumes the character of an original top. Pines and firs, therefore, which have fresh lateral branches, are not to be displaced, although they have lost their tops. Indeed, no tree in the forest, or other plantation, ought to be removed, until there be no room left to hope for its recovery. If the filling up of plantations be left undone till the trees have risen to fifteen or twenty feet in height, their roots are spread far abroad, and their tops occupy a considerable space. The introduction of two or three plants, from a foot to three feet in height, at a particular deficient place, can never, in the above circumstances, be attended with any advantage. Such plants may, indeed, become bushes, and may answer well enough in the character of underwood, but they will for

ever remain unfit for any other purpose. It is highly improper, then, to commence the filling up of hard-wood plantations before the third year after planting; or to protract it beyond the fifth or the sixth. March is the proper season for this operation. (*Plant. Calend.*, p. 296.)

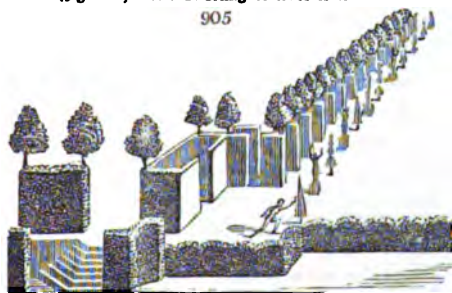
6392. *Pruning* is the most important operation of tree culture, since on it, in almost every case, depends the ultimate value, and, in most cases, the actual bulk of timber produced. In the purposes of pruning, as for most other practical purposes, the division of trees into resinous or frondose-branched trees, and into non-resinous or branchy-headed sorts, is of use. The main object in pruning frondose-branched trees is to produce a trunk with clean bark and sound timber; that in pruning branchy-stemmed trees is principally to direct the ligneous matter of the tree into the main stem or trunk, and also to produce a clean stem and sound timber, as in the other case. The branches of frondose trees, unless in extraordinary cases, never acquire a timber size, but rot off from the bottom upwards, as the tree advances in height and age; and, therefore, whether pruned or not, the quantity of timber in the form of trunk is the same. The branches of the other division of trees, however, when left to spread out on every side, often acquire a timber-like size; and as the ligneous matter they contain is, in general, far from being so valuable as when produced in the form of a straight stem, the loss by not pruning off their side branches, or preventing them from acquiring a timber-like size, is evident. On the other hand, when they are broken off by accident, or rot off by being crowded together, the timber of the trunk, though in these cases increased in quantity, is rendered knotty and rotten in quality.

6393. *With respect to the manner of pruning*, where straight timber is the object, both classes, in their infancy, as Sang observes, should be feathered from the bottom upwards, keeping the tops light and spiral, as in *fig. 904. a*. The proportion of their tops should be gradually diminished, year by year, till about their twentieth year, when they should occupy a third part of the height of the plant; that is, if the tree be thirty feet high, the top should be ten feet (*b*). In all cases, in pruning off the branches, the utmost care must be taken not to leave any stumps sticking out, but to cut them in to the quick. It is only by this means that clean timber can be procured for the joiner; or slightly smooth-stemmed trees to please the eye. It is a very general practice to leave snags or stumps (*c*): before the bole can be enlarged sufficiently to cover these, many years must elapse; the stumps in the meantime become rotten; and the consequence is timber which, when sawn up (*d*), is only fit for fuel. Pontey says, "The sap of a tree may be considered as the raw material furnished by nature; and man, the manufacturer who moulds it into the form most useful for his purpose." (*Forest Pruner*, pp. 152, 153.) Both Pontey and Sang seem to be of opinion that a considerable quantity of the branches and leaves of a tree may be removed without much diminishing the bulk of timber produced; but, since it is acknowledged that the strength of the roots of every plant depends on the strength of its top, and *vice versa*, the opinion of these writers, though both practical men of great experience, must be considered as erroneous. (*See Gard. Mag.*, vol. x. p. 293.)



6394. *Pruning for ornament or beauty* must be guided in its operations by what that beauty is. If it is the beauty of art, then the trees may require to be cut or clipped into the shape of animals; or inani-

mate natural objects, as mounds of earth, mushrooms; or geometric forms, triangles, globes, cones; or walls, columns, arcades, vases, arbours, temples, theatres, or other architectural or sculptural compositions. (*fig. 905.*) The dwarfing of trees is also another kind of artificial beauty, much practised by the Chinese; and though the habit be kept up chiefly by withholding nourishment,



yet the dwarf is produced by ringing a branch; enveloping it in a ball of loam; amputating it when it has made roots; and then pinching off all exuberance of growth, so as to keep it into shape. (*Livingstone in Hort. Trans.*, vol. iv. p. 294.)

6395. *If natural beauty is desired*, then the pruning must be rather negative than positive; the object being to let the tree assume its natural shape, or, as Sang describes it, "express its own nature." All that man can do, therefore, in the way of pruning for this object, is to assist a plant of the tree kind to express the characteristics of a tree; that is, a powerful trunk and ample spreading head, which distinguishes it from a shrub;

and this he does by clearing a part of the tree of its side branches; and by avoiding to train up a shrub with a single stem like a diminutive tree.

6396. *The general seasons of pruning* are winter and spring, and for the gean (wild cherry) midsummer, as it is found to gum very much at any other season. Pontey says, "as to the proper season for pruning, there is only one difficulty; and that is discovering the wrong one, or the particular time when trees will bleed. Only two trees have been found which bleed uniformly at certain seasons, namely, the sycamore and fir, which bleed as soon as the sap begins to move. In spring pruning, desist when this takes place." As a general rule, he thinks "summer preferable to winter pruning; because, in proportion as wounds are made early, they heal so much the more in the same season." (*Forest Pruner*, p. 226.) Sang suspends pruning from the end of February to the middle of July, but carries it on during every other month of the year; the gean, or any other tree very apt to gum, he prunes only in July and August. (*Plant. Kal.*, p. 268.) Mr. Main, who has considered the subject of pruning physiologically, and has been a practical pruner for upwards of forty years, prefers pruning in the beginning of summer; "because wounds made in winter do not begin to heal till after the summer growth takes place;" and because timber is deteriorated by pruning when the wounds made are not healed during the summer succeeding the time of performing the operation. (*Gard. Mag.*, vol. viii. p. 304, 305.)

6397. *Main's general rules for pruning* are:—"No branches to be cut off which do not interfere with the leader; no wound thus or otherwise made to be larger than an inch in diameter; and no pruning in autumn." These rules contain the essence of all which can be said on the subject of pruning. They are

admirably expatiated on by Mr. Malm in his *Essays on Vegetable Physiology*, and in an excellent article *On Pruning Forest Trees*, in the *Gardener's Magazine*, vol. viii. p. 304, already referred to. (See *Beg. of Agric.*, 2d edit. § 3894.) In the tenth volume of the *Gardener's Magazine* will be found a most valuable paper on pruning both resinous and soft-wooded trees, by Mr. Burton. It is full of the soundest practical views, the result of physiological knowledge, and half a century of experience and devotion to the subject. The essence of this paper will be found in our *First Additional Supplement to the Encyclopædia of Agriculture*.

6308. *Resinous trees*, Pontey and Sang agree, should not be pruned as so early an age as the non-resinous kinds. Sang commences about the sixth or eighth year, according to their strength or vigour, and removes no more than one or two tiers of branches at once. Pontey, when the plants are about eight feet high, gives the first pruning by "displacing two, or at most three, tiers of the lower branches; after which, intervals of three years might elapse between the prunings; never displacing more than two tiers at once, except more shall prove dead." (*Forest Pruner*, p. 304.) Sang judiciously observes:—"Excessive pruning, either of pines, firs, larches, or deciduous trees of any sort, is highly injurious, not only to the health of the plant, but to the perfection of the wood. If a sufficient number of branches are not left on the young plant to produce abundance of leaves, perfectly to concoct its juice, the timber will be loose in its texture, and liable to premature decay." (*Plant. Kal.*, p. 182.) The opinions of Nicot and Montezak are at variance with those of Pontey and Sang, as to pruning resinous trees. Nicot advises leaving none (*Pract. Plant.*, p. 213), and Montezak (*For. Guide*, p. 45), says, "Never cut off a branch till it has begun to rot, as the bleeding of a live branch will go far to kill the tree." Mr. Malm considers that all the pine and fir tribe, intended to produce clean sound timber, should be planted close, and suffered to grow up together, and, when they have attained a proper size, cut down all at once like a crop of corn. (*Gard. Mag.*, vol. viii. p. 307.) Mr. Ellis also is decidedly against pruning the Scotch pine, and silver and spruce firs, at all; the larch he admits may be pruned to a certain extent. (*Ibid.*, vol. vi. p. 547.) Billington recommends a system of pruning which he calls foreshortening, which is nothing more than pinching off, from time to time, the leading buds of the side branches, and which, as Mr. Malm has shown in the article above referred to, is particularly applicable to resinous trees when planted as nurseries. The fallacy of the theory and practice of Pontey and Salmon with respect to pruning the pine and fir tribe has been pointed out by Cruickshank in his *Practical Planter*, and by Sir Henry Stuart in his *Planter's Guide*, as well as by various other writers; and we are informed that the fir timber, which has been felled during the last five or six years at Woburn Abbey, where Pontey and Salmon pruned extensively, as well as at other places where the former was employed as forest pruner, is found to be full of defects occasioned solely by pruning. (See the article *Larch* in the *Arboretum Catalogue*.)

6309. *Non-resinous trees*, Sang observes, "should be pruned betimes, or rather from their infancy, and thenceforward at intervals of one, or at most, two years. If the pruning of young forest trees is performed only at intervals of eight or ten years, the growth is unnecessarily thrown away, and wounds are inflicted which will ever after remain blemishes in the timber; whereas, if the superfluous or competing branches had been removed annually, and before they attained a large size, the places from which they issued would be imperceptible, or, at least, not hurtful to the timber, when it came to the hands of the artist. The pruning of all deciduous trees should be begun at the top, or, at least, those branches which are to be removed from thence should never be lost sight of. Having fixed upon what may be deemed the best shoot for a leader, or that by which the stem is most evidently to be elongated and enlarged, every other branch on the plant should be rendered subservient to it, either by removing them instantly, or by shortening them. Where a plant has branched into two or more rival stems, and there are no other very strong branches upon it, nothing more is required, than simply to lop off the weakest clean by the bole, leaving only the strongest and most promising shoots. If three or four shoots or branches be contending for the ascendancy, they should, in like manner, be lopped off, leaving only the most promising. If any of the branches which have been left farther down on the bole of the plant at former prunings have become very strong, or have extended their extremities far, they should either be taken clean off by the bole, or be shortened at a proper distance from it; observing always to shorten at a lateral twig of considerable length. It is of importance that the tree be equally poised; and, therefore, if it have stronger branches on the one side than the other, they should either be removed or be shortened. Thus, a properly trained tree, under twenty feet in height, should appear light and spiral, from within a yard or two of the ground to the upper extremity; its stem being furnished with a moderate number of twigs and small branches, in order to detain the sap, and circulate it more equally through the plant. Trees of this size, standing in a close plantation, after being properly formed, will require much less attention; indeed, subsequent prunings will mostly consist in keeping their leading shoots single. From the want of air, their lateral branches will not be allowed to extend, but will remain as twigs upon the stem. These, however, frequently become dead branches; and if such were allowed to remain at all on the trees, they would infallibly produce blemishes calculated greatly to diminish the value of the timber. (*Plant. Kal.*, p. 180.)

6400. *Heading down such non-resinous trees as stole* we have already (6336.) stated to be an important operation. After the trees have been three or four years planted, Sang directs that such as have not begun to grow freely should be headed down to within three or four inches of the ground. The cut must be made with the pruning-knife in a sloping direction, with one effort. Great care should be taken not to bend the tree too much in the act of cutting. By so bending, the root may be split, a thing which often happens. The operation should be performed in March, and not at an earlier period of the season, because the wounded part might receive much injury from the severe weather in January and February, and the expected shoot be thereby prevented from becoming strong and vigorous. (*Plant. Kal.*, p. 297.) Buffon, in a memorial on the culture of woods, presented to the French government in 1748, says he has repeated this experiment so often, that he considers it as the most useful practice he knows in the culture of woods.

6401. *For the purpose of producing bends for ship timber, various modes of pruning have been proposed.* According to Pontey, "little is hazarded by saying that, if plenty of long, clean, straight, free-grown trees could be got, bottling and a screw apparatus would form bends." Montezak, a timber valuator of great experience, and in extensive practice, says, the value of the oak, the broad-leaved elm, and Spanish chestnut, depends a good deal on their being crooked, as they are all used in ship-building. He says he has seen trees successfully trained into crooked shapes of great value, in the following manner:—"If you have an oak, an elm, or chestnut, that has two stems, as it were, striving for the superiority, lop or pinch off the straighter stem; and if a tree that is not likely to be of such value be standing on that side to which the stem left seems to incline to a horizontal position, take away the tree, and thus give the other every chance of growing horizontally. At this time it will be necessary to take away a few of the perpendicular shoots off the horizontal branch; and, indeed, if these branches, which is sometimes the case in these trees, seem to contend, take away most of them; but if they do not, it is better at this time not to prune these trees over-much, except the crooked shoots on the horizontal branch, till they arrive at the height of fifteen or even twenty feet. By this time it will be easily seen what kind of tree it is likely to form; and, if it inclines to grow crooked, lighten a little the top of the tree, by taking off a few of the crooked branches on the straighter side, allowing all the branches to remain on the side to which the tree inclines to crook, to give it more weight, and to draw most of the sap or juice that way, and it will naturally incline more to the crook; at the same time clearing away any other tree on the crooked side, that may be apt, with the wind, to whip the side of the tree which inclines to crook, also taking away such trees if less value as may prevent it from spreading out to the one side more than to the other. He adds, "I have myself tried the experiment with several oak trees at about twelve feet high that were a little inclined to

crook, and that had also a main branch inclined to a horizontal position. In the course of less than twenty years I had the pleasure of seeing some of these very trees grow so very crooked that the branch would work in with the main stem or body of the tree, to a complete knee, or square, which is the most valuable of all trees. And as ten trees of crooked oak are required for one straight one, it is of the most essential consequence to have crooked oak trees; and, besides, an oak tree properly crooked, that will answer for a large knee, say the main branch, to be fit to work in with the body or trunk of the tree without much waste of wood, is nearly double in value to the same number of straight trees; and, indeed, knees of oak are extremely scarce, and difficult to be got."

6402. *Pontay* "knows of no way by which bends of tolerable scantlings (knees excepted) can be produced with certainty and little trouble, but from a side branch kept in a bent position by the branches of another tree or trees overhanging its stem." (*Forest Primer*, p. 174.)

6403. *Mathews*, in his directions for training trees so as to produce crooked timbers for shipbuilding, sometimes employs force to retain entire trees, or their branches, in particular positions, sometimes heads down the main stem, and depends on the crooked form of the branches; but he chiefly depends upon the effect of one tree upon another when planted close together, or, in other words, on accident. (*On Naval Timber*, &c., p. 30.)

6404. *Musro*, in order to produce crooked timber, has recourse to oak stools, from the young shoots produced by which he selects four or five of the strongest, and cuts off all the others. The selected shoots he then trains outwards by pegging, or otherwise fastening them to, or near to, the ground; bearing in mind that, whatever be the curve required, the shoot must always be kept straight in the direction of its length. (*Gard. Mag.*, vol. ix. p. 559.)

6405. *Coppice-woods*, in so far as grown for poles or barks, require pruning on the same principle as timber trees, in order to modify the ligneous matter into stem, and produce clean bark. In as far as they are grown for fence wood, fuel, or besom spray, no pruning is required.

6406. *Oster-holts* only require the laterals to be pinched off the shoots intended for hoops: those for the basket-maker seldom produce any. The stools also require to be kept free from dead wood and stunted knotty protuberances.

6407. *Hedgerows* require side pruning, or switching, from their first planting, so as gradually to mould them into "the wedge shape, tapering from bottom to top on both sides equally, till they meet in a point at the top. Two feet at bottom is a sufficient breadth for a five-foot hedge: a greater or a less height should have the bottom wider or narrower accordingly. In dressing young hedges, either of the deciduous or evergreen kinds, the sides only should be cut till the hedge arrive at the proposed height, unless it be necessary, for the sake of shelter, to cut their tops over, in order to make the hedge thicker of branches. Such cutting of the upright shoots, however, is not of any very great use in this respect; because every hawthorn hedge sends out a number of side shoots, which, if encouraged, by keeping the top narrow as above, will make it abundantly thick." (*Sang*, p. 447.) In pruning hedges, some use shears; but the hedge-bill (*fig. 364*) is the most proper instrument, and prunes a smooth, unfractured section, not so apt to throw out a number of small useless shoots as generally follow the bruised cut of the shears. (*fig. 386*.)

6408. *Hedgerows* trees require to be pruned to a tall, erect, clean stem, as at once producing more timber and doing least injury to the ground under their drip and shade.

6409. *Trees in strips for shelter, or screens for concealment*, ought to be furnished with branches from the bottom upwards; unless shrubby undergrowth supply this deficiency. Where this is not the case, care should be had that the trees be pruned into conical shapes, so as that the lower branches may be as little as possible excluded from the influence of the weather by the upper ones.

6410. *Trees for shade*, where shelter from winds is not wanting, should be pruned to ample spreading heads with naked stems; the stems should be of such a height that the sun's rays, at mid-day, in mid-summer, may not fall within some yards of the base of the trunk; thus leaving, under the tree, as well as on its shady side, a space for the repose of men or cattle.

6411. *Trees in parks* may be considered as chiefly ornamental; and, for this purpose, should be left with larger heads than such as are grown chiefly for timber. The height to which the stems are cleared of branches should vary according to the kind of tree (*fig. 906. a to e*); and hollies, thorns, and such



shrubs as are left untouched, or that are protected by enclosure from the cropping of cattle (*f, g*), should be left entirely to themselves. In parks, where no pruning whatever is given to the timber trees by man, we find they are all pruned or browsed to a certain height by cattle; this adds to their character as trees, but, in flat surfaces, forms a disagreeable repetition of the horizontal line in which they stand. To break this browsing line, pruning is a simple, obvious, and effectual resource.

6412. *Some trees, in pleasure-grounds and lawns*, where no cattle ever come, may be allowed to extend their branches so as they may almost recline on the turf; others may be pruned to different heights, according to their nature. Limes, planes, cedars, pines, and firs have a fine effect with their branches depending from their trunks; and give an idea of seclusion and exclusive consecration to man, highly characteristic of what is called pleasure-ground. Firs planted for ornament, Mr. Main observes, should stand at considerable distances, otherwise they never show the grandeur of their forms; though in this state the most worthless description of timber is produced. (*Gard. Mag.*, vol. viii. p. 307.)

6413. *With respect to the implements to be used*, Sang observes:—"In every case where the knife is capable of lopping off the branch in question, namely, in the pruning of infant plants, it is the only instrument necessary. All other branches should be taken off by the saw. A hatchet, or a chisel, should never be used. Every wound on the stem, or bole, should be quite into the quick, that is, to the level and depth of the bark; nor should the least protuberance be left. The branch to be lopped off by the saw should in all cases, be notched or slightly cut on the under side, in order to prevent the bark from being torn in the fall; and when the branch has been removed, the edges of the wound, if anywise ragged, should be pared smooth with the knife. If the tree be vigorous, nature will soon cover the wound over with bark, without the addition of any plaster to exclude the air. In the shortening of a strong branch, the position of which is pretty upright, it should be observed to draw the saw obliquely across it, in such a manner as that the face of the wound shall be incapable of retaining moisture; and afterwards to smooth the edges of the bark with the knife." (*Plant. Kal.*, p. 181.) In every case where the branches are too large for the knife, Pontay prefers the saw, as the best and most expeditious instrument; and one, the use of which is more easily acquired by a labourer than that of either the bill or axe. In "large work" he uses the common carpenter's saw; for smaller branches, one with somewhat finer teeth, with the plate of steel, and about twenty inches long.

6414. *The properly thinning out of plantations*, Sang observes, "is a matter of the first importance in their culture. However much attention be paid to the article of pruning, if the plantation be left too thick, it will be inevitably ruined. A circulation of air, neither too great nor too small, is essential to the welfare of the whole. This should not be wanting at any period of the growth of the plantation; but, in

cases where it has been prevented by neglect, it should not be admitted all at once, or suddenly. Opening a plantation too much at once, is a sure way to destroy its health and vigour. In thinning, the consideration which should in all cases predominate, is, to cut for the good of the timber left, disregarding the value of the thinnings. For, if we have it in our choice to leave a good and take away a bad plant or kind, and if it be necessary that one of the two should fall, the only question should be, by leaving which of them shall we do most justice to the laudable intention of raising excellent and full-sized timber for the benefit of ourselves and of posterity? The worse tree should never be left, but with the view of filling up an accidental vacancy."

6415. *In thinning mixed plantations*, the removing of the nurseries is the first object which generally claims attention. This, however, should be cautiously performed; otherwise the intention of nursing might, after all, be thwarted. If the situation be much exposed, it will be prudent to retain more nurseries, although the plantation itself be rather crowded, than where the situation is sheltered. In no case, however, should the nurseries be suffered to overtop or whip the plants intended for a timber crop; and for this reason, in bleak situations, and when perhaps particular nurse plants can hardly be spared, it may sometimes be necessary to prune off the branches from one side entirely. At subsequent thinnings, such pruned or disfigured plants are first to be removed; and then those which, from their situation, may best be dispensed with. At what period of the age of the plantation all the nurseries are to be removed, cannot easily be determined; and, indeed, if the nurseries chiefly consist of larches, it may with propriety be said, that they should never be totally removed, while any of the other kinds remain. For, besides that this plant is admirably calculated to compose part of a beautiful mixture, it is excelled by few kinds, perhaps by none, as a timber tree. (*Sang.*)

6416. *But when the nurseries consist of inferior kinds*, such as the mountain ash and the Scotch pine, they should generally be all removed by the time that the plantation arrives at the height of fifteen or twenty feet, in order that the timber trees may not, by their means, be drawn up too weak and slender. Before this time, it may, probably, be necessary to thin out a part of the other kinds. The least valuable, and the least thriving, should first be condemned, provided their removal occasion no blank or change; but where this would happen, they should be allowed to stand till the next, or other subsequent revision. At what distance of time this revision should take place, cannot easily be determined; as the matter must very much depend on the circumstances of soil, shelter, and the state of health in which the plants may be. In general, the third season after will be soon enough; and if the plantation be from thirty to forty years old, and in a thriving state, it will require to be revised again, in most cases, within seven years. But one invariable rule ought to prevail in all cases, and in all situations: to allow no plant to overtop or whip another. Respect should be had to the distance of the tops, not to the distance of the roots of the trees; for some kinds require much more head room than others; and all trees do not rise perpendicular to their roots, even on the most level or sheltered ground. (*Ibid.*)

6417. *With respect to the final distance to which trees standing in a mixed plantation should be thinned*, it is hardly possible to prescribe fixed rules; circumstances of health, vigour, the spreading nature of the tree, and the like, must determine. Whether the trees are to be suffered to stand till full grown; which of the kinds the soil seems best fitted for; whether the ground be flat or elevated; and whether the situation be exposed or sheltered, are all circumstances which must influence the determination of the ultimate distance at which the trees are to stand. It may, however, be said, in general, that, if trees be allowed a distance of from twenty-five to thirty feet, according to their kinds and manner of growth, they will have room enough to become larger timber. (*Ibid.*)

6418. *Plantations of Scotch pine*, if the plants have been put in at three feet or three feet and a half apart, will require little care until the trees be ten or twelve feet high. It is necessary to keep such plantations thick in the early stages of their growth, in order that the trees may tower the faster, and push fewer and weaker side branches. Indeed, a pine or fir-wood plantation should be kept thicker at every period of its growth than any of those consisting of hard wood and nurseries already mentioned. (*Ibid.*)

6419. *Plantations of spruce and silver fir*, intended for large useful timber, should be kept much in the manner above stated, both in their infancy and middle age. As already remarked, planting and keeping them as thick as is consistent with their health is the best means of producing tall, straight, clean stems and valuable timber. When planted for screens, or for ornament, they require to be left with all their branches on, as before stated. (*4007.*) (*Ibid.*)

6420. *To larch plantations*, the above observations will also apply; and, indeed, they are applicable to plantations of all kinds of resinous trees. It may be proper here to remark, that the exposed margins of all young plantations should be kept thicker than the interior. The extent to which this rule should be carried must be regulated according to the degree of exposure of the situation, the age of the plants, the tenderness of the kinds, and other circumstances. (*Ibid.*)

6421. *The proper seasons for thinning* are autumn, or very early in spring, where the trees are to be taken up by the root and replanted elsewhere; and winter for thinning for timber and fuel; but such trees as are valuable for their bark should be left untouched till the sap rises in April or May. Coppewoods require thinning when young, like other plantations, and, when once established, the stools require to be gone over the second year after cutting, and all superfluous suckers and shoots removed. This operation should be repeated annually, or every two or three years, in connection with pruning, till within three or four years of the general fall of the crop.

6422. *Ornamental plantations* require to be thinned on principles agreeable to the intention with which they were planted. In the artificial forms, the figure must be carefully preserved, as the main object; and in plantations in imitation of nature, the principle of grouping and connection must be kept steadily in view. A thin part is to be rendered thinner, and a thick group, or constellation of plants, not opened up, but merely deprived of such trees as are becoming smothered by the rest.

6423. *Improving neglected plantations*. Though it has been more or less fashionable, for upwards of a century, to form plantations; yet it has been also so generally the custom to neglect their future culture, that by far the greater proportion of the surface covered with trees in Britain may be considered as neglected or mismanaged. The artificial strips and masses have generally never been thinned or pruned; and the natural woods and copsewoods improperly thinned, or cut over. It is often a difficult matter to make much of such cases; and always a work of considerable time. "Trees," *Sang* observes, "however hardy their natures may be, which have been reared in a thick plantation, and consequently have been very much sheltered, have their natures so far changed, that, if they be suddenly exposed to a circulation of air, which, under different circumstances, would have been salubrious and useful to them, they will become sickly and die. Hence the necessity of admitting the air to circulate freely among trees in a thick plantation, only gradually and with great caution. To prevent a misfortune of this kind, a plantation which has become close and crowded, having been neglected from the time of planting till, perhaps, its twentieth year, should have only some of the smallest and most unsightly plants removed: one, perhaps, in every six or eight, in the first season; in the following season, a like number may be removed; and in two or three years after it should be gone over again, and so on, till it be sufficiently thinned. It will be proper to commence the thinning, as above, at the interior of the plantation, leaving the skirts thicker till the last: indeed, the thinning of the skirts of such a plantation should be protracted to a great length of time. With thinning, pruning to a certain extent should also be carried on. If the plantation," *Sang* observes, "consists of pines and firs, all the rotten stumps, decayed branches, and the like, must be cut off close by the bole. It will be needful, however, to be cautious not to inflict too many wounds upon the tree in one season; the removing of these, therefore, should be the work of two or three years, rather than endanger the health of the plantation. After the removal of these from the boles of the firs and larches, proceed every two or three years, but with a sparing hand, to displace

one or perhaps two tiers of the lowermost live branches, as circumstances may direct; being careful to cut close by the trunk, as above noticed. In a plantation of hard wood, under the above circumstances, the trees left for the ultimate crop are not to be pruned so much at first as might otherwise be required; only one or two of their competing branches are to be taken away, and even these with caution. If it be judged too much for the first operation to remove them entirely, they may be shortened, to prevent the progress of the competition; and the remaining parts may be removed in the following season; at which time, as often observed, they must be cut close by the bole." (*Plant. Kal.*, p. 487.)

6434. *The operation of thinning and pruning, thickening or filling up, or renewing portions that cannot be profitably recovered, should thus go on year after year, as appearances may direct, on the general principles of tree culture. And for this purpose the attentive observation and reflection of a judicious manager will be worth more than directions which must be given with so much latitude. Fontey has noticed various errors in Kennedy's Treatise on Planting, and even in Sang's Kalendar, on the simple subject of distances, which have originated in their giving directions for anticipated cases, which had never come within their experience. "Most people," he says, "take it for granted, that if trees stand three feet apart, they have only to take out the half to make the distances six feet, though, to do that, they must take down three times as many as they leave. By the same rule, again, most people would suppose, that twelve feet distance was only the double of six; but the square of the latter is only thirty-six, and that of the former one hundred and forty-four, or four times the latter; so that, to bring six feet distances to twelve, three trees must be removed for every one left." (*Profitable Planter*, p. 256; *Forest Pruner*, p. 31.)*

6425. *Copsewoods are sometimes improved by turning them into woods, which requires nothing more than a judicious selection and reservation of those shoots from the stools which are strongest, and which spring more immediately from the collar. But a greater improvement of copsewoods consists in cutting*



over the overgrown and protuberant stools, by the surface of the soil (*fig. 907. a, b, c, d*), which has been found by Monteath completely to regenerate them. The operation is performed with a saw, in a slanting direction, and the young shoots, being afterwards properly thinned and pruned, soon establish themselves securely on the circumference of large, and perhaps rotten-hearted, roots. (*Forester's Guide*, p. 60.)

6426. *Hedgerows are often neglected, and, like larger plantations, require restoration by cutting down and filling in vacancies, and by cultivating the soil at their roots. Hedges, Sang observes, which have been long neglected, shoot up to a great height like trees, become naked at bottom, and occupy too much ground, at least for lands in a state of high cultivation. The best method of reducing such to a proper size, and of forming them into an immediate fence, is by plashing.*

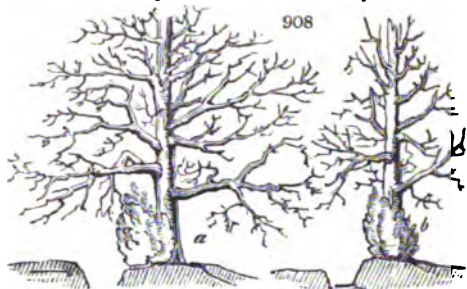
6427. *Plashing. This consists in selecting the strongest and straightest shoots. These are to be dressed up and headed down to four feet, and in such a way that the tops of the whole may range in a straight line. These are called the stakes; and, when they are deficient, either in strength or number, recourse must be had to artificial stakes, which must be driven in to stand firm, and supply the deficiency of natural ones. Having proceeded thus far in preparing the hedge for plashing, the hedge is to be begun at one end, and bend down as close as possible the remaining pliable branches, crossing them in the manner of basketwork. Such are too strong to be bent, may be cut half through with the bill, which will render them pliable enough to be used; and such as are not required for any of the above-mentioned purposes, must be cut off close to the ground. After the plashing is finished, the hedge should be dressed smooth on both sides by the switching-bill or shears. There is another method of plashing, which has been suggested as an improvement upon the foregoing; and that is, by not cutting any of the stems over as stakes, but weaving in the tops along with the other branches. This method will not have so immediate a tendency to bare the lower parts of the hedge by the growth of the top, as when any of the plants are cut over for stakes; but still, at the bendings, the growth will rush out with vigour; besides, this plan is attended with more labour. Indeed, the best security against baring the bottom of a plashed hedge, is by cutting over by the surface as many of the plants as can be at all spared; and the shoots arising from these will soon thicken the hedge at bottom. Plashing can only be effectually and handsomely performed, when there is a good portion of long, pliable, and well-feathered branches, and where the hedge has, if not youth, at least vigour, on its side. After the plashing is completed, the ditch is to be scoured out, and the bottom of the hedge cleaned and dressed up, in the same neat manner as if all were new work.*

6428. *Cutting over old hedges is a much less expensive method of reclaiming or renewing, than any of the above; and, perhaps, in most cases, may be a more eligible one; save when an immediate fence is the object. In cutting down an old hedge, there is certainly a very fit opportunity of laying the foundation of a complete and durable fence. The nature of the cutting must be regulated by circumstances, according to the age, the strength, or the closeness of the hedge, and whether it have been planted in single or double rows. If the hedge in question be pretty vigorous and branching towards the bottom, and if the stems stand regularly and closely together, it may be brought into due subjection, without being cut down to the ground. In this case, the sides are first to be switched up with the hook, not altogether close to the stems, but within about a foot of them on each side at bottom, tapering up close at top, which should be four or five feet high, according to the general height of the hedge; but if the hedge be thin at bottom, it will be advisable to cut more in, in order to make it bushy from the ground upwards. If the hedge is not regularly close from end to end, but ragged, and full of gaps, the best method is to cut it over, within eight or ten inches of the ground, and to fill up the gaps with stout well-rooted plants of the same kind; or the gaps may be mended by the following method:—Let one of the stoutest thorn plants next to the gap be reserved uncut, and the space be dug over, or it may require to be filled up with rich earth to within three inches of the height of the top of the ditch. Then having cleaned the thorn plant of all side branches or twigs, cut it half through at the height of the earth in the gap, on the side farthest from it, and lay it down upon the earth, securing the most distant end from rising up by a hooked pin; then cover it all over with rich earth, so as to make it the general height of the top of the ditch; and the thorn plant so laid down and covered, will take root, and send up a profusion of shoots over its whole length. If one plant will not reach the whole extent of the gap, one at each side probably will. The surface of the bank should be pointed up, and the ditch scoured as above directed in plashing. (*Sang*.)*

6429. *In other cases, when the hedge is getting thin below, or too tall, and when the stems are placed regularly within eight or ten inches of one another, and where it is necessary to retain a fence and at the same time to cut so as to have a supply of young shoots from the bottom, the plan to be followed is to cut alternately the one part to within eight or ten inches of the bottom, and the other at four feet high, dressing the bank and scouring the ditch, as directed above. In cases where two rows of quicks have been planted, the front one is to be cut by the surface, and the other at four or five feet high, as circumstances may require. (*Ibid.*)*

6430. *Neglected hedgerow timber may be improved by pruning according to its age. Blaikie recommends what he calls foreshortening, or cutting in, as the best method both for young and old hedgerow timber. "This operation is performed by shortening the over luxuriant side-branches (*fig. 908. a*), but not to cut them to a stump, as in snag pruning; on the contrary, the top only of the branch should be*

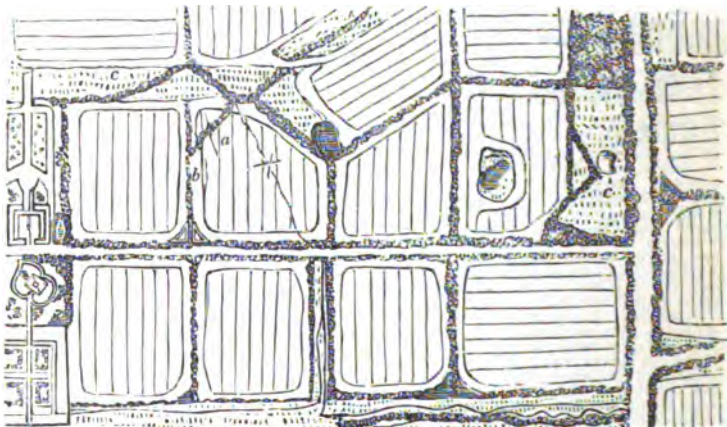
cut off, and the amputation effected immediately above where



an auxiliary side-shoot springs from the branch on which the operation is to be performed (b); this may be at the distance of two, four, or any other number of feet from the stem of the tree; and suppose the auxiliary branch which is left (when the top of the branch is cut off) is also over luxuriant, or looks unsightly, it should also be shortened at its sub-auxiliary branch, in the same manner as before described. The branches of trees pruned in this manner are always kept within due bounds; they do not extend over the adjoining land to the injury of the occupier, at least, not until the stem of the tree rises to a height out of the reach of pruning, when the top branches can do comparatively little injury to the land. By adopting this system of pruning, the bad effects of close pruning on old trees, and snag pruning on young ones, will be avoided; the country will be ornamented; and the community at large, as well as individuals, benefited." Pruning by foreshortening, has been ably treated on, and strongly recommended, by Mr. Billington, in his *Series of Facts, on Raising, Pruning, and Training Trees, &c.*; and by Mr. Cree, in the *Quarterly Journal of Agriculture*. (See *Gard. Mag.*, vol. vi. p. 446. 473. 673. and *Low's Elements*, p. 388.)

6431. *Hedgerows* frequently require to be altered in direction, to improve the form, or increase the contents, of farm enclosures. (Fig. 909.) Generally, and especially in flat arable lands, this is done by

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eradicating such as are in unsuitable directions (a), and substituting others (b) in parallel, or at least in straight, lines; but in hilly grounds, and where the surface will be improved by shelter, it frequently happens that a crooked hedge is superseded by two straight ones, and the interval (c) filled up with plantation.

6432. *Ornamental plantations* are no less frequently neglected than such as are considered chiefly useful. Clumps, belts, and screens which have become thin, because they have not been thinned, are almost everywhere to be met with. "In those neglected plantations," says Lord Meadowbank, "where daylight may be seen for miles, through naked stems, chilled and contracted by the cold, the mischief might, perhaps, be partially remedied, by planting young trees round the extremities, which, having room to spread luxuriantly, would exclude the winds, and the internal spaces might be thickened up with oak, silver fir, beeches, and such other trees as thrive with a small portion of light. When once the wind is excluded, the

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weakest of the old trees might be taken out, and the others left to profit by the shelter and space that is afforded." (*Life of Lord Kames, by Tytler*.) One of the most hopeless cases of improvement in this department is that of an old clump of Scotch pines (Fig. 910), from which scarcely any trees can be taken without risking the failure of the remainder. The only way is to add to it, either by some scattered groups in one direction, or in various directions. Where a clump consists of hard wood, either entirely or in part, it may sometimes, if effect permits, be reduced to a group, by gradually reducing the number of the trees. The group left should be composed of two or three trees of at least two species, different in bulk, and some what in habit, in order that the combined mass may not have the formality of the clump.

6433. *Scattered trees in ornamental scenery* otherwise of very good shapes, and very well managed as to pruning, destroying the browsing line, &c. individually, are often, from want of thinning in some places, and thickening in others, deficient in massiness (Fig. 911.); the obvious remedy is to thin out

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some (a), and plant others, so as to destroy the straggling non-cooperating appearance which such trees present, and produce something of grouping, connection, massiveness, and character. (Fig. 912.)

6434. *Wounds, bruises, casuallties, and defects of trees.* Small wounds, such as are required to be made by judicious pruning, easily heal up of themselves; large wounds, by amputations of branches, above six inches' diameter, should, if possible, never be made. Even wounds of six inches' diameter, or under, will heal quicker by the application of any material which excludes the air and preserves the wood from corruption; and we agree with Sang in recommending coal-tar, or the liquor produced from coals in manufacturing gas. It is, however, less favourable to the progress of the bark over the wound than a coating of clay or cow-dung, covered with moss to keep it moist. Pontey recommends putty and two coats of paint over it. In case the wood, at a *bruised* or amputated place, have by neglect become already corrupted, the rotten or dead wood is to be pared out quite into the quick; and the wound is then to be dressed with tar, or clay covered with a piece of mat, sacking, or moss. A wound, hollowed out as above, may at first appear an unsightly blemish; but, in subsequent years, nature will lay the coats of wood, under the new-formed bark, thicker at that place; and probably may, in time, fill it up to be even with the general surface of the tree.

6435. *All fractures*, by whatever means produced, are to be managed as the circumstances of the case require. If a large branch be broken over at the middle of its length, it should be sawn clear off close by the lateral which is nearest to the bole of the tree; but, if there is no lateral, or branch, capable to carry forward the growth, cut the main or fractured branch in quite to the bole. In both cases, treat the wounds as above recommended.

6436. *Interior rotting*, arising from the dampness of the soil, cannot by the art of man be cured; though it might have been prevented by timely draining. The hearts of trees frequently rot, where there is no excess of moisture, and especially such as have been produced from old roots left in the ground by a previous felling. Such roots, when in good ground, send up very great shoots with few leaves in proportion to their size; by the absence of a profusion of these, properly to concoct the juices so abundantly supplied by the roots, the fibre of the wood is loose and imperfect; the next season will supply more leaves in proportion to the supply of juices, yet not a sufficient number for making perfect timber; several years may pass before this event arrive; thus, crude and ill-digested timber, disposed to premature decay, is the foundation over which subsequent coatings of wood are laid; yet, however perfect these may be, they do not prevent the progress of decomposition going on in the interior. Nature teaches how necessary numerous leaves are to the proportion of the solid wood; the *cotyledons* and subsequent leaves of a one-year-old tree are a thousand times greater, compared to its solid contents, than are the leaves to the solid contents of the first year's shoots from roots like the above.

6437. *Shakes* often arise from the weight and multiplicity of top branches, and might have been prevented by timely pruning. Shakes or rents in the boles of trees, however, often happen where there is no excess of tops. Sometimes the rain, running down from the branches, wets one part of the bole, while the rest is comparatively dry. If this circumstance is succeeded by an intense frost, before the wetted side becomes dry, the bole may be rent for a great length, and perhaps to the depth of the core. Shakes or rents, like the above, are difficult to cure. The best method of helping them is, to trace out their upper extremity, caulk it up with oakum, and pitch it over, to prevent the rain descending that way in future. (*Sang*.)

6438. *In cases of hollowness*, Pontey recommends probing to the bottom, letting out the water, if any, with an auger, drying the cavity with a cloth, filling it with dry sand, plugging it with wood and oakum, and then painting it over.

6439. *Decoricated stems*, or branches stripped by lightning, or otherwise, if the soft wood is not much injured, will heal over and become covered with bark; and this the more certainly and rapidly, if the air be excluded by a coating of adhesive matter, as cow-dung and quicklime, or tying on moss or bandages of mat or cloth. Pontey gives an instance in which such treatment was successful in the case of an apple tree. (*Pruner*, p. 320.)

6440. *Withered or decayed tops* may arise from age and incipient decay; but also, as Pontey states, from improper pruning, or the want of it. We often see it from improper pruning of elms, which, after having been cut down to their summits for many years, are left entirely to nature; in that case they branch out luxuriantly below, and the top withers. By neglecting to thin out the branches on the stems of non-resinous trees, the same effect may be produced.

6441. *Stunted bushy tops* show a deficiency of nourishment: on very tall naked stems it is from these circumstances; and on short stems, from defects in the soil. *Obliquely placed misshapen heads*, in detached trees, commonly proceed from the same causes and want of shelter. Stunted growth, both in tops and stems, is also produced by ivy, and by lichens, mosses, the mistletoe, and other parasites. Ivy compresses the bark, precludes its expansion, as well as excludes air and moisture, by which the outer bark becomes rigid and corky. Trees will live a long time under the influence both of deformity and disease, though the timber produced must necessarily be defective.

6442. *Excessive eruptions of gum and resin* are peculiar to resinous and some other trees when over-pruned, or pruned at improper times. Mildew, honeydew, and aphides attack the oak, beech, poplar, and many trees: all that can be said is, if proper regimen has been regularly attended to, trees will overcome these and all other enemies.

6443. *Tree plantations are sometimes materially injured by animals.* Among quadrupeds, the most destructive are the long-tailed and short-tailed field mice (*fig. 913. a, b*), the hare, and the rabbit. The former two within these few years, have appeared in such incredible numbers in the New Forest, and in the Forest of Dean, that nearly all the plantations have been destroyed by them. The injury at one time became so extensive, that the noble rangers were alarmed, and Lord Glenbervie was indefatigable in his attempts to subdue these pernicious little animals. The mischief was occasioned by their barking the young plants all round the tree, from the ground, to the height of about six inches; and, in many cases, by their gnawing the root through and through. This first became apparent in the autumn of 1812, when a large quantity of five-year-old oaks and chestnuts, with many other forest trees, such as ash, larch, and fir, were planted at regular distances in the same enclosure: in the winter of that year, most of the hollies, whose shoots had got to the height of two, three, or more feet, were found to be barked, and either dead or dying. Various kinds of traps, poisons, &c., were tried, with little success: at length a number of trenches, or holes, were cut, of the following dimensions:—

They were eighteen to twenty inches deep at the bottom, about two feet in length, and a foot and a half in width; and, at top, only eighteen inches long and nine wide, or, indeed, as small as could be, to admit of the earth being got out of a hole of that depth; for the wider traps of this kind are below, and the narrower above, the better they answer their purpose. The holes were made



twenty yards asunder, or about twelve on an acre. To give some idea of the immense numbers of mice that infested the forest, it will be sufficient to state, that nearly 30,000 were caught in the traps alone; and that a far greater number had been previously destroyed by cats, stoats, weasels, kites, crows, and other animals, brought from all quarters for that purpose. Hares and rabbits are well known to injure trees by barking and gnawing the wood; and, to prevent this, it has been recommended to coat their stems with fresh cow-dung and urine: it may be laid on, with a brush, about two feet high from the ground, and a barrow load will suffice for a thousand trees, with stems from three to four inches in diameter, and one application will be sufficient for two years. (*Bull. in Cal. Hort. Mem.*, vol. iv. p. 190.) Grease, tar, and various other nauseous articles, have also been resorted to. Many persons plant the common laburnum, which hares are known to be very fond of, to preserve their more valuable trees; as the hares prefer the bark of this tree so greatly, as rarely to touch any other as long as they can obtain it. Squirrels are very destructive in plantations, by destroying the inner bark. (See *Gard. Mag.*, vol. vii. p. 245.)

6444. *The insects by which plantations are principally injured, are those generally termed timber borers. Many families of coleopterous insects, such as the capricorn and other beetles, live in their larva state en-*



tirely within the trunks of trees, which they perforate in all directions. The forests of Germany have been frequently devastated by a small beetle (*Böstrichus typographus F.*) which bores into the fir: these insects, in their larva state, feed upon the soft inner bark only; but forests are attacked by them in such vast numbers, that 80,000 have sometimes been found in a single tree; and it is supposed that, in the year 1783, more than a million and a half of trees in the Hartz forests were thus destroyed. Fortunately this scourge has never appeared in Britain. We have, however, the *Hylæsinus destructor* of Mac Leay, *Scölytus destructor* of Olivier (*Ag.* 914); a small beetle and the cause of the destruction now going on among the elms in Hyde and St. James's parks, and in Kensington Gardens. Mr. MacLeay, at the request of the park ranger, Lord Sidney, drew up a valuable report on the subject, which was printed in the *Edinburgh Philosophical Journal*, No. xxi. It appears from this, that the perfect insects (*a*, natural size; *d*, magnified) may be found in great numbers flying about the parks, and even in the streets of London, early in the spring; and that from that time until the end of summer, the females are busily employed in perforating the trunks of the elms. After making her way through the bark, the female insect proceeds to form a passage (*b*) between that and the wood, depositing her eggs on each side as she advances, and then dying at the end of the passage. The eggs are placed close to each other; and when hatched, the larvæ begin to work at right angles (*c c*) from the path (*b*) of the parent, proceeding in a direction almost parallel with each other. The best remedy against these insects that has yet been suggested, appears to be that recommended by Mr. MacLeay; viz., "That the trees should be inspected twice a year: in summer, when the perfect insect is on the wing; and again in winter, when badly infested trees ought to be cut down and burned. If the state of

the tree be not bad enough to warrant this summary mode of treatment, it may be subjected to such heat or fumigation as will destroy the larvæ; or covered over, with a mixture of tar and train oil, in March, to a certain height from the ground." In the *Gard. Mag.*, vol. i. p. 378—382, and *Mag. Nat. Hist.*, vol. iv. p. 152—156., are exhibited opinions, supported by adduced facts, opposed to that advanced by Mr. MacLeay, representing that the *Scölytus destructor* follows disease in trees, and does not occasion it.

6445. *Pine and fir trees are liable to the attacks of two species of hymenopterous insects; Sirex gigas, and Juvénicus. (Ag.* 915.) The latter, in point of size,



is rather less than the former; the body is of a beautiful steel blue, and the wings brown: the injury is done by the larvæ, which reside in the trunk, and bore it so much as to bring on premature decay. These insects destroyed a great number of trees in the plantations of Mr. Foljambe both in Yorkshire and Wiltshire. The abdomen of the female (*e*) is furnished with a particular ovipositor. Several other internal feeders might be enumerated among the insect enemies to trees; but the injuries they occasion are not such as to deserve particular notice.

6446. *The insects which are external enemies to trees are, the cockchafer, the larvæ of sawflies (Tenthredinids), and various species of aphides; these devour the leaves, or suck the sap; but no applicable remedy against them has yet been proposed, except hand-picking. (See § 3040. to § 3106.; and also the Arboricultural Catalogue.)*

CHAP. VI.

Appropriating the Products of Trees, preparing them for Use or Sale, and estimating their Value.

6447. *Of the different products afforded by trees, the first is their leaves, which are or may be collected in close plantations for the sake of the manure they afford; and in open groves, parks, and lawns, for that purpose, and to prevent their injuring the grassy surface. Leaves are also gathered on the Continent as food for cattle. Though, at first consideration, leaves would appear to benefit pastures by sheltering the roots of the grass during winter, and afterwards rotting into manure; yet experience proves, that in considerable quantities they impede the growth of the grass plants, by bringing on decay at their roots. For this purpose, in well-wooded parks, the leaves are carefully collected in the beginning of winter, and carried to rot-heaps in secluded situations,*

where in two years from the time of gathering, they become the valuable mould so much in demand by the gardener. The foliage of the larch, and probably that of other needle-leaved trees, seems under certain circumstances to be an exception. (See the article *Larch* in the *Arboricultural Catalogue*, and also *Encyc. of Agriculture*, § 2790.)

6448. *Prunings or spray* are the next product of trees; those which they afford at a very early period, and all clippings of hedges or artificial forms, are only fit to be used as leaves; the larger prunings may be used for some of the various purposes to which copewood and the lop of trees are applied. On the Continent, and especially in Sweden and Norway, spray of all kinds is cut with the leaves on; and after having been carefully faggoted in summer, is dried and slacked for the use of cattle in winter. This was also the practice of the Romans, who preferred the spray of the elm, as the Swedes do that of the birch. (See *Encyc. of Agriculture*, § 7005.)

6449. *The thinnings*, when not beyond a suitable age, and taken up properly, and at a proper season, may be replanted in other situations, or as single trees and groups; or they may be used as hoops, hop-poles, poles for garden-training, for fencing, for props in coal-pits, and for a great variety of purposes; those whose barks are useful for tanning should not be cut down or rooted up till May; but the others at any time during winter. It is common to sort them into lots, according to their kind or size; and to faggot up the spray for fuel, besom-stuff, or for distilling for pyroligneous acid.

6450. *The seeds of trees* in general cannot be considered of much use beyond that of continuing the species, and therefore, in very particular cases, where it is desired a tree should attain bulk as rapidly as possible, the flowers should be pinched off as they appear. The seeds of the oak, beech, and sweet chestnut, however, are valuable for feeding swine, and where they abound may either be swept together, after they drop, and carried away and preserved dry in lots for that purpose; or, if other circumstances are favourable, swine may be driven under the trees to collect them. These, and other seeds, as the haw and holly, are also eaten by deer. The seeds of the trees mentioned, and of all the resinous tribe, are in general demanded by the nurserymen for the purposes of propagation. The seeds of almost all other trees and shrubs are also in limited or occasional demand; or may be collected for private sowing. They generally ripen late in the season, and are to be collected in the end of autumn or beginning of winter, with the exception of a few, such as the elm, poplar, willow, and one or two others, which ripen their seeds in May or June, and ought to be collected when they begin to fall.

6451. In *osier-groves*, willows, whether intended for the basket-maker or cooper, should not be cut till the second season after planting, in order to strengthen the stools; but by the third autumn the crop will be fit for the basket-maker, and the fourth, plantations intended for the cooper (hoops requiring the growth of two years) will be ready. The seasons for cutting are November and March; after the former period the wounds are apt to be injured by frost, and after the latter the sap is too far advanced; some is lost by bleeding, and the buds are developed too suddenly to admit of proper strength in the shoots. The cut should be made within three buds of the point whence the shoot issues, in a sloping direction, and the section on the under-side. In cutting hoop-willows, the swell at the bottom of the shoot only should be left, that being furnished with abundance of buds for future growth. After being cut, the hoops are trimmed from any side shoots, and tied up in bundles of a hundred, of six scores each. The willows are sorted into three sizes, and tied in bundles two feet in circumference, within a foot of the lower ends. When to be peeled, they are, immediately after cutting, set on their thick ends in standing water, a few inches deep, and there they remain till the sap ascends freely, which is commonly by the end of the succeeding May. "The apparatus for peeling is simply two round rods of iron, nearly half an inch thick, sixteen inches long, and tapering a little upwards, welded together at the one end which is sharpened, so as that it may be easily thrust down into the ground. When thus placed in a piece of firm ground, the peeler sits down opposite to it, and takes the willow in the right hand by the small end, and puts a foot or more of the great end into the instrument, the prongs of which he presses together with the left hand, and with the right draws the willow towards him; by which operation the bark will at once be separated from the wood: the small end is then treated in the same manner, and the peeling is completed. After being peeled, willow rods will keep in good condition for a long time, till a proper market be found." (*Samg.*)

6452. *Copewood* is generally cut over when the shoots of the stools have attained from three to five inches' diameter at their bases; some, grown chiefly for hop-poles, and ware or stuff for crates, hampers, or watted hurdles, are cut over earlier; and others, where small timber for fencing and other country purposes is wanted, are left later. In some parts of Herefordshire, where the oak grows with great rapidity, copewoods are cut over every twelve years; in the Highlands of Scotland, where it grows much slower, the time varies from twenty to twenty-five or thirty years. "The bark is there considered as having arrived at its utmost perfection, and at its highest value, at the age of between twenty and thirty years: under that age, its virtues are weak, and above it, it becomes coarse and loses its sap. Another important reason for cutting down oak coppice-wood about the above period, is suggested in the *Strathshire Report*, p. 218; namely, "that it is a fact established by experience, that it will not renew itself, if it remains uncut beyond the space of about forty years." (*Gen. Rep. of Scotland*, p. 218.) Where there is a considerable tract of copewood, it is common to *divide it into portions*, in number according to the period of cutting. These are to be cut in rotation, so that when the last portion is cut over, the first is again ready for cutting.

6453. *The season for cutting* the kinds of trees whose barks are not made use of, is winter and early in spring; but the oak and other trees which are peeled, are left till the middle of April or May. Birch and larch woods will peel nearly a month earlier than the oak. Should there be no frost, birch and larch may be peeled about the beginning of April; but the birch is commonly allowed to stand till July. If possible, oaks should be barked by the middle of June, as every ton of bark taken off after the 1st of July will be deficient two cwt. per ton, compared with the same quantity taken off in May or early in June.

6454. *The termination of cutting* is generally fixed for the 15th day of July, and after this date there should not be a single stem of oak wood cut that is intended for the growth; and as soon as possible after the 15th, the whole of the wood and bark should be carried away, now either by horse or cart be permitted to enter it after that period, for after the beginning of August, oaks make what is termed a Lammass growth, and the future prosperity and health of the coppice, in a great measure, depend on the first year's growth, as far as regards form and vigour of the shoots. (*Forester's Guide*, 69.)

6455. *The best mode of cutting* is evidently that of using a saw, and cutting the shoots over in a slanting direction close by the surface. When the stool, after having been cut several times, has acquired considerable diameter, it is customary in the midland counties, Marshall states, to hollow it out in the centre, from a notion that by rotting away the central roots, the circumferential stems will grow more vigorously, and become as it were separate plants. This is in fact the case in very old coppes. For several cuttings, however, it must evidently be the safer policy to keep the stool highest in the middle to throw off the rain, and preserve it sound.

6456. *Monteath* says, "It will be found, upon experiment, perfectly evident, that stools are best when dressed down to the surface of the ground (taking care always not to loosen the bark from the root, or allow it to be peeled off in the smallest degree below the earth, but rounded down level to it), and that these stools will send forth the most vigorous shoots, and be the stoutest and best throughout the age of the coppice." (*Forester's Guide*, p. 61.) From the late season at which the trees to be barked are generally cut, they often receive considerable injury, both from that circumstance, and the manner in which the

operation is performed. Monteth appears to us to have furnished the best directions for executing the work in a safe manner. He first sends a person furnished with an instrument with a sharp cutting edge (fig. 401.) through the copse, whose business is "to trample down the long grass or faggots all round the root, and then, to make a circular incision into the bark so deep as to reach the wood, at about an inch above the surface of the earth; thus the bark, when taken off, will injure no part of that which is below the circular incision."

6457. *The root of the tree being thus prepared*, the cutters ought to proceed to their part of the work, not with an axe, however, as is most generally recommended, but with a saw; because, in cutting with the axe, unless the root of the tree be so small in diameter as to be severed in one or two strokes at most, the axe loosens the root to such a degree, that it not only loses the present year's growth, but often falls altogether to grow. Therefore, if the diameter of the root be six inches, or upwards, it should always be cut with a cross-cut saw; entering the saw about half an inch above where the circular incision has been made into the bark, if a small tree; but if the tree be ten or twelve, or more inches in diameter, the saw ought to be entered two inches above it.

6458. *There are two advantages to be derived from cutting with the saw*: it has no tendency to loosen the root of the tree, but leaves it in such a condition as to be more easily and properly dressed; it also saves a portion of the wood that would otherwise be destroyed by the axe. On no pretence should oaks of six inches diameter be cut with an axe, but always with a saw. Having cut through the tree with a saw, take a sharp adze, and round the edges of the stool or root, going close down to the surface of the earth, taking with the adze both bark and wood, sloping it up towards the centre of the stool, taking particular care always that the bark and wood both slide, as if they formed one solid body, being sure always that the bark be not detached from the root. An objection has been made to this mode of cutting with the saw, as taking up too much time; but I have found that two men with a cross-cut saw, kept in good order, will cut as much as two men will with an axe. (*Forester's Guide*, p. 58.)

6459. *Branches and spray*. Disbarked timber is prepared for sale by being sorted into straight poles of the largest size, stakes and other pieces fit for palls, faggots, fuel, &c. The unbarked wood is similarly sorted; and affords, where there is much hazel or ash, cord-wood or bundles of clean shoots for making packing crates, hampers, &c., poles for hops, larger poles for fences, rails, paling-stakes, stakes and shoots for hurdles, beam-stuff, spray for distillation, and a variety of other objects according to the local demand, or the opportunity of supplying a distant market by land-carriage. The brush or spray of non-resinous trees is called in some places ton-wood, and is used for distilling the pyrogenous acid used in bleaching and calico printworks. "When wood of this description is sent to Glasgow, where there are extensive works for the purpose of distilling it, it sells readily at from 1s. 2s. to 1s. 10s. per ton; but when there are large cuttings, particularly of young woods, it is worth while to erect boilers near the wood to distil as these boilers can be erected at no great expense, and in this case the liquid is easily carried in casks to where it is consumed, at less expense than the rough timber could be; of course it will pay much better. Small wood of this description is also used for charcoal; but, in distilling it, there is part of it made into charcoal, which will supply the demand of that article, so that it is by far the most profitable way, when there is any great quantity to dispose of, to erect boilers and distil it; unless where the local situation of the wood will admit of its being shipped at a small expense, and carried to where the works mentioned are carried on. All kinds of wood will give the extract in question, except fir; but oak, ash, Spanish chestnut, and birch, are the best." (*Forester's Guide*, p. 155.) The process for preparing pyrogenous acid will be found described in the *Ency. of Agric.* § 4039, and in the *Gard. Mag.*, vol. ii. p. 351. Where the oak grows slowly, as in the Highlands, the butt ends of the poles are used for spokes for chaise-wheels. "Long spokes are from thirty to thirty-two inches by three inches and a half broad, and one inch and a half thick, and the short ones for the same purpose, from twenty-two to twenty-four inches long, and the same sizes otherwise. Cart-wheel spokes, from twenty-six to twenty-eight inches long, four inches broad by two inches thick. These are the sizes they require to stand when rough-blocked from the axe. Small wood, when sold for this purpose, brought, in 1820, 2s. a cubic foot, measured down to three inches square." (*Monteth*.)

6460. *In some cases copsewoods are sown with grass seeds, and pastured by sheep, horses, and cattle*. Some admit the animals the fifth year after the last cutting, others not till the eighth; but Monteth thinks this should never be done till the fifteenth year. If the ground is properly covered with trees, it can seldom be advantageous to admit any species of stock unless during a month or two in winter.

6461. *In the operation of barking trees*, "the barkers are each furnished with light short-handled mallets, made of hard wood, about eight or nine inches long, three inches square at the face, and the other end sharpened like a wedge, in order the more easily to make an incision in the bark, which is done all along the side of the tree which happens to be upmost, in a straight line; and as two barkers are generally employed at one tree, it is proper that, while the one is employed in making an incision with the mallet, as above, the other, being furnished with the barking-bill (fig. 401.), cuts the bark across the tree, in lengths of from two feet six inches to three feet. Having thus made the incision in the bark, both ways, the barkers being also each furnished with peeling-irons (fig. 397. to 400.), if the tree or piece of timber to be barked is such as the two barkers can easily lift one end of it, this is placed on two pieces of wood, three feet long, and called horses; these are about the thickness of a paling-stake, and have a forked end on each about six inches long, the other end sharpened to go into the ground; two of these horses are placed in a triangular form against one another, one end of the piece to be peeled being raised on the horses, the two barkers standing opposite to each other, and entering the peeling-irons into the incision made by the mallet, and pressing the iron downwards between the bark and the timber. In this way it will be found very easy to take the bark off in one whole piece round the tree; and, if possible, let these pieces be as long as the incisions made in the bark. In some cases, where there is not much sap, the bark may require a little beating with the mallet, to cause it to separate easily from the wood; but the less beating with the mallet the better, as it has a tendency to blacken the bark in the inside, or fleshy part of it, so that, when the tanner sees it, he supposes it to be damaged, and undervalues it. The branches of the tree being previously all lopped off with the axe, the persons, in number according to the extent of the work, with the bill smooth all the branches, cutting them in lengths of from two feet six inches to three feet, down as small as one inch in circumference. The barkers, principally women, are each provided with a smooth hard stone of about six or eight pounds weight, beside which they sit down, and having collected a quantity of saplings, branches, or twigs, they hold it on the stone with one hand, and with the mallet in the other, they beat the piece till the bark be split from the wood, from the one end to the other, and taking it off all the length of the piece, if possible, then lay it regularly aside, till a bundle of considerable size is formed."

6462. *Drying the bark*. "The point most particularly to be observed in this art is, putting the bark up to dry; which is done by putting the bark upon what is called the lofts or ranges. These are erected by taking forked pieces of the longest, called horses, the one three feet long, the other two feet six inches, and driving each about four inches into the ground, opposite one another, about two feet asunder in the breadth, and as much betwixt them, lengthwise, as will admit long small pieces of wood to be put upon them, and as many of these must be put together as will hold the bark of every day's peelings. These ought to be erected in as dry and elevated a spot as can be found in the margin of the wood, or on the outside of it. The bark being carried and laid on this loft, is arranged so as have the thick ends of it all laid to the high side of the range, with the small bark laid on to the thickness of about six inches, and the bark taken off the largest of the wood which serves for a covering laid regularly on the top: the lofts or ranges having a declivity of about six inches, the rain will run off them readily; and if properly put up in this manner, the covering will keep out a great deal of rain. After the bark has lain in this state for

three days, if the weather is good and dry, it ought to be all turned over, and the small bark spread out, so as not to allow it to stick together, which, if much pressed, it is apt to do; and if it does so with the natural sap in it, it has a chance of moulding, which is extremely hurtful to the bark, and lessens it both in weight and in value. After the bark has stood on the ranges about eight or ten days, if the weather be good, it may either be put into a house or a shed, or, if intended to be put up into a stack, it may now be done. A stack of bark ought never to exceed eight feet in width, and twelve or fifteen feet in height, raised in the middle like a haystack. If it is to stand any length of time in the stack, it ought to be thatched, and in that state may remain all winter. The greatest care ought to be taken to preserve the colour of the inner parts of the bark, because the merchant or tanner judges of its value chiefly by its colour. Before being put into the stack, the natural sap ought to be dried out of it, in order to prevent its fermenting; because, if a fermentation takes place in one part of the stack, it generally goes through and spoils the whole. The same mode of treatment will do for all kinds of bark as well as the oak; but the birch has an outer or shready skin upon it, that is rejected by the tanner, and should be peeled off.

6463. *Chopping the bark.* "When the bark is ready for the tanner, it has to undergo the work of *chopping*, which is done by driving two or more stakes into the ground, with a fork on the upper end of each, leaving them about two feet six inches high, and laying a long small piece of wood across between the two, where a number of people stand. The bark being laid down behind them, they take it up in their hands and lay it on the cross tree; and then, with a sharp whittle or bill they cut it into small pieces, about three inches in length; when this is done, it is tramped into bags, which hold about two cwt. each. In these bags it is weighed when sold in tons, cwts., quarters, and pounds, and in the above manner delivered to the merchant or tanner." (*Forester's Guide*, p. 199.)

6464. *Pollard trees*, which may be considered in most cases as injurious deformities, are lopped at stated periods like copewoods, and the top, whether to be barked or otherwise, is to be treated in all respects like that of copes.

6465. *The period at which trees are felled*, for the sake of their timber, is determined by various causes. By maturity of growth, or where the annual increase is so trifling as to render their standing no longer worth while in point of profit: when wanted for private use or sale; or when defects in the tree, or new arrangements in its situation, point out the necessity of its removal. "A timbered estate," Marshall observes, "should frequently be gone over by some person of judgment; who, let the price and demand for timber be what they may, ought to mark every tree which wears the appearance of decay. If the demand be brisk and the price high, he ought to go two steps farther, and mark not only such as are full-grown, but such also as are near perfection." In trees, as in the human species, there are three stages, youth, manhood, and old age. In the period of youth, the growth is rapid; in manhood, that growth is matured; and in old age, it begins to decay.

6466. *The most profitable season for felling timber* is at what may thus be termed the beginning of manhood. After that time, though the tree may appear sound and healthy, its annual increase is so little, that it would be more profitable to cut it down and replant. The number of years that a tree may stand, before it arrives at this period, must vary in different soils and situations; but the period itself may easily be ascertained, by the annual shoots, the state of the bark, and by taking the circumference of the tree at the same place for two or three successive seasons, and comparing the difference. In the view of profiting from timber produce, it is of great consequence to cut down plantations at maturity. Many trees will stand half a century after they are full-grown, appear quite healthy, and, at the same time, make little or no increase of timber. But there are particular cases, arising from the nature and state of the markets, where it may even be more profitable to cut timber before it is arrived at a full growth. (*Treat on Country Residences*, vol. ii. p. 577.)

6467. *Preparations for felling.* It has been strongly recommended to disbark trees a year or more before they are taken down, in consequence of the result of certain experiments commenced by Buffon in 1757. In May of that year, he disbarked three oak trees, forty feet in height, where they stood. In the course of three years they died, and, on cutting them down, the outer wood was found hard and dry, and the internal wood moist and softer. After trying its strength, &c. he concludes, that "timber which has been disbarked and dried while standing, will weigh heavier, and prove stronger, than timber cut in its bark." Boec, and other French authors (*in Cours Compl. d'Agr. &c.*, art. *Aubier, Bois, Quercus*, &c.) strongly recommend this practice, which is followed in some places on the Continent, and in this country, with the oak and larch; but not, as far as we have learned, with any other tree. Montezem finds it by far the most efficient way of seasoning larch-timber. He barked some trees in spring, but did not cut them down till autumn, and others stood in the peeled state for two years. After various and extensive trials, he is "decidedly of opinion, that the larch treated in this way at thirty years of age will be found equally durable with a tree cut down at the age of fifty years, and treated in the ordinary way." (*Forester's Guide*, p. 152.)

6468. *As the dry rot (Merulius lachrymans Schum.)* is found to arise in a great measure from want of seasoning, or at least to proceed with the greatest rapidity in timber not well seasoned, this practice seems to deserve adoption in that point of view. (*Encyc. Brit. Suppl.*, art. *Dry Rot*.) A number of artificial methods have been proposed for the prevention or cure of this destructive production: the most approved modern recipe is the saturated solution of corrosive sublimate, first applied by Mr. Ryan. The details will be found in our *Encyclopædia of Cottage, Farm, and Villa Architecture and Furniture*, p. 2168. The seasoning of timber by evaporating the sap, which is done with the greatest rapidity by removing part of the atmospheric pressure, and applying artificial heat, was considered by the late Mr. Tredgold as the best of all modes of seasoning; effecting in four or five weeks what by the common process would require four or five years. (*Gard. Mag.*, vol. iv. p. 505.)

6469. *The season of felling* is commonly winter, for timber not to be disbarked; but some, for the resinous tribe, recommend summer as being the season in which it is generally felled in the north of Europe and in the Alps. But the summer season is there adopted from necessity, as in winter the woods are so filled up with snow that felling is hardly practicable. As the timber of these countries is generally squared for the market; the soft wood is chiefly removed, so that the season of felling does not seem as to them to be of much consequence. Besides, the timber is never so full of sap in summer as it is in spring and autumn; and, therefore, next to mid-winter, midsummer may be the next best time for felling all kinds of timber trees. Where the trees are disbarked at the base a year or more before felling, the soft wood will be partially hardened; but this practice is by no means general in the north.

6470. *Knowledge.* In a recent work on preserving the British Navy from Dry Rot, &c. after collecting the opinions of all the ancient and modern authors who have written on felling timber, concludes, that the common notion, that trees felled in winter contain less of sap or of the vegetable juices than those cut down at any other season of the year, is not true; and that the method of barking standing trees in spring, and not felling them till the succeeding winter, has not in any way realised the expectations formed of the plan. After describing all the different modes that have been adopted for seasoning timber, he concludes, that the best mode of seasoning is to "keep it in air, neither very dry nor very moist; and to protect it from the sun and rain by a roof raised sufficiently high over it so as to prevent, by this and other means, a rapid rush of air." (*Inquiry into the Means of preserving the British Navy from Dry Rot, &c.* by Knowles, Sec. to the Com. of Surveyors, chap. iii.)

6471. *The operation of felling* is performed either by digging an excavation round the stem, and cutting the root at two or three feet distant from it, or by cutting over the stem at the surface. By the former mode the root is obtained for use, and the ground more effectually cleared and prepared for the roots of other adjoining trees, or whatever crop is to follow. Where the tree is intended to stave, which can very seldom be advisable in the case of cutting full-grown timber, or where there is some nicety in

taking it down so as not to injure other trees or adjoining objects, it is cut or sawn over, and the root, if to be removed, dug out afterwards. In cutting down large trees, in order to make the tree fall the way required, enter the cross-cut saw on that side of the tree it is intended to fall, and cut it about a third part through, making a large notch there with an axe; then enter the saw at the other side, and when it is cut so far as to admit a wedge, place the wedge exactly opposite the notch, and keep driving it slowly till the tree is nearly cut through. It will fall exactly in the direction of the notch. (*Montesquieu*.)

6472. *Disbranching.* The tree, being felled, is next divested of its branches, which are sorted into fence-wood, fuel, ton-wood, &c., according to the kind of tree; and the trunk is generally preserved as entire as possible for the purchaser. Sometimes it is cut in two, and the root-cut, or butt-end, being the most valuable, sold, for one class of purposes, at a higher price, and the top-cut, for others, somewhat lower. Sometimes timber is purchased by private contract by the foot or load in a growing state, or after being cut down; in other cases regular sales are made annually, and the produce exposed for sale by auction. It is measured by the cubic foot, fifty of which are a load; and the calculated tables by *Measurer's Guide*, generally resorted to, are those of Hoppus.

6473. *The roots of trees* are the last product we shall mention. These should, in almost every case, be effectually eradicated; to aid in which, in the case of very large roots, splitting by wedges, riving by gunpowder, tearing up by the hydrostatic press, or by a system of cords and pulleys moved by a wheel and pinion, may be resorted to. Some compact ash or oak roots are occasionally in demand by smiths, leather-cutters, and others; but in general roots should be reduced to pieces not exceeding three feet long, and six inches in diameter, and put up in stacks, which in England are never less than three feet every way, but commonly contain two cubic yards. These, when dry, are sold for fuel, or reduced to charcoal on the spot. In eradicating and stacking up coppice-woods, it is common to allow a certain sum per sack, something for every acre of ground cleared; and if there are no trees to bark, the allowances are also made for the poles, faggots, &c. so that no part of the operation is performed by day-work.

6474. *The usual method of charring wood* is as follows:—

6475. *The wood being collected* near the place intended for the operation, and cut into billets, generally about three feet in length, the pits or stacks are usually formed in this manner:—A spot, adapted to the purpose, of from about fifteen or twenty feet in diameter, of a conical form, is selected, and after being properly levelled, a large billet of wood, split across at one end, and pointed at the other, is fixed in the centre of the area, with its pointed extremity in the earth, and two pieces of wood, inserted through the clefts of the other end, forming four right angles: against these cross-pieces, four other billets of wood are placed, one end on the ground, and the other leaning against the angles. A number of large and straight billets are afterwards laid on the ground, to form a floor, each being, as it were, the radius of the circular area; on this floor, a proper quantity of brush or small wood is strewn, to fill up the interstices, when the floor will be complete: and, in order to keep the billets in the same position in which they were first arranged, pegs or stumps are driven into the ground, in the circumference of the circle, about a foot distant from one another; upon this floor a stage is built, with billets set upon one end, somewhat inclining towards the central billet, and on the tops of these another floor is laid, in a horizontal direction, but of shorter billets, as the whole is intended, when finished, to form a cone. The whole is then coated over with turf, and the surface generally plastered with a mixture of earth and charcoal-dust.

6476. *Previous to the operation of setting fire to the pile*, the central billet in the upper stage is drawn out, and pieces of dry combustible wood substituted in its place, to which the fire is applied. Great attention is necessary during the process, in the proper management of the fire, and in immediately covering up the apertures through which the flame obtrudes itself, until the operation be concluded, which is generally effected in the space of two or three days, according to circumstances. When the charcoal is thought to be sufficiently burnt, which is easily known from the appearance of the smoke, and the flames no longer issuing with impetuosity through the vents, all the apertures are to be closed up very carefully with a mixture of earth and charcoal-dust, which, by excluding all access of the external air, prevents the coal from being any further consumed, and the fire goes out of itself. In this condition it is suffered to remain, till the whole is sufficiently cooled; when the cover is removed, and the charcoal is taken away. If the whole process is skilfully managed, the coals will exactly retain the figure of the pieces of wood: some are said to have been so dexterous, as to char an arrow, without altering even the figure of the feather. (*Encyc. Brit. vol. v. art. Charcoal*.)

6477. *The method of charring wood, for the making of gunpowder*, according to an improved system, adopted not many years ago, is, however, a much more costly operation, though the expense attending it is amply compensated by the superior excellence of the article when manufactured. It is done in iron cylinders; and in so complete a manner, that every particle of the wood is charred. The oily or tarry matter is also preserved, and may, so far as the quantity goes, be made use of instead of foreign tar or pitch. This mode of charring wood for making gunpowder is carried to the greatest perfection near Petworth in Sussex, and there is a manufacture of a similar nature near Chester. (*Gen. Rep. for Scotland, vol. ii. p. 332*.)

6478. *The valuation of trees* forms a distinct profession, and can only be acquired after much experience; like other valuations of property, it depends on a great variety of considerations, some of a general, but the greater part of a local, nature. All we shall here attempt is to give a few general ideas which may be of use to the private cultivator or forester.

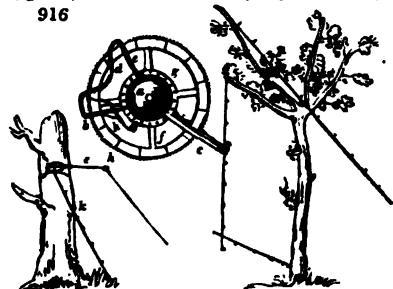
6479. *In valuing any plantation*, the first thing is to know its contents in acres; if this cannot be done, the number of plants must be counted. If a young plantation (the trees of which are unfit for present use as timber) is to be valued, then its value at any distant period, not exceeding twenty or twenty-five years, must be estimated; and whatever sum that estimate amounts to, the present value of that sum will give an idea of the value of the plantation, allowing liberally for accidents to the trees and other unforeseen circumstances. Thus, suppose a plantation of oaks, intended as copse, or actually established as such, to have grown four years, its present value would be next to nothing; but if arrived in its twentieth year, it would fetch 50*l.* per acre. Then the question is, required the present value of 50*l.* due sixteen years hence, the market price of money being five per cent. ? and this, according to any of the modern annuity tables (say *Baily's*, &c. 1808 tab. iv.) is 24*l.* 18*s.* This principle is applicable to all kinds of valuing by anticipation; and there is no other mode of valuing applicable to young plantations. The benefits derived from the trees in the way of shelter and ornament, are to be estimated in valuing the territory, and are foreign to the present purpose, which has for its object tree-produce only.

6480. *In valuing saleable trees* of any kind, their number per acre, or their total number by enumeration, being ascertained, and the kinds and sizes classed, then each class is to be estimated according to its worth as timber, fence-wood, fuel, bark, &c. "In a coppice-wood which cannot readily be measured, the readiest method of counting the stools is, to cause two men to take a line, say about a hundred feet long, or more, and passing the line round as many of the stools as it will enclose, the one man standing still, while the other moves round a new number of stools, and count always the stools betwixt the two lines, causing the one man to move the one time with the line, whilst the other man stands still, and so on alternately. The valuator at the same time taking care to average every twenty stools as they go on, before losing sight of the counted stools. This way, too, is a very speedy and sure method of counting the number of trees in any plantation. Or, the stools of a coppice-wood may be counted and averaged by two men going parallel to each other, and the person valuing going betwixt them; the two men putting up marks with moss, or pieces of white paper, on a branch of the stools; the one man going always back by the last-laid marks, and the valuator counting and averaging the stools betwixt the newly laid and the last-laid marks; counting and averaging the stools always as the men go on, taking only twenty, or even ten

stools at a time. To those who have been in the practice of doing this frequently, it will be found very easy, and will be done very speedily, and with a very considerable degree of accuracy. The proper method of learning to do this correctly is, when a person cuts an oak wood for the first time (or, even were the work repeated several times), he should then, in order to make himself perfectly acquainted with ascertaining the average quantity of bark that a stool, or even a stem of a stool, will produce, go before the peelers, and select a stool or stem; after having examined it narrowly, he supposes it to produce a certain quantity of bark, and marks this down in his memorandum-book. He then causes a person to peel it by itself, dry it, and carefully tie it up, and weigh it, and compare it with the weight he supposed it to produce, and he will at once see how near his calculation comes to the truth. A stem of oak from a natural stool, suppose it to measure in girth two inches, by seven feet long, will contain two solid inches and one third of an inch, according to the measurement of Hoppus. This stem or shoot will produce two pounds two ounces of bark. Again, a stem or shoot of natural oak, measuring four inches in girth, by nine feet in length, will be found to contain one solid foot of wood, and will produce thirteen pounds and a half of bark." (*Forester's Guide*, p. 170.)

6481. When growing trees are valued, an allowance is made from their cubic contents for the bark. The rule given by Monteath is, "when the girth or circumference is any thing from twelve inches up to twenty-four inches, then deduct two inches; from twenty-four to thirty-six, three inches; from thirty-six to forty-eight, four inches; from forty-eight to seventy-two, five inches; and above seventy-two, six inches." These deductions, he says, "will be found to answer in almost all trees; unless in such as are very old, and have rough and corky barks, or barks covered with moss, when an extra allowance is to be made." (*Forester's Guide*, p. 180.) "Many persons," the same author observes, "in valuing measurable oak trees, proceed on the datum that every cubic foot of timber will produce a stone (sixteen pounds) of bark. This," he says, "is not always correct;" and he states the following facts from his own experience, with a view to assist beginners in ascertaining the quantity of bark from various trees:—"An oak tree, about forty years old, measured down to four inches and a half side of the square, and weighing only the bark peeled off the timber that is measured, without including any of the bark of the spray, &c., every foot of measured timber will produce from nine to eleven pounds of bark. An oak tree, of eighty years old, weighing only the bark peeled off the measurable timber, as above, every foot will produce from ten to thirteen pounds of bark. Every foot of large birch timber, peeled as above, will produce fourteen pounds of bark. Every foot of mountain ash, as above, will produce eleven pounds and a half of bark. Every foot of the willow, unless a very old tree, will produce from nine to eleven pounds. Every foot of larch fir, not exceeding thirty years old, will produce from seven to nine pounds of bark. The timber of trees, particularly the oak, is peeled out, every branch and shoot, down as small as an inch in circumference." (*Forester's Guide*, p. 183.) The price of timber, like that of every other article in general use, varies with the supply and demand; and is easily ascertained from the timber-merchants at the different sea-ports; as is that of bark, charcoal, and firewood from the tanners and coal-merchants.

6482. To facilitate the measuring of standing timber, Monteath has invented a very ingenious machine, (fig. 916.) It consists of a wheel, or perambulator, about eight inches in diameter, with a bell (a) on the end of its axle; at the end of every foot gone over by the serrated circumference of the perambulator, this bell is struck by means of a spring (b); the sound of this bell will be heard from the top of the highest tree. A forked handle (c) works on the top of the main axle on each side of the wheel; one of a set of connecting rods (e, A) goes into it, and is fixed with a screw making a swivel joint, and by screwing the nut firm, the wheel can be set to any position, and it will work equally well any way. A small hand (d), in the circle of the triangular spring, points to the inches or quarters of an inch on the wheel, and tells what exceeds the inch after a lesser spring (e), which strikes at every inch, has struck the bell. The circumference of the wheel (f) measures two feet. The rods for working the measuring machine are each three feet long, and one inch in diameter, with connecting screws of brass on each end of them; so that as many as are required for any length or height can be easily



screwed into each other. The other small rods for taking the length of the tree, as also of its branches, are only five eighths of an inch in diameter: each rod is three feet long, and goes together with connecting screws of brass. The rods are painted black, and divided into feet and inches, with white letters; so that, by connecting any number of the rods together that may be required, and by applying them to the tree or branches (h), you can take the exact length in a speedy, accurate, and simple manner. (*Forester's Guide*, p. 307.) A very simple and effective dendrometer has been invented by Mr. Gorrie, which will be found figured and described in the *Gard. Mag.*, vol. ii. p. 3; and another will be found in the *Encyc. of Agric.*, 2d edit. t. 4076.

6483. The value of the invention consists in the use of the wheel, in taking the girth of the tree. Thus, "after having taken the length of the tree in feet and inches, which length may be taken by the rods as already described, the girth is most generally taken at half the length, which girth we are enabled to take with the measuring wheel: this is easily done, by putting up the wheel, with as many of the connecting rods together, as will put it up to the height required; then, suppose there are no branches in the way, and having before made a mark on the bark of the tree with the small rods, the uppermost one having a small marking-iron in its end for that purpose; this mark is made where the girth is to be taken, and from where you are to take your departure with the wheel, which being done, press the wheel round the tree, following it, and keeping it as level as possible, which the wheel will in a great measure do of itself, by its having teeth like a saw in the hem of the wheel, unless carelessly attended to. As the wheel goes round the tree, be sure to count the number of times the bell strikes, which it does at every foot; and when you see you have not another twelve inches or one foot more to run, to arrive at the place where you took your departure from, count the number of inches that it strikes over and above the last foot, and thus you will at once have the feet and inches that the tree is in circumference; of which take the fourth, and this gives you the side of the square: but when there are branches in the way of getting round the tree, you must have a spare handle for the machine (e, A), about two feet, or two feet six inches, in length; and by altering the swivel-joint at the top of the first rod to any position required, the person working the wheel by the rods can stand in the same place, and put the wheel, say half way round the tree, if it is very large, and by turning the swivel-joint, and reversing the wheel, at the same time sending it round the other side of the tree till it meet where it left off, and by counting the feet and inches as above, and adding the two together, you will at once have the extreme girth of the tree. When branches are to measure, or when branches are in the way of getting round the tree with the rods, the person with the small rods stands on the opposite side of the tree, and directs the person when to stop with the wheel. Thus, by a little practice in working the wheel, and paying attention to count the feet and inches as they strike, two men will measure growing or standing trees equally as accurately and expeditiously as if the trees were lying on the ground. In taking the girth with a line, you have first to put it round the tree, then you double it, and apply it to a foot-rule; you then take the half for the side of the square, whereas this machine gives you the exact feet

and inches from the top of the highest tree, without the help of any other rule." (*Forester's Guide*, p. 208.) Neither this machine, nor a mechanical dendrometer, invented about twenty years ago, though both of considerable merit, appear to us so well calculated for general use as the *Timber Measurer of Broad*. (fig. 415.)

6484. The books of accounts for trees and plantations have already been mentioned. (3170.) Some have proposed measuring the whole of, or at least all the detached and hedgerow trees on an estate periodically; numbering each tree, and keeping a corresponding register, by which the proprietor, when at a distance, might give directions for cutting down particular trees, &c.; but this appears rather too much in the mercantile style for the dignified enjoyment of landed property, and does not promise any very great advantages.

CHAP. VII.

Formation of a Nursery-Garden for the Propagation and Rearing of Trees and Shrubs.

6485. *Nurseries for rearing trees* are commonly left to commercial gardeners, as the plantations of few private landowners are so extensive, or continued through a sufficient number of years, as to render it worth their while to originate and nurse up their own tree and hedge plants. Exceptions, however, occur in the case of remote situations, and where there are tracts so extensive as to require many years in planting. Besides, as Sang observes, "some are of opinion, that trees, in order to their being rendered sufficiently hardy, should be reared on the soil and situation where they are ultimately to be planted; and if the design be extensive, and such as may require many years for its completion, a conveniently situated nursery is highly desirable, not only as saving the carriage of plants, and facilitating the business of transplanting, but as increasing the chance of success, on account of the plants remaining a much shorter time out of the ground than if brought from a distance. If the situation, however, ultimately destined for the trees be cold, high, and bleak, and the soil, of course, various, some good, and much of it bad, or of an indifferent quality, there it would by no means be advisable to attempt the establishment of a nursery, and especially a nursery to raise plants from seeds. The chief properties of nursery plants, intended for transplanting, consist in their strength and cleanness of stem, and in their roots having a multiplicity of healthy fibres; and, in order to obtain plants possessing these qualities, it is necessary to sow, and plant out to nurse, if not in rich, at least in mellow earth, and in a moderately sheltered situation." (*Plant. Kal.* p. 20.) The following directions, by Sang, as to the soil, shelter, aspect, and fencing of a nursery-garden are equally applicable to such as are intended for private or commercial purposes:—

6486. *In order to have a complete nursery*, it should contain soils of various qualities, and not less than eighteen inches or two feet deep; the generality of it should be light friable earth; a part of it should be of a clayey nature; and another part should be peaty. Each of these will be found peculiarly useful in the raising of the different kinds of young plants. The whole should be well drained, and trenched, and cropped with vegetables for one or even two years previously to sowing tree-seeds. For transplanting, it may be used the first year. A nursery may certainly be over-sheltered; "but this is likely to happen only in the case of its being very small; for, if it extend to several acres, unless it be surrounded by very tall trees, the area will be considerably exposed. No part should be either too much exposed, or too much sheltered. Any aspect from east to west, following the course of the sun, will answer. Ground of an unequal surface is most likely to contain the various soils above-mentioned. A nursery should, therefore, in general, rise from a level to a pretty smart acclivity; yet no part of it should be too steep, because it is in that case very troublesome to labour. The nursery-ground may be sufficiently fenced by a stone wall, or even a hedge six feet high; and if it be of small size, say an acre or thereabouts, it will require no other shelter; but if it extend to four or five acres, it must have dividing hedges properly situated, to afford shelter over all the space. The fence, whether of thorns or stone, should be made proof against the admission of hares or rabbits. It should be subdivided into compartments and borders, of proportionate size to the contents of the area, by walks. The compartments should never be encumbered with large trees, as apples, pears, or the like; because, being already established in the ground, they never fail to rob the young trees of their food, and to cause them to be poor and stunted, unworthy of being planted in the forest. It would be very convenient to have a rill of water passing through the ground, or to have a small pond, fed by a spring or a pipe, for the purpose of watering. (*Plant. Kal.* p. 22.)

6487. *In preparing the soil for the culture of trees* it will be advisable to trench it to its full depth, and "necessary," the same author continues, "to give it a good dressing of lime or marl and dung in compost. Rank manure, such as stable litter, should not be applied to nursery ground, at the time of cropping, with nursery articles; but, if it be necessary to enrich it, this should be done by a manured crop of onions, turnips, lettuce, or the like. Potatoes should never go before a crop of seedlings, even of the coarser sorts, as ash, oak, or chestnuts; because potatoes never can be taken clean out of the ground; and it being indispensable to pull up those which rise among the tree-seedlings, many of these unavoidably come up along with them. Hence, crops of lettuce, turnips, cabbages, or the like, should rather precede the crop of seedlings. The best kind of management, in this particular case, is to interchange the crops of timber trees and reculents occasionally; perhaps, with respect to most sorts of seedling plants, alternately observing to sow all small seeds, in particular, if not in a rich, at least in a fine tilth." (*Plant. Kal.* p. 23.)

6488. *For a private nursery*, he continues, "no place, certainly, can be more eligible than a field, which may also be occupied as a kitchen-garden. If, for instance, three acres were required for the purposes of nursery, and one or two acres were also required for extra kitchen-ground, or for green crops for cattle-feeding, it would be proper to enclose five or six acres, less or more, according to circumstances; by which means two important objects might be obtained; viz., land of a good quality, and fine tilth, for the raising of seedlings; and an opportunity of effectually changing crops at pleasure. Carrots are peculiarly scouring for a nursery, and, indeed, rather severe for most lands; but we have very seldom found a

good crop of trees following one of carrots; while we have found peas, beans, and especially lettuces easy and enriching crops, well adapted as preparers for succeeding crops of nursery articles."

6488. *In so far as respects public nurseries*, "we have long remarked, that those which are as much market-gardens as nurseries, generally produce the best seedlings, and young articles, for sale; provided that their ground be any thing more than of a middling quality." This fact, if one were wanting, is a sufficient proof of the utility of occupying the ground, as above advised, in the double character of a kitchen-garden and nursery."

6490. *In a cold climate, or bleak situation*, "with a poor barren soil, we would by no means advise the raising of seedlings, either in public or private nurseries. It will be found a cheaper, as well as a more satisfactory method, to purchase seedlings, transplant them, and nurse them till fit for final planting; and, even, in this case, a piece of the best and most sheltered land in the situation will be necessary for the purpose." (*Plant. Kal.*, p. 26.)

6491. *A raising-ground* will be required for the preparation of certain seeds, by mixing them with sand, ashes, or soil, and leaving them there for different periods, from six months to two years, to rot off their interior coverings. On a small scale, a portion of the compost-ground of the kitchen-garden may be used for this purpose. If the scale is large, an area of a few square poles should be set apart for bedding in plants taken up for replanting, or what is called laying in by the heels, or shoughing: this is generally called the *bedding-ground*, or (in Scotland) the *shoughing-ground*.

6492. *Buildings*. If the situation of the nursery be near to the kitchen-garden, and the latter have the proper office-buildings, no other erection will be required for the nursery than a working-shed for ordinary purposes, occasional shelter, and protection to newly taken up plants; and for packing or tying them up properly before sending them to their final situation, &c. Frames and hand-glasses may be required for some of the more tender seeds and seedlings; and, on a large scale, a seed-loft and its appendages, as well as an office for writing, &c., may require to be erected apart from those belonging to the kitchen-garden.

6493. *Stocking with plants*. The ground being arranged, and prepared by one or more vegetable crops, the next thing is to stock it with stools, or stock plants, to propagate from by layers, and to procure stocks for grafting or budding, but, especially in a private forest-tree nursery, with tree-seeds. In our *Hortus Britannicus* will be found the particular mode of propagation, and the requisite soil for each species and variety of tree and shrub in cultivation in the British Isles; by inspecting these sources, it will be seen what plants must be procured for stools. If the object is merely forest culture, few, except some limes, poplars, and planes, will be required; but, if tender trees and shrubs are to be reared, the number will be more considerable. Plant the tenderer sorts in the sheltered borders, and the more hardy in the open compartments: the tree kinds may be placed from six to eight feet every way, and the more delicate shrubs from three to six feet apart in suitable soils. Stocks for grafting, whether for fruit or barren trees, are to be planted in nursery rows, according to their kinds; those for larching, round the parent plant, or in pots.

CHAP. VIII.

Culture and Management of a Nursery for Trees and Shrubs.

6494. *The principal objects of culture in a private tree-nursery are the hardy trees and shrubs of the country, which produce seeds; and the great object of the private nursery-gardener must be to collect or procure these seeds, to prepare them for sowing, to sow them in their proper seasons, and to transplant and nurse them till fit for final planting.* We shall arrange the principal trees and shrubs which ripen their seeds in this country; as cones, nuts, berried stones, berries with small seeds, leguminous seeds, and small soft seeds. Before treating of the gathering, storing, separating the seeds, sowing, and nursery culture, of each of these general divisions, it is essential to remark, that, in collecting every kind of tree-seed, preference should be given to that produced by trees the largest and most perfect of their kind, and to the fullest and best-ripened seeds on these trees. The reasons have been too frequently given in this work to require repetition.

SECT. I. *Coniferous Trees and Shrubs, their Seeds, Sowing, and Rearing.*

6495. *The principal hardy coniferous trees and shrubs, which ripen their seeds in Britain, are as follow:—*

Pinus sylvestris, November.
Pinaster, October.
Pinus, December.
Abies, October.
Cedrus, November.
Abies Picea, October.
Balsamifera, September.
canadensis, November.

Abies excelsa, November.
rubra, November.
nigra, November.
Alba, November.
Larix europæa, December.
pendula, December.
microcarpa, December.

Cedrus Libani, March.
Juniperus virginiana, December.
Cupressus thyoides, January.
sampervirens, January.

Thuja occidentalis, November.
orientalis, November.

6496. *Cones* may be gathered any time between the ripening season and the following April; but the sooner they are gathered the better, as they supply work for the regular hands of the establishment in bad weather during the winter months; or admit of giving industrious money-making persons work by the job in the winter evenings. The general mode of separating the seeds is by kiln-drying, in the same way as in drying malt, but applying a more gentle heat.

6497. *The cone-kiln* is constructed after the manner of a common malt-kiln: the bearers should be about nine feet distant from the fire, and two inches apart. A wirecloth is spread over them from side to side of the kiln, and the cones are laid on it to the thickness of twelve or fourteen inches. A gentle fire is then applied, and regularly kept up till the cones become opened. A greatly improved form of kiln, adapted for drying malt or hops, or flowers, seeds, or leaves of any description, has been invented by Read, who so greatly improved the garden syringe. This kiln will be found figured and described in detail in our *Encyclopædia of Cottage, Farm, and Villa Architecture*, § 1272. to § 1280. During the time of drying, the cones must be frequently turned upon the kiln; and when the seeds begin to drop out, they must be removed to the seed-loft, and sifted till all the seeds which are loose fall out, and be taken from among the cones. The cones are afterwards to be threshed severely with flails, or passed through a hand-threshing machine, and sifted as before, and so on, till the seeds are taken out as completely as possible. It is, however, a safer method to split the larch cones before putting them into the kiln. This

operation is performed by a small flat triangular spatula, sharpened at the point and cutting-angles, and bevelled like a shoemaker's awl. The cone is held by the forefinger and thumb of the one hand, upon a flat piece of wood, while, with the other, by the splitter, it is split up from the great end; and afterwards each half is split up the middle, which parts the cone into four divisions. This is by far the best, and least destructive to the seeds, of any method we know; because the cones so split, when exposed to the heat, are suddenly opened, and readily discharge the seeds; which, consequently, are less injured by the fire-heat. Besides the above method of splitting, there are others. Some people use a cone-mill, which has large sharp teeth in a concave cylinder, and others fixed in a corresponding roller. The mill is worked by turning the roller by a handle resembling that of a common winnowing machine. The cones are let into the mill by a hopper. This instrument is very difficult to work, and bruises the seeds very much; many of which are of course destroyed. We have several times made use of the common improved bark-mill, for separating the seeds from larch fir cones; but the cones are thus so much compressed and bruised, that the seeds suffer exceedingly; and we would by no means advise it: indeed, among all the methods which we have known adopted, to perform the painful and laborious work of extracting the seeds of the larch, the plan of splitting them singly is much the best and safest for the seeds, and ought to be adopted by every one who has occasion to use only small quantities of seeds. None of the other kinds of cones require so much labour as the larch, except, perhaps, those of the cedar of Lebanon, and the black American spruce. Cones, which have given out all their seeds, are generally, and very properly, used as fuel for drying other cones. This sort of fuel requires the attention of a very steady feeder; indeed, the most careful and attentive are apt to set the full or drying cones on fire, from the resinous nature, and tendency to flame, of the empty cones used as fuel. Such kilns should, therefore, be erected in situations far removed from a dangerous neighbourhood. (*Sang.*)

6498. The cones of *Scotch pine*, the *larch* and the *spruce*, are the principal kinds which are opened by kiln-heat. The cones of the silver fir, the *balm of Gilead* fir, and the *Weymouth pine*, give out their seeds with very little trouble; indeed, if they be not gathered soon in autumn, and kept from severe drought, they will fall to pieces of their own accord. Cones of the black, red, and white American spruces should be split, and exposed in a sieve tilted before a gentle fire, with a sheet of paper below the sieve to receive the seeds as they fall out. The seeds should be removed every quarter of an hour; because they are small, and are very easily injured by the heat. (*Ibid.*)

6499. The cones of *cedar of Lebanon* should be kept for one year at least, after they are taken from the tree, before the seed is taken out. This is necessary, on account of the soft nature of the seeds, and the great quantity of resinous matter which the cones contain when growing, and which is discharged by the keeping. The best way to take out the seeds of the cedar, is to split the cones, by driving a sharp conical piece of iron through the heart of them. This work, as well as the taking out of the seeds, is greatly facilitated, by steeping the cones in water for a day or two, previous to splitting them. The coats of the leaves should be opened with the hand, and the seeds carefully taken out. The seeds of the cedar will grow, though the cones have been several years taken from the tree. (*Plant. Kal.*, p. 365.)

6500. *Sowing.* April is the best season for all the species; the soil should be in excellent condition, well mellowed by the preceding winter's frost and snow, carefully dug, and raked as fine as possible. All the sorts are sown in beds, except the cedar of Lebanon and some pines; and the manner of sowing is by *casting* or *bedding in*, already described. (6587.)

6501. The soil for the *Scotch pine*, before being dug over in February, should be thickly coated with rotten hotbed dung: the seeds should be sown so as to rise at the distance of a quarter of an inch from one another; and the covering should be, on the average, of soils a quarter of an inch thick. The best preparation for larch-seeds is a previous crop of two-years' seedling *Scotch pine*, and next, a similar crop of the larch. The soil should be dunged and prepared as for the *Scotch pine*; after sowing the seeds, both of this tree and the *Scotch pine*, previous to covering them, draw a light roller along the bed, to press the seeds firmly into the earth; then cover a quarter of an inch thick. The larch should rise at the same distance as the *Scotch pine*; but, the seeds being generally more or less injured in separating, many do not come up, and they are therefore sown thicker than the other. (*Sang.*) In England it is common to cover the seeds with peat earth, or with very fine sandy loam, and lay over the beds *guz*, furze, large heath, or bushes as a mulch; as well to keep off the birds, as to diminish the direct heat produced by the sun, and the evaporation of moisture by the sun and wind. (*Gard. Mag.*, vol. iii. p. 123.)

6502. The seeds of the *spruce fir* are to be treated like those of the *Scotch pine*; and the *balm of Gilead* fir-seeds, like those of the larch, only the covering should not be less than half, nor more than three quarters of an inch. (*Sang.*)

6503. The seeds of the *silver fir* and *pinaster* require the same sort of treatment as those of the larch. "They must not be sown to rise nearer one another than three in an inch. The covering should be a full inch thick, and performed with great accuracy: for if any of the seeds be left too lightly covered, or if any of them be too deeply covered, they will alike be destroyed." (*Plant. Kal.*, p. 332.)

6504. The seed of the *Weymouth and stone pines* may be treated like those of the *Scotch pine*, but the former covered three quarters of an inch thick, and the latter an inch and a quarter. *Sang* states, that the only way to get stately trees of these, as of most of the pine tribe, is to sow them where they are to rise into timber.

6505. The white American spruce-seeds "are smaller than those of any of the preceding kinds, and therefore require a lighter covering than any of them. One fifth of an inch is quite sufficient. They should be sown on a piece of fine dry sandy loam, and be covered with earth of rotten leaves of trees to the above thickness, by sifting it upon them." (*Plant. Kal.*, p. 333.)

6506. The seeds of black and red American spruce fir "are very small and tender. They are still smaller than the seeds of the white American spruce, and therefore require a covering still lighter than mentioned for it. The black and red American spruce should be sown on rich peaty earth, which has been made very fine; and should be covered as lightly as possible. Rich heath soil, containing a good portion of white sand, answers best. The seed should be sifted over the seeds with a fine sieve. Neither of these American spruces will allow the roller to pass over them previous to covering. The whole of them should be shaded from the mid-day sun in the time of coming up, and for some time after, by means of hoops and matting, or spruce fir branches stuck in the opposite alleys, so as to form an arch over the beds." (*Plant. Kal.*, p. 334.)

6507. Cedar of Lebanon seeds should be sown in boxes of light sandy loam; or on a spot of properly prepared well-sheltered soil, and covered half an inch: the seeds of the red cedar (*Juniperus virginiana*), and of the white cedar (*Cupressus thyoides*), may be similarly treated, covering a quarter of an inch thick. Seeds of the arbor vitae (*Thuja occidentalis*) will come up best under a frame or hand-glass: they should be sown on light sandy soil, and covered a quarter of an inch.

6508. The strictest attention should be paid to the foregoing directions, both in regard to quality of soil, and thickness of covering the seed; for, though resinous trees are extremely Hardy when grown up, yet they are all very tender in infancy. The raising regular crops of this tribe is, therefore, regularly receding to the masterpiece of nursery culture in the open ground; and is supposed to be best understood in the northern counties.

6509. *Transplanting.* This tribe benefit less by transplanting than the non-resinous trees; and therefore, where circumstances admit, the better plan is, after the seedlings have stood two years in the seed-bed, to remove them where they are finally to remain. The exceptions are those sorts which are reseeded into pots, as the cedars and cypresses, and some of the more delicate pines, which may be kept in the nursing state, in pots, several years, as their roots can be turned out entire. At the same time,

when any of the pine or fir tribe are kept so long in pots that their roots form a web on the surface of the ball of earth, it is found that they require several years after being turned out into the open ground to establish themselves securely. About the middle of April is the proper time for transplanting all the resinous tribe, except the larch; for, as this tree pushes earlier than the others, it should be transplanted in February and March. The first operation common to all seedlings is to loosen the roots of the plants in the seed-bed with a fork, so as, when drawn out by the hand, they may come up with all their fibres entire. The ground, which must be mellow, need not be so rich as for sowing the seeds; being previously prepared, they should be immediately planted in the trench manner. The Scotch pine is generally planted in lines twelve inches apart, and the plants a foot distant in the lines; if intended to remain two years in the lines, they should be placed six inches apart in the line; but they always rise with the best roots, after being only one year transplanted. The spruce and balsam of Gilead firs should generally be transplanted at two years; but, if weak in the seed-bed, may remain till the third year. They should be planted at the same distances as the Scotch pine, in humid rich earth. The silver fir may be treated in the same manner, but it requires rather more space. If to be nursed only one year, silver firs may be planted in lines nine inches apart, and at six inches' distance in the lines; but if to remain two years, then fifteen inches between the lines, and eighteen inches in the line, will be necessary. The Weymouth pine should be transplanted at two years into a well-pulverised, rich, and sub-humid soil, where it should remain two years before final planting; distance between the lines twelve inches, and from plant to plant eight inches.

6510. *The Præster and stone pine* generally rise to well-sized plants the first season after sowing, and should then be transplanted into a rich well comminuted soil, rather sandy and dry, at nine inches between the lines, and four inches apart in the lines. After remaining there one year, they should be removed to their final situation. Great care is requisite in moving these plants, especially the stone pine, which sends down very long roots.

6511. *The white American spruce*, after remaining two years in the seed-bed, should be nursed two years in rich sandy and rather dry soil, in lines distant twelve inches, and the plants six inches apart in the lines. The black and red American spruce are much more delicate than the white. After being two years in the seed-bed, they should be planted out in beds of sandy or subpeaty soil, at six inches apart, to stand for one year; at the end of this period, they should be lifted and planted in rows at the same distances as the white American spruce.

6512. *The cedar of Lebanon*, when one year old, should be taken up and planted in pots of the finest soil; or in lines, at the same distance as the silver fir, after being two years nursed, it should be removed to its final situation, as it never does much good if planted finally at a greater age, unless in pots, which is much the best method. The red and white cedars, and the cypress, may remain two years in the seed-bed, and then be treated like the cedar of Lebanon.

6513. *The larch* may be moved from the seed-bed into the nursing lines, at one or two years. The soil to receive them should be soft, tender, and prepared by a crop of esculent vegetables with dung the preceding season; but they should never be planted in land newly manured with fresh dung. One year's seedlings, to be nursed one year, should be planted four inches apart in the lines; but if to stand for two years, five inches, and fifteen inches between the lines. The two years' seedlings should be sised, as in the seed-bed they never all rise to the same height; the larger size may be placed six inches apart in the lines, and twelve or fourteen inches between the lines, to stand one year; the smaller, at five inches, and a foot, for standing the same period: they should then be removed to their final situation.

6514. *Care of the roots.* No description of tree-plants receive so much injury from the loss of roots; from the roots being exposed to the air by being kept long out of the soil; or from compression and exclusion of air and moisture by being kept in close bundles, or thick layers, as those of the resinous tribe; they should therefore be finally planted as soon as possible after removal from the nursery; and, indeed, whenever it is practicable, no more should be taken up in one day than can be planted that day or the next. Nor are any plants more easily deprived of the vital principle, by packing and carriage either by sea or land; though, being all evergreens, except the larch, they do not readily show it. This has been stated to us, by experienced planters in Wales and other parts of England, as the reason why so few trees are finally produced from the immense numbers of Scotch pine and larch fir annually sent thither by the Scotch nurserymen.

6515. *Pruning* is not required by any of the resinous tribe in the nursery, unless to pinch off a con-tending leader, or amputate a bruised part of the root or top.

Sect. II. Trees and Shrubs bearing Nuts, Acorns, Mast, Keys, &c., their Gathering, Sowing, and Rearing.

6516. *The principal hardy trees and shrubs bearing nuts, acorns, mast, &c., which ripen their seeds in Britain*, are the following:—

Quercus Phillos, November.
virans, November.
Pice, November.
Abies, November.
granatilla, November.
Prinus, November.
Leucobates, November.
coccinea, November.
Carya, November.
alba, November.

Quercus Ibbur, or *pedunculata*, Dec.
rustica, December.
sessilifera, December.
pubescens, December.
Fraxinus excelsior, November.
Cedrus, vides, November.
Fagus sylvatica, September, October.
Castanea vesca, November.
Usculus Hippocastanum, October.
Carpinus Bétulus, November.
Platanus occidentalis, December.

A'cor Pseudo-Platanus, October.
compatrie, & various species, Sept.
Japlena regia, from November.
nigra, October.
Carya alba, October.
Shrubs.
Amygdalus coccinea, September.
Staphylea trifolia, October.
Corylus avellana, October.

6517. *Gathering and keeping.* The seeds of these trees being gathered, the greater part of them should, if circumstances permit, be immediately sown; but where this cannot be done, or where they are to be sent to a distance, they should be thinly spread in a sly left till thoroughly dried, when they may be preserved till spring in bags or barrels, or sent off to any distance in these or other packages. When the seeds of the ash, sycamore, platanus, and hornbeam, are only to be kept for the purpose of spring sowing, the best plan is to take them to the rotting-ground (6488), mix them with their bulk of dry sand or ashes, spread them in a stratum of ten inches in thickness, in the form of beds, cover with sand to the same thickness, and leave them in that state till wanted for spring sowing.

6518. *Sowing.* The bedding-in, or cuffling-in manner (2687), or by drills, may be adopted for all the kinds. Acorns, horse and Spanish chestnuts, almonds, and hazel-nuts, should be sown in February, in strong loam, in good heart, and well comminuted: the seeds should be placed half an inch apart, and covered two inches thick. Walnuts require a similar soil and covering, but should be placed two inches nut from nut. Ash seeds will come up in soil of middling quality, but it should be well dug, and in an open situation, that the plants may not be drawn. Place the seeds half an inch apart, and cover one inch. Sycamore plants when young being liable to be killed by the frost, the seeds should not be sown till the end of March, or beginning of April: they should be sown in exposed, dry, sandy soil, an inch apart, and covered one inch in thickness. On rich moist land they will rise so tall and swift, that the extremities of their shoots will not ripen in autumn, and the plants will in consequence be unfit for use. Beech plants, when newly risen, are still more tender than those of the sycamore kind, and therefore should generally be sown in April, but not later than the middle of the month; for, if very dry weather set in, they will not rise till the following spring, and so have a great chance of perishing by the frost. The soil should be tender and rich, previously under a culinary crop with dung; and it should receive a

small dressing of well-rotted manure previously to digging for sowing. The seeds should lie an inch apart, and be covered a full inch. The best time for sowing the hornbeam is in October; but it may also be sown in February: the soil should be light, but not very rich: the bed form answers best: the seeds should lie half an inch apart, and be covered half an inch in thickness. The platanus is seldom raised from seeds; but when this is done, a soft peat-earth soil is the best, and the covering should not be more than a quarter of an inch. The seeds of the bladder-nut, if sown as soon as gathered, will come up the following spring; if not, a part will not rise till the second year: sow in light rich soil, and cover an inch and a half deep.

6519. *Transplanting.* The operations of loosening the plants, sorting them into sizes, and pruning their roots and tops, require to be first performed. As these plants have generally long and strong tap-roots, these require to be cut in the operation of loosening; which, for this purpose, must be performed with a sharp spade, and care taken, in thrusting it down, that the root may not be cut too high; care should also be taken to preserve uninjured all the lateral fibres. In sorting the plants into two or three sizes, the fractured tap-root of each must be cut smoothly off with a sharp knife, and any side shoots on the stem cut close off. If the plants cannot be immediately planted, they may be *laid in by the heels*, or *shouged*; that is, thickly bedded in the bedding-ground (6491.) till wanted. Here they may remain in layers not more than three or four inches thick, for a month or two in the winter season; and for a week or two even in February and March. None of the kinds should remain in the seed-bed longer than two years; but in drills they may remain three years; and more especially if the operation of tapping be performed; that is, cutting through their tap-roots about eight inches below the surface. This is most effectually and readily done by two men with sharp spades; *rutting* or cutting the ground obliquely with their spades, on each side the line at once, and exactly opposite to each other. After this operation has been performed, the plants should be made firm, by a person treading the rows with one foot on each side. These kinds, so tapped, will, in the course of the following season, in consequence of being thus root-pruned, push many more fibres on the upper part of their roots, than they otherwise would have done; and thus will the plants be better fitted for being transplanted into shallow soils, or indeed into any soil, than they would have been by being allowed to remain in the ground untapped till the time of taking up. (*Plant. Nat.*, p. 135.)

6520. *Trench planting* is decidedly the best for all plants to be placed in lines; but more especially for ligneous sorts. Dibbling in is an easier and more rapid mode; but by trench planting the fibres are spread out and regularly disposed on each side of the main root; whereas, by dibbling, as Sang observes, they are "buddled together into a hole probably not more than an inch and half in diameter." Dibbling, however, may be adopted in the case of such seedling trees as have been robbed of most of their fibrous roots, by being pulled out in thinning beds intended to stand for two years.

6521. *The age at which most of these sorts should be transplanted* is one year; and the soil most desirable for removing them to, is the same as recommended for the seed-bed. The distances between the lines and the plants in the line depend partly on their kinds, but principally on the length of time they are to stand before retransplanting or final removal. The larger growing broad-leaved sorts, as the chestnuts and walnuts, to stand only one year, should not be nearer than eighteen inches by six inches; and the oak, ash, beech, &c. not nearer than fourteen inches by three inches; if to stand for three years, the interspaces may be two or three inches more: something depends on the openness of the situation, and a good deal on the soil. The judicious nursery-gardener will consider all the circumstances, and adopt such variations of the ordinary distances as shall produce plants with well-ripened shoots and numerous fibrous roots.

6522. *Pruning, culture, and taking up for final planting.* When the plants are to remain two or more years in the nursery lines without removal, dig the ground between the rows in winter. A week or two before midsummer cut close off the lower side shoots: some defer this work till winter; but, besides the loss of sap avoided by midsummer pruning, the wounds heal the same season. In taking up for final planting, such plants as have been trench-planted must be loosened on the side which was solid at planting; if they have been in training for several years, they should be lifted by throwing out a trench on one side, fully to the depth of the roots, and then putting in the spade on the opposite side, so as to get below all the roots.

SECT. III. Trees and Shrubs with berried Stones, their Gathering, Sowing, and Rearing.

6523. *The principal hardy trees and shrubs with berried stones which ripen their seeds in Britain, are the following:—*

Pyrus Aria, September.
intermedia, October.
terminalis, November.
pinastifida, October.
aucuparia, August.
americana, October.
hybrida, October.

Crataegus Pyracantha, November.

Crus galli, November.
Oxyacantha, October.
Azalea, October.
Aronia, November.
tanacetifolia, November.
odoratissima, November.

Nephele germanica, November.
Cydonia vulgaris, November.
Amelanchier vulgaris, November.
Cotoneaster vulgaris, October.
Plex Aquifolium, November.
Taxus baccata, November.
Rhamnus Alaternus, October.
Fraxinus, September.
catharticus, November.
Laurus nobilis, November.
Alnus, various species, October.
Prunus domestica, October.
spinosa, October.
instituta, October.

Cerasus Avium, July.
Padus, August.
virginiana, August.
canadensis, August.
laustica, September.
Laurocerasus, September.
Hedera Helix, April.
Daphne Laureola, June.
Mezereum, June.
Viburnum Tenu, June.
Phillyrea angustifolia, February.
Juniperus communis, October.

6524. *Rotting.* The whole of these, when gathered, require to be taken to the rotting-ground; mixed with their bulk of dry sand or ashes, laid in beds of ten inches in thickness, and then covered with ten inches of sand, light sandy earth, or ashes. Here some sorts, as the holly, will require to remain two years; the haw, mountain ash, and yew, one year; and the other sorts, one winter, or till the following February. During this time the beds of each kind should be uncovered, carefully turned over, and the covering replaced. The advantage of rotting off their exterior covering in heaps, rather than in the soil, where they are to germinate, is the saving of ground; for though some of the holly and haw, for example, will come up the next or the second season after sowing, yet, by keeping them one or two years in the rot-heap, we are sure all the seeds will germinate the same spring in which they are committed to the soil. To the above general remarks, the gean, or wild cherry, forms an exception; for, if sown immediately after being gathered in July, it will come up the following spring; but it will keep in the rot-heap a year. When any of these seeds are to be sent to a distance, instead of being carried to the rot-heap, they are spread thin in lofts, dried and packed in barrels; great care must be taken that they are sufficiently dried, otherwise putrescent fermentation will commence, and the vegetative principle will be destroyed by the heat evolved.

6525. *Sowing.* The season is generally February, and the manner by *bedding in*, as before. The haw, the most important of this class, should be sown in the lightest and richest land in the nursery; and if not very rich, some dung may be added. Sow in beds three feet four, or three feet six inches apart; the seeds should lie within a fourth of an inch of each other, and be rolled with a roller of fifty or sixty pounds' weight, and exactly the breadth of the bed, previously to covering, which should be one inch deep. If the seeds are too moist to admit of drawing a roller over them, beat in the seeds with the back of the spade. This operation of rolling in seeds not only fixes them in their places, so as to admit of applying the covering with greater freedom, but, by consolidation, is calculated to retain moisture, exclude too much

air, and thereby promote germination. Holly and yew seeds should be sown on rich friable soil, shaded by a wall, or by wattled hurdles, or other means, from the mid-day sun. The distance is the same as for haws; they should be rolled, or beaten in, and covered not more than half an inch. If previously rotted for two years, they will all come up the following May; but if only one year in the rotting-bed, a part will not come up till the second year: in this case they should be sown thin, as the growing plants will impede the others in breaking through the soil. Mountain ash seeds require a fine and rather rich soil; the seeds should not lie nearer than an inch, and the covering should be only a quarter of an inch. The gean should be sown, as soon as gathered, in deep sandy loam, the pulp being previously bruised; it need not be very rich, but must be dug deep before sowing: place the seeds an inch apart, and cover three quarters of an inch thick. Gean-stones, which have been preserved in the rotting ground for spring sowing, will not come up regularly the summer following, but a part will lie till the second spring. The advantage of sowing as soon as gathered, is therefore obvious. Great care should be taken not to sow the cherry for the gean, as the former is not nearly so well calculated for a timber tree. The seeds of the common and Portugal laurel, laurel-bay, mezereon, spurge-laurel, phillyrea, and the like, should be sown as soon as gathered, in rich soft soil, on a dry bottom: the seeds should be an inch apart, and be covered an inch. During the severest weather of winter, it will be advisable to protect them by hoops and mats. The seeds of the service, buckthorn, bird-cherry, and other species of *Prunus*, *Rhamnus*, and *Pyrus*, may be treated like those of the laurel, but will not at all require so deep a covering, nor will any of them require protection in winter.

6526. *Transplanting.* What has been advanced on transplanting plants from nuts, keys, &c. will apply here. Most of these species, being smaller, will not require so great distances between the rows and plants. All the deciduous species may be transplanted in February or early in March; and all the evergreen species from the middle of April to the middle of May, and during the month of August. The greatest care will be requisite in taking up evergreens from the seed-bed, when they have been already once moved, so as not to injure their fibres; and on no account should more be taken up at a time than what can be planted the same day. Select for them the soils most suitable to their natures, as far as the limits of the nursery will permit; and, in general, rather prefer a shady situation, especially for the holly, yew, and all the laurels. Hollies having but few fibrous roots should be frequently transplanted; but this is not necessary with the yew, which has fibres in great quantity. In transplanting the deciduous sorts, prefer narrow spaces between the lines, and wider intervals between the plants in each row, to wide rows, and plants crowded in the row. One year's seedling thorns, for instance, to be nursed one year, may stand nine or ten inches by two inches; if for two years, twelve or fourteen inches by three or three and a half inches.

6527. *For pruning, culture, and taking up for final planting, see nut-bearing trees, &c. (6513.)*

SECT. IV. Trees and Shrubs bearing Berries and Capsules with small Seeds.

6528. *The principal hardy berry and capsule bearing trees and shrubs, which ripen their seeds in Britain, are the following:—*

Tilia europæa, and other species, Nov.
Tilia cordata, October.
Malus, October.
Amygdalus vulgaris, September.
Betula europæica, September.
Cornus masculina, October.
Sanguinaria, October.

Sambucus nigra, September.
Racemosa, 4, September.
canadensis, September.
Lonicera, various species, August.
Ceptholium, various species, August.
Symphoricarpos racemosa, September.

Jasminum fruticans, October.
Ligustrum vulgare, October.
Budynus latifolius, November.
europæus, November.
Fibrous Lantana, September.
O'pulus, October.

6529. *Gathering and keeping.* As this class of seeds are only wanted in small quantities, the most convenient way of preserving them is in the seed-loft or root-cellar in dry sand. They should be frequently turned over to separate the seeds from the pulp and husks, and cleaned by sifting and winnowing early in February. For sending to a distance, they are to be treated like berried stones; or they may be separated and cleaned previously to deportation.

6530. *Sowing.* All of them require a soft and rather moist soil, with the exception of the box, which should have a soil rather sandy and dry. They may be sown in February, in beds, and covered not more than a quarter of an inch; and when the seeds first begin to vegetate, it will be an advantage to shade them from the sun, by wattled hurdles; place them across beds which lie north and south, and along those lying in a direction east and west.

6531. *Their transplanting and future culture are the same as for the foregoing division.*

SECT. V. Trees and Shrubs bearing leguminous Seeds, their Gathering, Sowing, and Rearing.

6532. *The principal hardy leguminous trees and shrubs, which ripen their seeds in Britain, are as follow:—*

Cytisus arborescens, October.
cræta, October.
hæstipica, November.
medica, October.
Coronilla Bæmaris, October.
Cytisus Laburnum, October.

Cytisus alpinus, October.
nigricans, September.
smallifolius, October.
auriculatus, September.
hirtus, September.

Robinia Pseud-Acacia, November.
viscosa, October.
Gleditsia hœstida, November.
triacanthos, November.
Cercaria arborescens, October.

6533. *Gathering and keeping.* These being collected are to be dried thoroughly in an airy loft, and the pods being afterwards threshed or opened, the seeds may be preserved in bags or boxes till spring, or sent to any distance.

6534. *Sowing.* The season for sowing all of them is February; the soil should be light, deep, and sandy, and the seeds placed an inch apart, and covered three quarters of an inch thick. This should be particularly attended to in the case of the laburnum, the seeds of which, being generally sure growers, if they rise thick, the plants lose their leaves about midsummer, become mildewed, and die.

SECT. VI. Trees and Shrubs bearing small soft Seeds, their Gathering, Sowing, and Rearing.

6535. *The principal hardy trees and shrubs with small seeds, which ripen them in Britain, are as under:—*

Alnus glutinosa, November.
Betula alba, and other species, October.
Ulmus campestris, June.
glabra, June.
Populus nigra, May.

Populus tremula, May.
alba, May.
balsamifera, May.
Salix alba, June.
pentandra, and other spec., Aug.

Syringa vulgaris, October.
Cistus, various species, September.
Philadelphus coronarius, October.
Rhus cœcinea, and other species, July.

6536. *Gathering and keeping.* All these require to be gathered as soon as ripe, otherwise some are apt to drop out of their cones and capsules, as the alder, birch, and lilac; and others to be blown away and lost, as the elm, poplar, willow, and sumach. They should be gathered perfectly dry, and spread thin in an airy loft, till fit to put up in bags or boxes, for keeping or deportation.

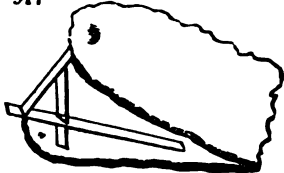
6537. *Sowing.* Most of the sorts may be sown immediately after being gathered, in which case they will be more certain of germinating; and a number of elms, poplars, and willows will come up the same autumn. But as protection during winter will, in that case, become requisite, the better way, in general, is to defer sowing till March or April; when all the sorts may be sown in light rich earth, rather moist, and covered not more than half an inch. The principal tree of this class is the broad-leaved elm, which, when intended for two-year seedlings (in most cases the preferable age for transplanting), should be sown to rise at least two inches apart, as the plants grow with great vigour even the first year.

6538. *Their transplanting and future culture* are the same as directed for berried stones, keys, &c.

SECT. VII. Culture common to all the Classes of Tree-Seeds.

6539. *Insects and vermin.* New-sown seeds of most kinds are greedily devoured by various descriptions of vermin.

917



Mice attack "acorns, sweet chestnuts, hazel-nuts, walnuts, and holly-seeds. They not only eat them on the spot, but they carry to their retreats great numbers of the seeds of which they are most fond. The cheapest, and perhaps the most effectual trap for their destruction, is the well known, but neglected, fourth figure trap. (fig. 917.) A very effective mouse trap is formed by burying an empty flower-pot with the bottom uppermost, and the hole covered with a handful of straw, as shown in fig. 918. (See *Gard. Mag.*, vol. ii. p. 278.) Another plan is to sink bell glasses filled half full of water, with a little oatmeal strewn over the water, and a little also on the earth outside of the bell glass; covering the whole with some loose straw to prevent evaporation in summer, and freezing in winter. (*Ibid.*, vol. vii. p. 593.)



The new-sown haws and mountain ash berries are a prey to the chaffinches, green linnetts, and other birds. If the quantity sown be not great, the beds may be hooped over and covered with small-meshed nets. But if a great breadth of ground be sown, it must be constantly watched after sowing. If the watching be vigilantly attended to, for a few days immediately after sowing, the seed will not need much more attention till they begin to break the ground; at which period the watching should be closely and regularly continued. As they are always the strongest and best-ripened seeds which rise first, it is therefore of much importance to prevent these from being picked up." (*Plant. Kal.*, p. 250.) In May the pines and firs will begin to pierce the ground with the husks of the seeds still on their tops, and then watching the birds becomes of the utmost importance; not one ought to be allowed to light on the beds; to prevent which will require unremitting attention from break of day till sunset, for five or six weeks, till the plants are all up, and have thrown off their husks. After the nuts, mast, and haws have come up, they are no longer in danger from mice, or birds, but they may be attacked by snails, and grubs of beetles and cockchafers at their roots. These may be captured and destroyed by placing slices of potatoes or turnips near the plants, either above or beneath the earth, according to the nature of the vermin: examining the bait every morning, and replacing it so long as appears necessary.

6540. *Weeds.* Before the tree-seeds come up, a crop of weeds will probably have made their appearance: these must be removed when young, otherwise drawing out their roots will materially disturb the vegetating seeds.

6541. *Stirring the soil.* "It not unfrequently happens, that the land in which fir and larch seeds have been sown, becomes battered by heavy rains. This will certainly happen if rain fall immediately after sowing, before the surface become dry; but if it once be fully dried after sowing, and before the rain fall, it will seldom or never batter. Suppose, however, the seed-beds are battered, so that the tender seeds cannot rise with freedom, the best way to relieve them is to draw over them a wooden roller, stuck over with lath-nails at half an inch distance, and driven in so as to remain half an inch beyond the wood of the roller. The roller should not be more than thirty inches long and not more than thirty pounds weight. By drawing this roller along the one side of the battered bed, while walking in the alley, and returning with it over the other, an ordinary-sized bed will be completely relieved. Some people rub their battered beds, in order to enable the seeds to rise. This is a most dangerous and destructive method of relieving vegetating plants. From their tender state, the smallest twist breaks them over, and consequently destroys them. We have experienced much advantage from using the light-armed roller, here recommended. It is, however, much better when no such are required. The surest way to guard against the need of such means, is to work the land when it is in a proper condition, and to sow the seeds in such weather as that the surface after sowing will be fully dry before rain come on. There is no dispensing with this precaution, when it is wished to secure an equal and good crop of seedlings." (*Plant. Kal.*, p. 367.)

6542. *Watering and shading.* In June severe droughts very often set in, and these are very prejudicial to small seeds, especially those of the resinous tribe, when rising through the soil. At this time watering and shading may be applied with great advantage, provided the former is accompanied by the latter, and daily attended to from the time it is commenced till rain falls. The best mode of shading is by the wattled hurdle. By the end of July the seedling plants of most sorts will be out of danger, and except a few of the tender sorts specified as requiring protection in winter, or by hand-glass or cold-frame, will require no other care but weeding till fit to be transplanted.

SECT. VIII. *Propagating Trees by Layers, Cuttings, Suckers, Grafting, &c.*

6543. *Layering* is, next to rearing from seeds, the most general mode of propagating hardy trees and shrubs.

6544. *The more common species of forest trees* to which this mode is applicable are, the *Acer platanoides*, *Pseudoplatanus*, *tataricum*, *dasycarpum*, *Opalus*, and other species; *Negundo fraxinifolia*; *Bétula lenta*, *populifolia*, and *rubra*; *Fagus ferruginea*; *Platanus occidentalis* and *orientalis*; *Populus græca*, *monilifera*, and *canescens*; *Tilia alba*, *americana*, *europæa*, and *pubescens*; and *Ulmus campestris*, *memoralis*, *rubroba*; and *fastigiata*, *horizontalis*, *péndula*, *variegata*, and other nursery varieties. Some of these, as the poplars and planes, are also propagated by cuttings; but layers make the strongest plants. Whenever seeds can be procured, however, it is best to propagate in that way, as likely to produce the largest trees. The other trees propagated by layers, and also all the shrubs so propagated, will be found in our *Horæ Britanncæ*, and the more common of them in the Arboricultural Catalogue which forms the following chapter. The situations and distances for planting stools in the nursery have been already mentioned; and, as there is nothing peculiar in the operation of layering timber trees or shrubs, we have merely to refer to the general directions as to layers and stools. The young or preceding year's shoots of all the sorts above enumerated, if layered in autumn or winter, will be fit for being detached and planted in nursery lines by that time twelvemonth. They should be transplanted into well comminuted soil, suitable, as far as practicable, to the nature of each; and the distances should be regulated by the size of the layers and the time they are to be nursed. For ordinary purposes layers need not be nursed more than two years; but for single trees and ornamental plantations, they should be several times removed, and close pruned, till they have attained six or eight feet in height. Evergreen trees and shrubs, as being more tender than the others, should be layered in March and April, and from August to October. Some sorts root most freely when the wood is in a succulent state; and of such the current year's shoots are laid about midsummer. This is practised with *Stauris*, *A'rbutus*, *Andrœmeda*, *Kalmia*, *Magnolia*, *Myrtus*, *Phayfœus*, *Ledra*, *ac nobilis*, and *Sassafras*. *Kentia xylinum*, *Cydonia japonica*, &c. The same practice is adopted with other free-growing sorts that it is wished to multiply as rapidly as possible; as the *Rosa*, *Hibiscus*, *Lonicera*, *Caprifolium*, *Aristœthia*, *Mespilus*, &c. Layers of the last sorts made during summer from the same year's shoots, will be fit to detach by the winter, or the following spring; of the other sorts seldom sooner than the second August, or autumn; but even then a season is gained, as the layers of those plants made in autumn, generally require to remain two years before they have made sufficient roots. The layers of all evergreens should be removed at the proper seasons for pruning, laying, or transplanting that tribe; that is, April and May, and in August and September.

6545. *By cuttings* is the next general mode of propagating trees and shrubs, and the common forest trees generally so multiplied are as follows:—*Platanus occidentalis* and *orientalis*; *Populus angulata*, *balsamifera*, *dilatata*, *græca*, *monilifera*, *nigra*, *péndula*, and *trépida*; *Salix*, all the tree species; and *Sambucus nigra*. These are also propagated by layers, and a few of them by seeds; which last, it should never be forgotten, is by far the best mode where timber trees are the object. The numerous tribe of shrubs propagated by cuttings will be found in the *Horæ Britanncæ*, already referred to.

6546. *The manner of forming and planting cuttings* has been already described. The season for deciduous and evergreen woody plants are the same as for layering; and as in the latter mode of propagation, so in multiplying by cuttings, some sorts succeed best when the current year's wood is taken at midsummer; as for example, *Lærus setivialis*, *Benedên*, and *Sassafras*; *Bignônia*, *Euphœbia*, *Philœnia*, *Rosa*, *Santolina*, &c. Cuttings of some of these sorts, made of year-old wood in spring or autumn, require to stand two seasons before they have made sufficient roots to admit of their removal; by midsummer cuttings one year is gained. The same practice may be applied to deciduous sorts; but the plants produced are not so strong as by cuttings of the ripened wood. All cuttings require to be planted in a shady situation, and sandy soil, dry at bottom; but to be kept somewhat moist by occasional watering in dry weather: their lengths are generally made in proportion to the length of the year-old wood, but seldom exceeding six or eight inches. The shoots of some sorts, as poplar, willow, honeysuckle, &c. are divided into several cuttings of this length. An inch of the former year's wood is often preserved in autumn-made cuttings, but this is not essential; more important points are, making a smooth horizontal section at a bud, and, in planting, pressing the earth very firmly to the lower extremity of the cutting. Midsummer cuttings should, in almost all cases, be covered with hand or bell glasses. The alder, most willows, the Lombardy and some other poplars, will grow from cuttings or truncheons of several feet long, and of several inches in diameter. "This method is occasionally adopted, when it is requisite to form expeditiously some rough plantation, to serve as a hedge or screen along an outward boundary. Cuttings for this purpose may consist of long slender rods of one or two years' growth, or as well of large truncheons or stakes from three to six feet in length. Further, the willow, in particular, will increase from large pole-cuttings of from six to ten feet, planted out at once to form either pollard-stems, or be trained into full standards." (*Abercrombie*.)

6547. *Cuttings of the roots.* Many trees and shrubs may be thus propagated. Among these, are almost all the species of *Prunus*, *Pyrus*, *Malus*, *Cræægus*, *Mespilus*, *Ulmus*, *Populus*, &c. *Rhôs*, *Aldærus*, *Corâria*, *Rosa*, *Spiræa*, and many other genera, may in part be so propagated. Excellent hawthorn hedges are sometimes produced from cuttings of the roots of an old hedge; in general, however, the cuttings of roots should be taken from young trees rather than old. They should be cut into lengths of from six inches to a foot, planted with that end of the root uppermost which was next to the trunk of the tree previous to removal, made firm, and the upper section covered with from half an inch to an inch of soil.

6548. *The seasons for transplanting struck cuttings into nursery lines* are those already mentioned as the most fit for moving deciduous and evergreen trees, originated by other modes. (6541.)

6549. *By suckers.* A few common trees, and a number of shrubs, are propagated by suckers. The timber trees are, the *Allœurus glandulosa*, *Robinia Pseud-acacia*; *Populus canescens*, *alba*, and *trémula*; and *Ulmus campestris*. Of hedge plants, the common sloe and other wild plums, crabæ, and pears, are, or may be, so propagated. Various shrubs are propagated by suckers. Suckers make better trees than plants raised from cuttings, and also very good hedge plants. To induce a tree to send up suckers, the horizontal roots may be laid bare, notched in different places, and the earth mixed with sand and replaced; a powerful co-operative would be to cut the tree over by the surface, by which means all the sap would be employed in root-shoots. At the end of one, but sometimes not till the end of the second season, the suckers will be fit to slip off, or to separate with the knife a part of the parent root attached; they may then be pruned as required, and planted in nursery lines. In raising plum stocks, it is a common practice to lay down all the shoots of the stools in winter, quite flat, and to cover them wholly over with an inch of soil. The following summer every bud produces a shoot, or sucker, which by the succeeding autumn is found sufficiently well furnished with roots to admit of removal. *Rhôs Côtinus* may be thus multiplied.

6550. *Grafting, budding, and inarching*, are modes applicable to a few hardy trees and shrubs. The common forest trees are, the *O rnus americana*; *Populus canadensis*, *heterophylla*, and *maritima*; *Quercus Lucombeana*, and *Ulmus campestris* and *suberba*. These, and the ornamental trees and shrubs so propagated, are raised on stocks of the more hardy species of the same, or of the next allied genus; and, probably, make as durable plants for timber trees as layers; by which mode the above enumerated sorts are also propagated. The stocks should be at least one year established, previously either to grafting

or inarching; the operation for deciduous sorts is performed in spring at the movement of the sap. Evergreens are almost always inarched either in April, or May, or August. Budding is performed in June and July, and is chiefly used in propagating the rose. Some inarched sorts require two seasons before the scion can be detached from the parent plant.

6551. *General culture and management of a private nursery.* There is nothing material to be advanced on this head, but what has been already mentioned in this chapter, or in treating of the general management of the kitchen-garden. The first grand point is so to arrange the rotation of crops, that a crop of culinary vegetables shall intervene between every crop of trees, where that crop remains on the same soil two or more years; and between every two or three crops, where the crop of trees is taken up annually, or every second year. The next thing is changing the surface of the soil, as in horticulture, weeding, stirring the surface, watering, shading, pruning, training, staking, and protecting. The important points of management are to procure the proper quantities of seeds or stock requisite to produce the quantity of trees to be annually furnished; to proportion the number of plants taken up daily to the number replanted in the nursery or forest the same day, and to attend to general order and neatness.

CHAP. IX.

Arboricultural Catalogue.

6552. In our *arboricultural catalogue* we mean to enumerate, and shortly describe, the principal timber trees, which may be cultivated with advantage as such, in the climate of Britain, and also the most useful plants for hedges. We shall arrange the whole as resinous, hard-wooded, and soft-wooded trees; including in each section the hedge plants belonging to it, and in the last, the willows proper for osier plantations; the general culture of the trees contained in each of these sections has been given in chapters III. IV. VII. and VIII.; and the soil and mode of propagation of each individual species, together with a descriptive enumeration of all the species hitherto introduced into Britain, will be found in our *Hortus Britannicus*.

SECT. I. Resinous or Coniferous Trees.

6553. *The coniferous trees in common cultivation in Britain* are comprised in the three tribes composing the natural order Coniferae: viz., Abietinae, Cupressinae, and Taxinae. The four genera of the Abietinae, or pine and fir tribe, which are most generally planted in Britain, are Pinus, Abies, Larix, and Cedrus. The Cupressinae, Juniperus, Thuja, Schubertia, and Taxus, are the principal trees belonging to the other tribes; but as they, with the exception of Taxus, may be considered on the whole more as ornamental than forest trees, we deem it unnecessary here to add any thing to what our readers will find in our *Hortus Britannicus*. Taxus will be noticed with more propriety under the succeeding section.

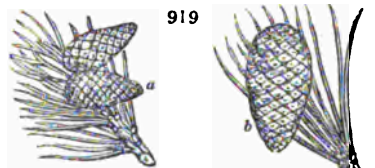
6554. *Of the genera composing the Abietinae*, the pines are distinguished by fasciculated leaves in different sheaths, but proceeding from the same sheathing-base; the firs by solitary leaves; the larches by fasciculated leaves from solitary sheaths; and the cedars by dichotomous and spreading leaves. The branches of the whole of the Abietinae are frondose or spreading, and caducous: those of the pine spread the least; those of the fir are thin and much spread, and are peculiarly frondlike; those of the larches rather droop; and those of the cedars are characterized by straight horizontal branches.

6555. *The Wild or Scotch Pine*, erroneously denominated Scotch fir, is the *Pinus sylvestris* L. (Lam. Pin. t. 1. 1.) Pin. Fr.; *Kiefer* or *Föhre*, Ger.; *Pijnboom*, Dutch; and *Pino*, Ital. (Ag. 511. c.) It is an evergreen sub-conical tree; the leaves inclining to dark-blue or grey; shorter and broader than those of the pinaster (b); it is common in most parts of Europe,

properly pruned, and grown to a sufficient age, as likely to equal that of foreign growth. Main says that "the Scotch pine, when allowed to stand till it has attained a great size, produces a fine yellow deal as any imported." and he instances "two cut down on the estate of Chalfont, Bucks, in 1800, which had been growing at least 300 years. These trees contained about 15 load of clear timber each, and were declared by every carpenter who saw them to be most excellent yellow deal." The tree is of great value as a nurse-plant; being, next to the common Scotch mountain ash, or mountain ash (Pyrus Ayl.), the most hardy timber tree. A mass of its minor uses we shall only mention the production of tar by incision.

6557. *Varieties.* Of these several have been noticed by botanists. According to Rang, the variety commonly cultivated is least worth the trouble. "The *P. sylvestris* var. *montana*," he says, "is the variety which yields the red wood; even young trees of this sort are said to become red in their wood, and full of resin, very soon. The late botanist, Mr. Don, of Forfar, exhibited specimens of cones of each variety to the Highland Society of Scotland, and likewise to the Caledonian Horticultural Society. The variety preferred by Don is distinguished by the disposition of its branches, which are remarkable for their horizontal direction, and for a tendency to bend downwards close to the trunk. The leaves are broader and shorter than in the common kind, and are distinguishable at a distance by their much lighter and beautiful glaucous appearance. The bark of the trunk is smoother than in the common kind. The cones are thicker and not so long pointed. The plant is more hardy than the common sort, grows freely in almost any soil or situation, and quickly arrives at a considerable size." Rang says, he has seen trees of this variety at Carlston and Brechin Castles: and it is much to be wished that he, or some other competent nurseryman in that quarter, would collect the seeds, and propagate it extensively. Thonin (*Note sur la Culture des Pins*, Soc. 1819) mentions a variety, which he calls *P. syl. var. Pin de Hain*, as affording the best timber. Vilmorin, who has paid great attention to this subject, considers the Pin de Hagenau a very superior variety, and grows annual supplies of its seeds. (Gard. Mag., vol. v. p. 67.)

6558. *Soil and native site.* "This tree is naturally the inhabitant of mountainous districts, and of rocky, gravelly, or poor sandy soils, where its timber becomes most valuable and durable; On the sides of mountains, in dells and below, among stones and rocks, beside rapid rivulets or mountain torrents, it is found in high perfection; and, if it stand single, it is of great beauty. In many parts of the Scottish Highlands, where the soils are extremely various, and much mixed, the Scotch pine has arrived at a good size, and often attained remarkable dimensions. In many kind of soil, from a sandy to a clay, provided the substratum be rubble or rock, it will grow and flourish; but in wet clay soils, it ought never to be planted; because, whenever the roots have exhausted the turf or upper soil, and begin to penetrate the subsoil, the tree languishes and dies." (Plant. Kal. p. 65.)



particularly the northern countries, and is the only species of the genus indigenous to Britain, being a native of Scotland, and naturalised in England and Wales. Under favourable circumstances it attains the height of eighty feet: it flowers in May, and the cones are fit to gather in December of the following year. The finest pine forests in Britain are at Invercauld in Inverness-shire, and Gordon Castle in Aberdeenshire.

6556. *Use.* The timber of this tree is the red or yellow deal of the north of Europe, and is the most durable and valuable of any of the genus, unless we except the common larch. The universality of its application is known to every one. The Highland pine, Rang states to be not inferior to any imported, either in cleanness or durability, when it has been grown on a proper soil, and to a sufficient age. "But the planted Lowland pine," he adds, "is seldom applied to offices higher than that of roofing sheds or huts, lining of carts, lathing, or making of packing-boxes; while the natural or self-sown is fit for the finest purposes." Matthew says that the best Scotch pine he has ever seen was grown on the alluvial soil of the Carrs of Gowrie. (Naval Timber, &c., p. 303.) According to Reid, an eminent Aberdeen nurseryman, the best Scotch pine timber is always found growing on a basal loam. (Gard. Mag., vol. iv. p. 618.) Pustey considers the English-grown Scotch pine, if

6549. *Insects.* The larvae of *Necora pinastri* L. (*Xylina* Sw.) are deposited in the leading buds, and often perforate the young shoots, and leave the tree without a leader. The *Aphis* pine infests the tender shoots; and various *Dermatids* live in the bark, and perforate the soft wood. The little beetle *Hylurgus picipes* is hatched under the old bark, and in the month of May when pines and firs make their young shoots, the larva or grub inserts itself into their bark, nearly at where the new growth proceeds from the old wood (Fig. 590. a), and works upwards till it finds its way out at the extremity b. (*Gerd. Mag.*, vol. II. p. 355.)

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It seems to bear cones very freely, which ripen nearly about the same time as those of *P. sylvestris*. It has been tried on sandy hills in the coldest part of Norfolk, and it was found that, while the Scotch pine in the same situation had reached no higher than six or seven feet, the *P. Laricio* was at least twelve feet high. (*Gerd. Mag.*, vol. I. p. 79.) This pine, therefore, deserves to be extensively cultivated, perhaps more so than any other.

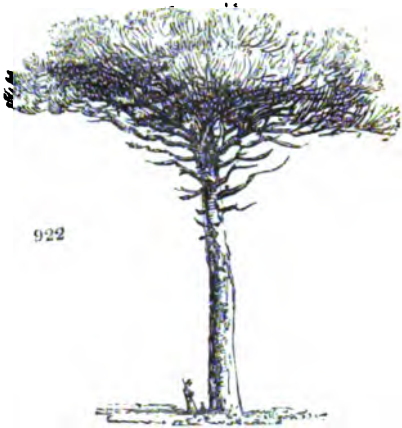
6561. *The Pitch or Red Canadian Pine* (*P. resinosa*) (Lam. Pin. 30. t. 4.) is an American tree, introduced in 1756, not unlike the Scotch pine, and "receives its name of red from the colour of the bark. From the high geographical range of this pine, it is well adapted to associate with the *P. sylvestris*. It has been imported in the form of mast into this country. Like the *P. sylvestris*, it affords an inferior timber on a damp and unsuitable soil." (*Caled. Hort. Mer.*, vol. II. p. 367.)

6562. *The Planer or Cluster-Pine* (*P. pindaster* L.) (Lam. Pin. 3. t. 5.) (Fig. 919. b) grows to the height of fifty or sixty feet, with broader, thicker, and longer leaves than the common pine (a): the branches are also further apart, and grow more horizontally than in that tree. As the tree advances in age it becomes naked and unsightly below; but the top grows highly picturesque, and may readily be distinguished in the landscape of the Roman and Florentine painters. It grows naturally on the mountains of Italy and the south of France; in Switzerland it is cut into shingles for covering the houses, and also for making pitch. It flowers in April and May, and the cones are fit to be gathered in December. A variety of this species is much cultivated on the sea coast, being found to stand the sea breeze both in France and Britain. It is generally known in France under the name of *Pinus maritima*. It was introduced in 1566, but never much cultivated, being less hardy and much less valuable as a timber tree than the common pine. It is very picturesque, and well merits culture in that point of view. There are some large specimens at Culzean Castle, on the sea-coast of Ayrshire.

6563. *The Stone Pine* (*P. Pinus*) (Lam. Pin. 11. t. 6, 7, 8.) (Fig. 38., Fig. 921., and Fig. 922.) grows to a considerable height, with a straight stem and rough bark. The leaves are not quite so long as those of the planer, and are of a greyish or ashy-green colour. The cones are five inches in length, round, thick, and obtuse; the kernels are large, and frequently served up in slices for the same purpose. It is during the winter season in Italy and the south of France, and they are also much relished by the Chinese, for the same purpose. It is a native of Greece, but not of Italy; though it forms a distinguishing ornament of the coast of Rome and of Florence. It was introduced here in the year 1570; but, as the wood is not so resinous as most of the other pines, it has been cultivated only for ornament.

6564. *The Cedrus Pine, or Apharoceli Pine, or Siberian Cedar* (*Pinus Cedrus* L.) (Fig. 923. a.) is a native of the mountainous land and also of Siberia, though it is now rarely found wild in the former country. The general form of the tree is conical; and in Switzerland it is of very slow growth, usually not rising more than a span in height during six years. The timber has a most agreeable perfume, and is much used for wainscoting, as well as for domestic utensils. Its growth in Britain is from two to six inches in length in a year; and, with a view to the use of its timber in cabinet-work, as well as to the beauty of the tree in scenery, it deserves to be introduced in all extensive plantations.

6565. *The Weymouth or New England pine* (*P. Stricklandii*) (Lam. Pin. 81. t. 2.) (Fig. 923. b.) forms the connecting link between the pine and larch tribe. It is one of the tallest of the genus, attaining in America the height of 100 feet and up-



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wards. The bark is smooth and delicate, and the leaves soft and of a bluish-green. Vast quantities of the timber, under the name of the white pine, are imported from America; but the tree seems to be of so delicate a habit, as to prevent our expecting it ever to become a large or valuable tree with us, especially in exposed situations. It was introduced in 1708, by Lord Weymouth, and has been a good deal cultivated, having formerly been supposed the most valuable tree of the genus, next to the common pine. The Weymouth pine always arrives at the greatest size when planted by the sides of rivers. The largest specimens are at Merham, Heitch, Sir E. Knatchbull's seat in Kent, and at Whifton Park in Middlesex.



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6566. A number of other species are enumerated in our *Hortus Britannicus*; all of which are of interest in a botanical and picturesque point of view, and therefore are most desirable for furnishing a pinetum; though, for profitable planting, none are equal to the Corsican and the Scotch pine.

6567. *The Norway Fir, or Common Spruce Fir* (*Abies excelsa* Peir., *P. A'bis* L. (Lam. Pin. 73. t. 25.); *Sapin Excelsa*, Fr.; *Fichte*, or *Tanne*, Ger.; *Sparredom*, Dutch; *Abies*, Ital.) is one of the tallest of European trees, attaining from 100 to 150 feet in height, with a very straight but not thick trunk, and throwing out its spreading fir-like branches so as to form an elegant narrow cone of vivid green. It is a native of the north of Europe and is particularly abundant, as the name imports, in Norway; its timber being the white deal received from that country and the Baltic; and the smaller trees forming the well known Norway spruce of European timber merchants, so much in use as masts for small craft, and as scaffolding poles by builders. It is supposed to have been introduced about 1649, and has been, and still is, more cultivated than any species of the *Abietina*, except the common pine and the larch.

6568. *Use.* The timber is inferior to that of the common pine in durability and bulk; and, being often knotty, is not so portioneously strong for horizontal bearings with that timber. White Norway deal, however, is used for a great variety of purposes in building; and the entire trees are more prized than any other for masts for small craft, for spars both for marine purposes and on land. What constitutes the value of this fir is, that its timber is equally durable at any age, like that of the larch; and what renders it peculiarly adapted for masts, spars, scaffolding, poles, &c. is its habit of almost in every case, whether standing single or detached, growing perfectly erect and straight. The tree may be cut for poles, stakes, and scythe or other implement handles, when the trunk at the base is not more than two inches in diameter,

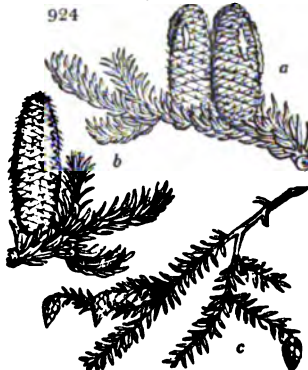
and the bark, being kept on it, it will prove almost as durable as the larch. Poultry says that poles of spruce are so far inferior to those of the larch, that they are more apt to crack when exposed whole to the influence of the sun and air; but in all other respects it is nearly equal to it, and in straightness surpasses it. The tree is peculiarly valuable as a nurse, from being evergreen, and closely covered with branches, by which radiating heat is retained; in its conical shape and rigid stem, by which it does not suffocate or whip the adjoining trees; from its being valuable at whatever age it is thinned out; and from its being an excellent shelter for plants for shelter, but is deficient in point of defence and durability. By incision, it yields a resin, from which, by various preparations, turpentine and Burgundy pitch are formed. The tops or sprouts (*sproutings*, Ger.) give the flavour to what is called spruce-beer.

6569. *Silv. and Silv.* Poultry says it grows rapidly on every description of soil, from a very stiff loam, and such as possess a very considerable degree of humidity, to a very dry sand, provided the situation be not very much exposed. Sang says it flourishes much in deep low situations: in shallow soils and exposed places it never succeeds. It should never be planted for the sake of its wood, except in masses or groves by itself; otherwise its timber is so coarse and knotty, that it is hardly worth working: but in the mass way, if planted thick and properly pruned and thinned afterwards, it may be trained to tall clean timber.

6570. *The White, the Red, and the Black Spruce*, (*A. alba*, *A. rubra*, and *A. nigra*) with some other species, are chiefly to be considered as ornamental trees. They are all natives of North America, and their timber, which is white, possesses nearly the same properties as that of the European species. The white spruce rises only to forty or forty-five feet, with pale bluish-green leaves. The black spruce is reckoned the most durable of the tribe. "In America, the black spruce is used for knees in ship-building, where neither oak nor black larch can be easily obtained: these knees are not prepared from two diverging branches, as in the oak; but from a portion of the base of the trunk connected with one of the largest diverging roots. Some old trees of the black spruce in England, for example at Fyvie, and Woodhouse Glade, yield their lower fronds of a timber-like size, and appear suitable for the sort of knees referred to. The timber of the red is universally preferred throughout the United States for sail-yards, and indeed imported into Liverpool from Nova Scotia, where it is also used for constructing oaks for salted fish. It is chiefly from the decoction in water of young shoots of the black, and not exclusively from those of the white spruce, as supposed by Leach, that the celebrated beer is prepared by fermentation, with a due proportion of sugar or molasses. The essence of spruce of the dealers is prepared by evaporating this decoction to the consistency of honey."

6571. *Isaert.* "The *Cocculus alba*, and occasionally the others which infect the common pine.

6572. *The Pitch or Silver Fir* (*A. Picea W.* (*Linn. Plin. 46. t. 30. 1.*), *Serpis comensis*, Fr.) (*Fig. 224. a.*), is a lofty evergreen tree,



forming a cone broader at the base, in proportion to its height, than the spruce, and displaying a more stable and majestic figure than any of the other firs. It frequently attains the height of 100 feet in England, and cut down in the park at Woburn Abbey upwards of 110 feet high. It is more thinly covered with frond-like branches than the spruce, and differs from it also in regard to the frondlets, which, when they grow old, and begin to decay, do not drop down, as in that tree, but remain rigid till the last. The upper surface of the leaves is of a fine vivid green, and their under surface has two white lines running lengthwise on each side of the midrib, giving the leaves that silvery look, whence has arisen the name. It flowers in May, and the cones are ripe in December. It is a native of the Alps and Germany, was known here in 1603, and has been a good deal planted as an ornamental tree. It grows faster for the first twenty or thirty years of its growth than any other tree of the Abietinæ, except the larch, and probably the *A. Douglasii*.

6573. *Use.* The timber is reckoned inferior to that of the common pine, and is not of much value till of forty or fifty years' growth. According to Sang, though till of late years planted only as an ornamental tree, yet there is, perhaps, none of the genus more worthy of cultivation for the sake of its timber. "It is more prolific in resinous matter than any of the fir kind, and hence it derives its name of pitch fir.

6574. *Its soil and site* are nearly similar to those most desirable for the common spruce; but it requires a drier rather milder, and a more loose soil than it. On poor soils, where the common pine and larch will thrive, a *Pinus* of a year or two after planting. None of the genus are so majestic on a lawn; but its characteristic or natural situation is in dells, and on the sides of shaggy rocky mountains.

6575. *The Balm of Gilead Fir* (*A. balsamifera*) (*Linn. Plin. t. 31. 1.*) (*Fig. 225. b.*) is an American tree of much smaller stature, and more delicate habits, than the silver fir. It is similar in its little value of little value as an ornamental tree, though frequently planted for the sake of variety. The resin procured from it possesses no medical properties superior to those of common turpentine; but the tree during summer sends out a pleasing odour almost as sweet as rose.

6576. *The Hemlock Spruce, or Hemlock Fir* (*A. canadensis*) (*Linn. Plin. 50. t. 32. 1.*) (*Fig. 225. c.*), is a drooping, low, evergreen tree, which may be considered as equally ornamental.

6577. *Several species of fir* belonging to the division with solitary leaves, have, since 1810, been introduced from North America, Nepal, and Siberia; some of which promise to be rapid-growing trees, which will attain a height still greater than that of the silver fir. Of these we may mention, in particular, *A. Douglasii*, *A. taxifolia*, *A. caroliniana*, *A. virginiana*, and *A. abietina*. All these, and some others, deserve to be introduced. Various particulars respecting these trees which interest the cultivator will be found in our *Herbarium Britannicum*, and in the account of the pinetum at Drummond in the *Gardeners Magazine*, vol. III. p. 283, and vol. IV. p. 100.

6578. *A collection of ornamental trees* under the designation of a pinetum, has lately become a fashionable pleasure to the pleasure grounds of first-rate country residences. We are anxious to know whether the silver fir be the best to plant at Fonthill, both dating their existence from the last five years of the eighteenth century. There can be no doubt, however, that the most extensive and complete in Britain is that at Drummond (see *Gent. Mag.*).

6579. *The Common Larch* is the *Larix europæa* Des. (*Linn. Plin. 53. 33.*) *Larix* or *Melior*, Fr.; *Laricina*, Ger.; *Leich*, and *Larix*, Ital. It rises to the height of 100 feet high, forming a tree with a trunk straight, unbranched, caducous, pendulous branches, with delicate drooping spray. It is a native of the alpine mountains, on the south side of the Alps, in the chain of the Pyrenees, and the greatest height and thickness, and most durable timber. It is timber is said to last four times longer than that of the pine grown at the same elevation. In returning from Italy by the Italian Alps, the silver fir, the most common of the firs, is the bellows on the south side, the common Scotch pine on the summit, and the larch in descending to the Valais. It appears to have been cultivated by Parkinson in 1695; and Evelyn, in 1664, speaks of a tree of great stature, "as long since to be seen at Cheshamstead, in Essex (also mentioned by Hart), which sufficiently approaches our not cultivated useful material for many purposes." Hart, in his country essays, published in 1712, speaks of the larch, and strongly recommends its culture. It was first introduced into Scotland by Lord Kaim in 1734 (*Linn. Plin. t. 33. 1.*), and afterwards, in 1741, planted by the Duke of Athol at Dunkeld, and these last trees have prospered, and the timber produced from such as have been cut down has fully answered all the eulogiums that have been bestowed on it; that the larch is now considered, on the whole, to be the most valuable timber tree, not even excepting the oak. Some of the first-planted larches in the low grounds, at Dunkeld, have grown to the height of 120 feet in fifty years, which gives an average of two feet 4 inches a year, as stated by the Duke of Athol, in a communication to the Horticultural Society, made in June, 1820, that on mountainous tracts, at an elevation of 1500 or 1600 feet, the larch, at eighty years of age, arrived at a size to produce six loads (360 cubic feet) of timber, appearing in durability and every other quality to be likely to answer every purpose, both by sea and land. (*Hort. Trans. vol. IV. p. 416.*) Professor Martyn (*Philos. Diet.* in larch) has collected together a mass of valuable information respecting the history of the larch of this country, and its uses in others. This singularly accomplished agricultural writer, Dr. Anderson, did much to promote its increase by his good and other works from 1750 to 1790; and, subsequently, the Bishop of Lincoln, Marshall, Nicol, Pontey, and Gung have each, in practice and by their popular publications, contributed to spread its use; and now several millions are annually planted in the mountainous districts of the empire. The larch, long deserved, passes all other timber trees, for the first ten or twenty years after planting, and will arrive at a timber size in almost any situation or soil. It bears, he says, "the secondary use of the Scotch pine in the following important circumstances: that it brings double the price, at least, per reasonable lot; that it will arrive at a useful size in one half or one third part of the time; in general, which the fir requires; and, above all, that the timber of the larch, at thirty or forty years old, when placed in soil and climate adapted to the production of perfect timber, is in every respect as good as that of the silver fir at a hundred years old. In short, it is probable that the larch will supersede the Scotch pine in most situations in which it is now planted, at no very distant period. The greatest possible source of information respecting the larch, which is to be found in the *Transactions of the Highland Society of Scotland*, vol. IX., in which the whole history of the larch culture, since 1734, is detailed, and from authorities furnished by the Duke of Athol. We have given some account of this paper in the first additional Supplement to our *Encyclopædia of Agriculture*, to which we refer the reader.

6580. *Use of the wood* is the basis of the durability of larch timber in Italy: its resistance to fire, according to some (Mastelloni), and its great combustibility, according to others (De Haussel); its durability under water (at Venice), and even its not being liable to warp, when the beam is cut, are circumstances its great and almost only defect. We shall confine ourselves to its use, as experimentally proved, in Britain; and perhaps we shall do this with more effect by stating that it may be used for all the purposes for which the beam of oak is applied; for many of those of the oak; and that it is more durable than any other timber when placed in a situation between wet and dry, and exposed to the weather, and moved, it being still more incorruptible than the wood. The bark is also of considerable value in tanning; as a circum-

of great importance, since it is found that disbarbing a year or more previously to felling is the best mode of seasoning the timber, and preventing it from warping, or being attacked by the dry rot or rot. One property almost peculiar to the larch is, that the timber is exceedingly valuable at every period of its growth; so that a dead hedge of larch-boughs, or a hurdle walled with larch-spray, will last longer than dead hedges or walled hurdles of any other species of tree. Planted in rows to expose the garden to form a useful hedge-plant in point of shelter; but in this respect is deficient as a fence, and gets soon naked below. Mr. Gorrie has formed excellent live fences with the thinnings of larch, which he had stood nine years in a plantation, and were from ten to twelve feet long; they were planted along the top of a ditch, in a slanting direction, at from fifteen to eighteen inches apart. (See *Gord. Mag.*, vol. ix. p. 59.) Rods, stakes, pales, rails, posts, and especially gate-posts, of this tree, are therefore more valuable than of any other; the spruce fir approaching the nearest to it in these respects. Turpentine is extracted from it in the Tyrol; but, being always inferior to the timber, can never be recommended for adoption in this country: it is also peculiarly valuable as a nursing-tree.

6581. Use and value of larch plantations. At Dunkeld it is found that plantations of larch actually increase the depth of the soil, and improve the grasses on its surface. The lower and stronger branches meet together in six or seven years after planting, so as to form a good and lasting cover to the soil. The air and light being excluded by them, all plants that are under them die. At the same time, the annual deposit of leaves from them, by means of decomposition, forms, in the course of time, a rich and fertile soil. At Dunkeld, in a twenty-four, the larches lose the spray on the lower branches altogether, and that is the natural mark of their being ready to be removed by thinning, to a considerable extent. On the air being readmitted, and that the soil will be improved, in the new-made soil, wherever it has been formed, even among the rocks, becomes immediately covered with natural grasses, of which the *Stellaria media*, and *St. lanata* are the principal. These grasses continue to grow, and to thicken into sward by the annual top-dressing which they receive from a continued deposition of leaves.

6582. With regard to effects of trees effecting an improvement of the soil, the following are the results of many experiments made by the duke on the subject. In oak coppice, the value of the pasture is only 5s. or 6s. per acre for eight years only in England; and in Scotch pine the copse is cut down again. Under a Scotch fir plantation, the grass is not worth 6d. more per acre than it was before it was planted. Under beech and spruce it is worth less than it was before; but the spruce affords excellent shelter to cattle, either from the heat of summer or the cold of winter. Under ash the value may be 2s. or 3s. per acre more than it was in its natural state. But under where the ground where not worth 1s. per acre, the pasture worth from 6s. to 10s. per acre, after the first thirty years, when all the thinnings have been completed, and the trees left for naval purposes, at the rate of about 400 to the acre, and twelve feet apart. Nay, so improved was the value of the larch as an improver of natural pastures, that he makes a statement to show that the pasture alone, independent of the ship-timber on it, would increase the value of land by increasing its value, so that it itself would repay the whole outlay of fencing and planting, at 5 per cent compound interest, thus:—

3000 acres of land in its natural state, not worth above 1s. per acre, at 5 per cent per annum, will give	3750 0 0
Plants and planting, at 6s. per acre	300 0 0
3400 acres of fencing, at 5s. per acre	600 0 0
Twenty years, at 5s. per acre	27 10 0

L. 5287 10 0
5287. 10s. — at 5 per cent compound interest, to 50 years, the periods at which the land is fit to be begun to be depastured, gives 21,150s.; but 2000 acres at an improved rent only of 6s. per acre per annum, at twenty-five years' purchase, yield 22,500s. (*Highland Soc. Trans.*, vol. ix. p. 159.)

6583. The value of larch wood at Dunkeld, exclusive of the value of the pasture under it, may be estimated in this manner:—Suppose the plantations are thinned out by thirty years to what they are at present for ship-timber; that is, to 400 trees per Scotch acre; suppose, after that period, the whole were cut down at the following respective ages: the value of the whole per acre, at the different periods, would be as follows:—

400 trees at 30 years old, at 24 cubic feet each tree, at 10s. per cubic foot, or 30 loads, at 1s. 6d. per foot profit, =	75 per acre.
400 trees at 45 years old, at 15 cubic feet each tree, = 6000 cubic feet, or 180 loads, at 1s. 6d. per foot profit, =	450 —
400 trees at 50 years old, at 140 cubic feet each tree, = 16,000 cubic feet, or 320 loads, at 3s. 6d. per foot profit, =	2000 —
400 trees at 75 years old, at 20 cubic feet each tree, = 8000 cubic feet, or 240 loads, at 2s. 6d. per foot profit, =	2000 —

The average of these prices would be 1281l. 5s. per acre; but that 1000l. is a high calculation of the value of the duke's larch plantations. (1844.)

6584. Species and varieties of the larch. That extensively cultivated by the Duke of Argyll is the common white larch, *Larix europæa* Dec., but the following other species or varieties were tried:—1. The Tyrol larch, with white flowers; these of the common variety being pink flowers. 2. The Tyrol larch, with white flowers and the cones also remarkable for their whiteness, and for being erect, not conical. The shoots of the Tyrol larch are generally stronger than those of the common larch; but the foliage of both kinds is similar. 3. The weeping Tyrol larch, a variety of the common, with pendulous branches; but distinct in botanic characters from the *Larix pendula*, or black larch of North America. 4. The red larch of North America, or *Larix microcarpa*. This species is remarkable for the great gravity of its wood, which is so ponderous that it will scarcely swim in water. Its cones are shorter or smaller than those of the common larch, its branches weaker, and its leaves narrower. 5. The

Russian larch, raised from seed procured by the duke from Archangel, about the year 1806. The bark is cinereous, not yellowish-brown; the leaves come out so early that they are liable to be injured by spring frosts. The *Larix pendula*, or black larch of North America, and *Larix laricina* of Dr. Fischer of Petersburg, are distinct species, no examples of which exist at Dunkeld or Blair. (*Scott. Trans.*, vol. iv. p. 416.)

6585. Soil and site. The larch will grow and attain a large size in every soil and situation, except in standing water; but a certain elevation of surface, or closeness of climate and fertility of soil, is absolutely necessary to produce the timber in perfection. The quality of the timber of all trees is more or less affected by climate and soil; but that of the resinous tribe particularly so. We pointed out several instances in 1806 (*Scott. Trans.*, vol. ix. p. 59.) Sang mentions a number as having occurred since 1812 (*Philos. Cal.* p. 59.), and observes generally, that he has "known it in many places make the most rapid progress in 30 or 35 years, and, though there was no external signs of disorder, yet, when it was felled, the wood had begun to rot in the hearts of the trees; so that there was scarcely a sound tree over a large extent of ground; yet the oak, the chestnut, the elm, and the ash, among which the larch had been admitted as a nurse, were not only in the utmost vigour, but their wood was perfectly sound. Some larches in a similar soil and situation had attained the height of 100 feet each, and were quite hollow in the upper part. In Dumfriesshire, it is found that the larch, when planted on a soil having a substratum of red sandstone, decays at from fifteen to twenty-five years of age. (*Gord. Mag.*, vol. ix. p. 534.)

6586. In speaking of the larch planted on a wet soil, the writer observes, that it is an error to suppose that the larch will thrive in all soils and in all situations. There are many kinds of soils in which it will not thrive, and ought not to be planted; and that it is an error to suppose that the larch, when turned by the plough, and which have borne white crops, the larch cankers. It cankers in wet situations also. In soils resting on a wet silty subsoil, it decays at the heart, after arriving at forty years of age, in a situation where the water stands for a length of time about the roots, it becomes fogged, or covered with lichens. But in all rocky situations, the particular those which are composed of granite, and containing crystal of garnet, among the fissures and fragments of which they can push down their roots, larches thrive to admiration. The geognostic character of the country from Dunkeld to Blair is primitive. At Blair it is a soft silty sandstone, clay slate, and the intermediate space is occupied by mica slate; they lie conformably on one another.

6587. Situation. The advantages resulting from planting mountains in first sight appear to be of great moment; but of trees that may be supported on the acclivity of a mountain than on a surface equal to its base. Trees derive nourishment from the soil immediately around the place in which they are fixed; and, as the superficiality of that soil must, of course, be greater on an acclivity than on the base, a greater number of trees will be there supported. Practically speaking, 100 trees, at six feet apart, can be planted on the hypotenuse of a right-angled triangle, whereas the base would only permit eight at the same distance. Another and a great advantage derived from planting mountain ground is, that, as an acclivity, the trees expose a greater surface to the influence of the sun, and air, and rain, than they can do on a level surface. That trees derive much nourishment from the air, through the instrumentality of their leaves, there is no doubt. The experiment of taking the bark from fifty standing larches, in May, 1814, at Dunkeld, did not prevent their vegetation, and even forming wood for two years after. The outside trees in a forest are always the strongest. On an acclivity, they all possess the advantage of close trees, and, at the same time, most of the shelter enjoyed by those in the interior. (*Highland Soc. Trans.*, vol. ix. p. 185.)

6588. Nurseries not used by the late duke. The late duke's plantations were a mixture of Scotch pine and larch; but so were the former from nursing the latter, that at the end of seventeen years they had not attained a height exceeding three feet; while the larches which they were intended to nurse were from fifteen to twenty feet high.

6589. The growth of the larch. Taking the average height of an average larch, of eight years from the seed, at eleven feet, it will be nearly accurate to allow sixteen inches as the annual growth, till the tree is fifty years old, and after that only ten inches per annum for twenty-two years longer; so the length of the tree hence in ground at the full of the wood increases. These data give a larch tree of seventy-two years of age a height of ninety-three feet four inches; a fair average, agreeing with actual experience. The larches beyond thirty-five years of age are heavier, though they are not so long as those of younger trees. The larch, like the oak, puts forth two shoots every year, the one in spring, the other in autumn, and the autumnal shoot pushes out like the spring one; but, at the time this process is going on, the spring one is throwing out lateral branches.

6590. In regard to the growth of the larch, a larch tree, on an average, will acquire an inch in girth per annum, till it be twenty-four years old; and from that time, till it has acquired the venerable age of seventy-two years, it will grow one inch in girth every year; the last quarter of its life.

In 24 years, it will be 2 feet in girth, at 1 inch per annum.
48 years more, 5 feet in girth, at 1 inch per annum.

In 72 years, it will be 7 feet.
The larch begins to make wood at twenty-four years of age.

At 30 years old it will contain 36 cubic feet of wood.
60 — 14 ditto more.
72 — 20 ditto more.

In all, 60 ditto, or one load of 80 cubic feet, and 10 feet more.

6591. These results correspond exactly with the quantities which the duke obtained at these respective ages. The larch appears to be on the greatest increase of timber from fifty-seven to seventy-two years old. A larch containing fifty cubic feet, or one load of timber, is quite fit for naval purposes. At half that size it is suitable for every country purpose.

tree, and rather to be avoided by the profitable planter, as it is generally propagated in the nurseries by layers. Raised from seeds, it produces pinnae leaves. There is a weeping variety considered curious, or ornamental.

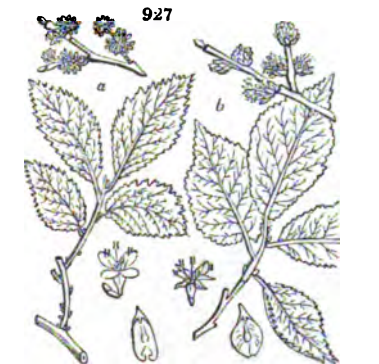
6608. *The White or American Elm* (*Ulmus americana* Ph.) (Michx. Arb.) is a lofty tree like the other, distinguished by the whiteness of its bark, its narrow leaves, and smaller seeds. It is found in Jersey and Pennsylvania, where it attains the height of eighty feet, with about three feet in diameter at the base. It is palmet of cold, thrives in damp fresh soil, by the banks of rivers, and unites all the good properties of the common ash. There are two varieties, the red and blue; by some accounted distinct species. They are smaller trees, but present no advantage to the profitable planter over the two species mentioned.

6609. *Use.* The ash is unquestionably the most valuable indigenous timber, next to the oak; and in some places, as Cornwall, is more valuable than that tree. It is more especially used by the coachmaker and the agricultural carpenter. The wood is useful when the trunk is only three inches in diameter. Toughness and elasticity seem to be its characteristics, and the faster the tree grows the better. Timber from a tree of slow growth, and considerable age, is uniformly found to be more or less brittle, and therefore more or less unfit for the purposes to which this tree is applied, especially shafts or poles of carriages. As underwood, it is fit to cut every seven years for crusa-ware for the potteries, hoops, and hop-poles; requiring for these purposes more or less of the bark, but chiefly periodical cutting. It forms excellent fuel; burning when green or new better than any other tree. "A few ash pollards," Professor Martyn observes, "will produce many loads of top, which makes the greatest of all fires." The ash-bark affords more potash than those of most trees; and the bark is used occasionally for tanning, and will dye yellow.

6610. *Soil and site.* It will not thrive on thin soils, where the bottom is wet, nor in peaty earth or gravel; but in most others it will do well: and above all, in a hollow, where a friable loam has accumulated from the debris of more elevated rocky heights, and is drained by a rivulet. Such rocky dells and dingles abound in Perthshire and Fishburgh, and in them the ash is to be found in great perfection. It will not thrive at a great height above the sea, or in any high situation.

6611. *The Elm is the Ulmus L. = Pseud. Dig. L. and Umbrac J. Orme, Fr.; Umbracum, Ger.; Olm, Dutch; and Olmo, Ital.* There are two species which may be regarded as timber-trees.

6612. *The English or Narrow-leaved Elm* (*U. campestris*) (Eng. Bot. 1856.) (926. Ag. et), is certainly the loftiest of



native deciduous trees of this country, being often found upwards of eighty feet high. It flowers in April and May, and ripens its seed in a fortnight or three weeks after the decay of the flower. This species requires a dry soil, rather good than indifferent, and also a good climate. It does not thrive in the north of England or in Scotland, unless in good soils and moderately sheltered places. Professor Martyn says, it is not found north of Newark on Trent. It grows to a great size in a short time. Evelyn says, in little more than forty years it will arrive to a load of timber. Marshall says, the largest narrow-leaved elm he has seen are in the Vale of Gloucester.

6613. *The Dutch Elm* (introduced with King William), U. major (E. 2161.), U. suberba W. It is chiefly remarkable for its fungous rough bark, large rugose leaves, and rapid growth. It is a native of the Netherlands, and is probably a variety of this species; the tree attains a great height, and in the neighbourhood of London produces its leaves from ten days to a fortnight earlier than the common elm. There are some fine specimens in Egham Park. (See Gard. Mag., vol. ix. p. 443.)

6614. *The Scotch or Smooth-barked Elm* (*U. glabra*) (E. B. 2348.) (Eng. 926. 8) is readily distinguished by its smooth dark lead-coloured bark, and by its leaves, which are nearly smooth on the upper surface. It is the most useful timber tree of the genus, and is almost the only tree of the elm kind planted in Scotland, where the Scotch elm, in its vigour in Durham and Northumberland. A new variety of this species has attracted notice at Downton, which Sabine (*Hort. Trans.*, vol. vi. p. 146.) proposes calling the Downton elm. A very rapid-growing variety, called the Scampton elm, is in vogue in Durham and Northumberland. (*Art. Surv. of Durham*, ch. x.) and the weeping elm, or, as it is called by some, the horizontal elm, also seems to belong to this species. The latter is a tree of an singular and beautiful. A kind of elm with a fine broad leaf, and upright plematic growth, called the Chichester elm,

is preferred to others in the south of England, and in Huntingdonshire.

6615. *Other species.* The genus *Ulmus*, like *Salix*, is one of those whose species are so nearly related as to be often confounded. Linnaeus considered all the European elms as forming only one species. At present botanists make five British species, besides an equal number from America. The *U. campestris* and *glabra*, however, are the only sorts worth cultivating for their timber. (See, in Neill's *Hort. Trep.* p. 639.)

6616. *Use.* Elm timber is used in all works where it may be continually dry or wet; as, for water-pipes, pumps, water-wheels, &c. It is also very generally used for the water-board, and for common cabinet-work. The knotty parts, like those of the ash, are used for masts. The top and top make good fuel and charcoal.

6617. *Soil and site.* The narrow-leaved elm requires a light dry soil and warm situation, and will do little good in sand or gravel, in exposed places; but the smooth-barked sort is a very hardy tree, and will grow in thin clay soil on retentive substrata better than most others. It will also thrive in situations elevated and exposed on all sides.

6618. *The Beech is the Fagus sylvatica L.* (Eng. Bot. 1846.); *Monac. Polyd. L. and Americana J. Bérre, Fr.; Bêche, Dutch; and Faggio, Ital.* It is a native of England, and grows in its natural soil and situation to sixty or eighty feet high. It is found congregated in forests, in chalky daisy soils, thrives well in sheltered bottoms, and is exposed to the west. It is not so long-lived as the elm, nor will it grow in situations so much elevated as will the Scotch elm. The varieties with red and purple leaves, of which there are several, form striking objects in ornamental plantations. There is also an American species (*F. ferruginea*) with rusty leaves, which is easily known from the others by its flowering a month later. (See *Hort. Brit.*)

6619. The timber is brittle and decays soon in the air; but under water it is more durable, and is therefore much used as piles in bridge-building. It is used by the millwright, turner, carver, last and wheel maker, chair-maker, cabinet-maker, and more or less in other branches. It is much used by bakers and in glass-houses as boiler-wood; and the stack-wood forms an excellent charcoal.

6620. *Soil and site.* Dryness and some degree of calcareous matter are the characteristics of the soil in which the beech delights; and the declivities of hills facing the east or south are its favourite situations.

6621. *The Common Hornbeam is the Carpinus Betulus L.* (Eng. Bot. 2033.); *Monac. Polyd. L. and Americana J.* It is a native tree, nearly allied in habits and appearance to the beech, but is less lofty, and thrives in colder situations, and in rather more elevated situations than the beech. It flowers in April, and ripens its seeds in November.

6622. *Use.* Chiefly in turnery, being white and tough, as the native imports. It is frequently used as a substitute for the beech; and as, like that tree it retains its decaying, shrivelled pale leaves during winter, it forms a valuable shelter when planted in hedgerows.

6623. *Soil and situation.* A dry soil is essential, whether cold or chalky. It is a social tree, and found in natural copse-woods, as in Hertfordshire; but never at any great height above the level of the sea.

6624. *The Sweet or Spanish Chestnut is the Castanea vesca W., Fagus Castanea L.* (Eng. Bot. 885.); *Monac. Polyd. L. and Americana J.* It is the *Châtaignier* of the French; *Castanhus* of the Germans; the *Kastanienbaum* of the Dutch; and the *Castagno* of the Italians. It is one of the most magnificent of European trees, exceeding the oak in height, and equalling it in bulk and extent. It is doubtful whether it be a native of Britain, though it ripens its fruit in sheltered valleys, even in Scotland. It is a long-lived tree. The shade of the chestnut, like that of the ash, is said to be injurious to other plants. The leaves, which continue late in autumn, are not liable to be eaten by insects, like those of the oak.

6625. *Use.* The sweet chestnut has been already described as a fruit tree. (5166.) As a timber tree it is used for the same purposes as the oak; though by some considered as more brittle when old. It is used by the cabinet-maker and cooper; makes an excellent coppice tree for poles and hoops; and the bark is equal in stringency to that of the larch and mountain ash for tanning; and the leaves and nuts afford food both for men and deer.

6626. *Soil and situation.* The soil in which it thrives best is a deep sandy loam, and the situation one somewhat sheltered. In Calabria, and on the Apennines between Plorence and Bologna, where we have seen it in abundance, it does not attain a great size on the higher and more exposed parts of those mountains; but, as Sang observes, a surprisingly magnificent tree in the hollows. Forney says, "on many spots, the oak would make but slow progress, I have seen the chestnut grow extremely quick, and therefore, in such cases, the latter should be used instead of the former."

6627. *The Water Elm (Fraxinus riparia)* has been already treated of as a fruit tree. (5155.) Its timber, when of mature age, is valuable as a cabinet wood, and for gun-stocks, being light, hard, and durable.

6628. *The Common Sycamore is the A'or Pseudo-Platanus L.* (Eng. Bot. 305.); *Polyd. Monac. L. and Americana J.* It is one of our hardiest native trees, and equal in magnitude with those more tame in its outline and form than the oak. It flowers in April and May, and ripens its leaves or seeds in November. Its foliage is earlier than that of most trees, and its decadence is next to that of the ash. It is a quick grower, will endure the sea-breeze better than most trees, and is not liable to grow to one side when exposed to winds that blow chiefly in one direction.

6629. *Use.* The timber is chiefly used by the turner and millwright; and formerly, when earthenware was less common, it was in great request for trenchers and other table and household utensils. It affords a saccharine juice, like the sugar and other American maples, from which a kind of maple sugar is made.

6630. *Other species.* The Norway Maple (*A. platandoides*) is a tree common in the native woods of Lithuania; and in Norway it clothes the hills from the sea-shore to their summits. It grows to a large size, and its leaves dye to a golden colour. Its timber does not differ materially from that of the sycamore. *A. rubrum* forms a splendid tree in autumn (*Gard. Mag.*, vol. ix. p. 481.); as do all the American species, and those from the Levant (*See Hort. Brit.*)

6631. *Soil and situation.* The acers thrive best in a soil

similar to that preferred by the ash, but will grow in all inferior soils, and exposed to the sun-burns, as well as at a great height above the level of the sea.

6632. *The Mountain Ash* is the *Pyrus europæica* E. R. (*Eng. Bot.* 557.); *Iss. Di-Ponting*, L. and Rousseau J. It is a low and very hardy native tree, attaining the height of twenty or thirty feet, with a straight, clean erect stem, and globular compact head. It flowers abundantly in April and May, and ripens its berries in August or October, according to the situation.

6633. *Uw.* In profitable planting, it is chiefly valuable as a nurse tree, growing very close, and spreading the tree being not so frequently planted as a nurse to others for cover of variety. In the north of Europe, it is much used for fuel, and in France and Germany both native, and American birch timber is extensively employed by cabinet-makers. This tree also the mountain ash, will grow in almost every kind of soil and situation.

6634. *Soil and site.* It will grow in any soil, dry or wet; and as to situation, it is found on the seashore, and near the tops of the highest mountains. It seems to thrive best on the sides of most rocky dells and dingles.

6635. *The Whitebeam Tree* (*Pyrus Arie*) (*Eng. Bot.* 1856.) is a very hardy native tree, growing to the height of thirty or forty feet, with an erect stem. Its leaves and culture are the same as those of the mountain ash. Its white leaves, and coral berries, mostly to the taste, like those of *Pyrus torminalis* (5189.), have a fine effect in autumn.

6636. *The Apple or Laurel Tree, Robinia-Perse-Achela* L. (*Schmidt. Arb.* 1. t. 53.); *Diadelp. Decais. L.* and *Laguminesc. J.* This is a thorny fast-growing tree, of middling stature, a native of America, of no great beauty as a tree, but ornamental when young, and very well adapted for copewood and rough timber. It flowers in June and July, and ripens its seed in September. The leaves come out late in spring, and fall off early in autumn from the ash. The tree is stout (Gladstische) is a more slow-growing tree than the Robinia, but its trunk attains a much larger size.

6637. *Uw.* The timber is much valued in North America, and said to be superior to that of the labourer "being close-grained, hard, and finely valued; and in America more valued by the cabinet-maker than any other native timber whatever. It is also, Cobbert for steam, much used there for timbers in shipbuilding. Parsh, in his valuable *Plores*, asserts that, being nearly incorruptible, it is equally useful for posts and gates; gateposts of this timber, on a property near Baltimore, are said to have remained fresh for nearly a century. The rapid growth of this tree, when young, renders it suitable for hop poles and for fuel. Blake informs us (*Gard. Mag.*, vol. iii. p. 306.) that the tree is very little thought of in France, except as an ornamental object.

6638. *Soil and site.* It prefers a deep sandy soil, and rather sheltered situation; being very apt to throw up suckers from the running roots; and, as it grows freely, it seems peculiarly calculated for coppice-woods. Boston (*Conn.* to *Bord. Agr.*) has cultivated it in this way to great advantage.

6639. *The Birch* is the *Betula L. Menz.* Poly. L. and *American J. Besler.* Fr. *Birkhaken.* Fr. *Birkbaum.* Dutch; and *Betula*, Ital. There are two species which may be considered valuable as timber trees. The common birch (*B. alba* L.) (*Eng. Bot.* 1498.) is a middle-sized native-forest tree, distinguished by its white bark, fragrant leaves, and graceful panicle form. It grows in the coldest regions of the north, and farther up the sides of the British mountains than any other timber tree. In the swampy grounds of Sweden and Russia, it grows to a much greater size than in the more temperate climate of this country. The pendulous variety is taller and more rapidly growing, but a more beautiful tree.

6640. *The American Birch* is the *B. pumila* (Michx. Arb. 2. p. 145. t. 4.) (*Fig.* 927.) This is a more lofty tree than the

tain when dried by means of a stove, affording, on infusion of boiling water, an agreeable distillate" (*Catal. Mus.* vol. v. p. 380.).

6641. *Other species.* The Poplar-leaved Birch (*B. populi-folia*) and the Paper Birch (*B. papyrifera*), with *B. canadensis* and other American species, are elegant rapid-growing trees, and when once they are so common as to be propagated from seed, will deserve culture as timber trees.

6642. *Uw.* The timber of the common birch in England is chiefly used as fence-wood, fuel, and occasionally for harness and other agricultural implements. The tree being not so frequently planted as a nurse to others for cover of variety. In the north of Europe, it is much used for fuel, and in France and Germany both native, and American birch timber is extensively employed by cabinet-makers. This tree also the mountain ash, will grow in almost every kind of soil and situation.

6643. *The Wild Cherry* is the *Prairies cerasus* L. (*Michx. L.* 435.); *Iss. Di-Ponting*, L. and Rousseau J. *Gageus*, Fr. *Wild Kirschen*, Ger.; and *Cerasio cerasus*, Ital. It is a native tree, above the middle size, the timber of which is of considerable value. It thrives best in dry sandy loams. It is of peculiar beauty in spring when in flower, in August when in fruit, and in autumn when its leaves change to a beautiful red and yellow. Its timber is chiefly used by the cabinet-maker and chair-maker: it is prone to break out in the varnish.

6644. *The Birch* (*Laburnum*, *Cytisus laburnum* V. B.

(*Bot. Mag.* p. 176.); *Diadelp. Decais. L.* and *Laguminesc. J.* It is a tree of about thirty feet high, a native of Switzerland, cultivated chiefly for ornament, but affording, as a valuable timber, for this purpose, the same advantages as the birch leaves and long racemes is decidedly to be preferred to the C. Laburnum, which rarely exceeds fifteen feet in height.

6645. *Uw.* The timber (the finer stems) of the French *Laburnum*, without the bark, makes an excellent wood for the beauty of grain, and durability. The tree is frequently used in plantations isolated with hares and rabbits, who will touch no other tree so long as a twig of *Laburnum* remains. The high stems to the ground, and in *Boston* (*Conn.*) to the top of the spring again next season, and thus afford a constant supply for these animals, so as to save the other trees till of a size to resist their attacks. The timber has been used for the masts of a sovereign pig-boat. It becomes most valuable in light soils and sandy soils.

6646. *The Holly* is the *Ilex Aquifolium*, L. (*Eng. Bot.* 684.); *Iss. Di-Ponting*, L. and Rousseau J. *Heule*, Fr.; *Holly*, Ger.; *Heule*, Dutch; *Agrifoglio*, Ital. It is an elegant, shining evergreen tree, rising from twenty to thirty feet high, affording a timber of considerable value, and much in use as an ornamental hedge plant. It is of a very hard and durable texture, and found growing in woods and forests, as an undergrowth to the oak, beech, ash, and fir. It thrives best in a deep loam, rather light, as in North-west Forest, in Staffordshire, and the first-forest of Blackball, in Scotland. It is a cheerful-looking tree from its shining leaves and coral berries, and peculiarly fit for ornament.

6647. *Uw.* The timber, which is as white as ivory, is chiefly used in inlaying and veneering, and by turners and mathematical-instrument makers. The straight shoots, of five and six feet in length, make excellent coachmen's whips. Besides this use, without the bark, makes an excellent wood for the beauty of grain, and durability. The tree is frequently used in plantations isolated with hares and rabbits, who will touch no other tree so long as a twig of *Laburnum* remains. The high stems to the ground, and in *Boston* (*Conn.*) to the top of the spring again next season, and thus afford a constant supply for these animals, so as to save the other trees till of a size to resist their attacks. The timber has been used for the masts of a sovereign pig-boat. It becomes most valuable in light soils and sandy soils.

6648. *The Elm Tree* (*Ulmus campestris* L.) (*Eng. Bot.* 1541.); *Iss. Di-Ponting*, L. and Rousseau J. *Ulmus*, Fr.; *Ulm*, Ger.; *Ulm*, Dutch; *Ulm*, Ital. It is a native tree, of great importance as a hedge plant, and is also frequently introduced into narrow plantations as an undergrowth. It will not grow, however, under the drip of taller and denser trees. It is of a stable point of view, is only to be considered as affording the impervious, close, durable, and easily raised fence, called quick-set-hedges. The timber of such plantations grows, and attains a tolerable size in a very short time by the aid of light and sun, and under the drip of trees. Raised from the soil it will attain the height of twenty or twenty-five feet, and be fit to cut down in thirty years. (*Miller's Dict.* in loc.) As an ornamental undergrowth and shelter, it is of the greatest value. (*See Gard. Mag.*, vol. ix. p. 11. 723.)

6650. *The Elder Tree* (*Sambucus nigra*), already treated of as a fruit tree (5045.), forms an excellent screen-plant in exposed situations, and a rapid hedge in most places. The wood is very hard, and used by the toy-makers and turners.

6651. *The Hawthorn*, *Crataegus Oxycantha* (*Eng. Bot.* c. 1.); *Iss. Di-Ponting*, L. and Rousseau J. *Hawthorn*, Fr.; *Hageborn*, Ger.; *Bramus spinosus*, Ital. It is a native tree, of great importance as a hedge plant, and is also frequently introduced into narrow plantations as an undergrowth. It will not grow, however, under the drip of taller and denser trees. It is of a stable point of view, is only to be considered as affording the impervious, close, durable, and easily raised fence, called quick-set-hedges. The timber of such plantations grows, and attains a tolerable size in a very short time by the aid of light and sun, and under the drip of trees. Raised from the soil it will attain the height of twenty or twenty-five feet, and be fit to cut down in thirty years. (*Miller's Dict.* in loc.) As an ornamental undergrowth and shelter, it is of the greatest value. (*See Gard. Mag.*, vol. ix. p. 11. 723.)

6652. *Soil and site.* It will not thrive in a wet soil, nor one very dry and poor, much elevated or much shaded; a free deep loam in any airy situation suits it best. For hedges it may be raised from cuttings of the roots, planted where they are finally to remain. Each cutting should be of the length of four feet, where an old hedge is to be removed, and the labour of selecting and preparing them falls little short of the price of good two-year seedling plants; so that, unless in a summer of unusual plenty, it is better to purchase the roots and cuttings from the nursery. Most of them may be procured from the nursery of great beauty, from the general form of the tree assuming at an early age a peculiar and marked character, from the profusion of blossoms, generally fragrant, and from the yellow and red autumnal tints.

6653. *Other species of thorn.* In our *British Botanicum* will be found upwards of fifty species and varieties, plants of most of which may be procured from the nursery of great beauty. Most of them may be described as of great beauty, from the general form of the tree assuming at an early age a peculiar and marked character, from the profusion of blossoms, generally fragrant, and from the yellow and red autumnal tints.

6654. *The Yew* is the *Taxus Jacquin* L. (*Eng. Bot.* 764.); *Polg.* *Menz.* L. and *Confertus Taxus* J. *Y.* Fr.; *Elm*.



common birch, with a brown-coloured bark spotted with white. "It abounds most in the middle states of Pennsylvania, New York, and the Jerseys, where it attains a height of seventy feet; but disappears altogether in the higher latitudes of the northern states, and is scarcely to be found in Nova Scotia. It is therefore likely to succeed with us in the moist and deeper soils of our Highland valleys, especially when closely associated with other trees. The probability of this is heightened by various facts already ascertained. The value of the timber is well known to our cabinet-makers; and we have seen tables, bed-posts, and other articles of furniture made of it, equalling in beauty those of mahogany, which it resembles, when some time exposed to the light, the newly wrought boards being of a rose-colour. Although of an exceeding quick growth, the grain being naturally close, it takes a fine polish in cabinet work. We add to this, that the leaves, which appear early in spring, are said to possess a peculiar fragrance, which they re-

6675. *The Willow*, *Salix* L.; *Die's. Moudin*. L. and *Ammon*. J. *Smile*, Fr.; *Wildebaum*, Ger.; *Salice*, Ital. There are two species which seem more immediately to mark cultivation as timber trees, and several as fit for cultivating in ornamental grounds.

6676. *The Huntingdon or Common White Lincolnshire Small-leaved Willow* (*S. alba*) (Eng. Bot. 2450.) (fig. 930.) grows



to a lofty tree, with a branchy stem, and tapering flame-shaped head. It seems common to Europe, being found pollarded by way-sides in Sweden, the south of Russia, and Italy. As a timber tree, it produces a great bulk in a short time; and as pollard or coppice-wood, on suitable soils, it is prolific in fuel, poles, and bark for the tanner. The advantages of planting this tree, even in the poorest soils, have been ably pointed out by Mr. Gorrie. (*Gard. Eng.*, vol. 1, p. 44.)

6677. *The Upland or Red-twigged Willow of Pontey* (*Profl. Plant.*, p. 72.) appears to be a variety of the *S. alba*, being distinguished from it by its hoary or silver-like leaves, and deep red shoots. The timber and mode of growth appear to be the same as those of the Huntingdon willow; but, being of slower growth, the former is to be preferred. Of the red-twigged willow of Sanz, there are large trees near Dunfermline, upwards of sixty feet high.



6678. *The Bedford Willow* (*S. Russelliana*) (Eng. Bot. 1808.) (fig. 931.) is also a lofty bulky-headed tree, in general appearance and habits very much resembling the *S. alba*.

6679. *Use*. Willow timber may be used generally in rural economy, and the poles form light and convenient handles. Pontey says, the timber is "considerably durable; a property which, it appears, may be much augmented by steeping some months in water, as is frequently done with oak saplings." The bark of all the sorts mentioned is found to be sufficiently supple to be now generally used by tanners.

6680. *The last willows for ornamental use are the following:—*

6681. *The Common Osier*, *Salix viminalis* (Eng. Bot. 1828.) (fig. 932.) The leaves are long, waved at the edges, but not



serrated; shining green above, and silvery underneath. The shoots grow long, straight, and tough, and are well adapted for the larger sorts of baskets, hampers, crates, and hampers.

6682. *The Arched Osier*, *S. stipularis* (Eng. Bot. p. 1216.)

"The two-year-old shoots make excellent rods for baskets, crates, bins, cages, and such articles; and the one-year shoots are used as fillings. The shoots are long, nearly equal in thickness throughout their extent, and somewhat downy, or hoary, particularly at the tops or extremities. The leaves are alternate, with footstalks, long and narrow, somewhat notched on the edges, green and smooth above, woolly below. The stipules or leaf-scapes are conspicuous and remarkable, resembling a pair of ears."

6683. *The Green Osier* (*S. rubra*) (Eng. Bot. 1145.) is an excellent whet willow. "The shoots are very long, tough, smooth, and of a grey colour, occasionally inclining to purplish. The leaves are narrow and very long, from three to four inches, bright green on both sides, and serrated."

6684. *The Basket Osier*, *S. Forsykiana* (Eng. Bot. 1544.)

"The best willow for the finest sorts of basketwork. The shoots are of a yellowish ash-colour, sometimes purplish; smooth, very flexible and tough. The leaves are alternate, on footstalks, from two to three inches long, somewhat serrated, chiefly towards the top; dark green above, and glaucous or pale bluish beneath."

6685. *The Long-leaved Triandrous Willow* (*S. triandra*) (Eng. Bot. 1454.) "is common in ornamental beds, and its shoots afford most excellent shoots for basketwork, long, slender, pliable and tough; they are smooth, of a brownish colour, and towards the top they are fluted or grooved. The leaves are long, and closely and strongly serrated."

6686. *The Yellow Osier*, *S. multicaulis* (Eng. Bot. 1508.) "Its leaves are very smooth and green above, and very silky and soft beneath. Shoots long and very numerous, but not tough; when allowed, however, to remain for two years, their main capital rods."

6687. *The Yellow Willow, or Golden Osier* (*S. vitellina*) (Eng. Bot. 1829.) produces "handsome shoots, of a yellow colour, and shining, and well adapted for basketwork." In our *British Nurseries* will be found enumerated above 100 species; all of which are of the easiest culture, and many of them may be procured in the British nurseries. There is, however, such a general sameness in their appearance, that but few of them can be recommended in an ornamental point of view, and the more useful species have been already above enumerated.

BOOK IV.

LANDSCAPE-GARDENING.

6688. *In landscape-gardening*, the art of the gardener is directed to different objects, and some of them of a higher kind than any belonging to gardening as an art of culture. In the three branches hitherto considered, art is chiefly employed in the cultivation of plants, with a view of obtaining their products; but in the branch now under consideration, art is exercised in disposing of ground, buildings, and water, as well as the vegetating materials which enter into the composition of verdant landscape. This is, in a strict sense, what is called landscape-gardening, or the art of creating or improving landscapes; but as landscapes are seldom required to be created for their own sakes, landscape-gardening, as actually practised, may be defined, "the art of arranging the different parts which

compose the external scenery of a country residence, so as to produce the different beauties and conveniences of which that scene of domestic life is susceptible."

6689. What these *beauties and conveniences* are, must, in different ages and countries, depend on the state of society and climate; and, in the same age and country, on the wealth and taste of individuals, and on the state of the country with respect to culture. This art would be a very simple one in rude ages and mild climates, when man had few wants, and scarcely any desires; but, like other arts, would become more intricate as mankind betook to more variable climates, and became more refined in habits and manners. Taking a view, as far as history permits (see Part I.), of the past and present state of landscape-gardening in all countries, the objects desired in the country residence of a wealthy man, wishing to display his riches, are fundamentally the same. These were, and are, *adaptation* to the habits of genteel life for the time being, as to matters of use and convenience; and *distinction* from the common scenery of the country, as to matters of taste or beauty in landscape. The first object would principally affect the mansion and accompanying erections for men or cattle; and these would, at first, be merely of greater dimensions than those of the common mass of rustics; but, as society improved, they would be distinguished by more perfect execution, and by appendages indicative of the habits of genteel life. The second object, distinction in the accompanying scenery, was and is effected by such dispositions of the common materials of landscape, as ground, water, trees, &c., as indicate the employment of art and expense. In early times, this would lead to the formation of regularly level or sloping surfaces of ground, and of pieces of water, and plantations of trees bounded by straight or geometrical lines, which would distinguish the country residence from the natural or open unenclosed scenery around. In late or modern times, when the general face of the country was disposed in artificial forms, a contrary practice would be pursued, and natural-like scenery would be created for precisely the same object as in the other case; that is, the display of wealth and taste, and the attainment of distinction.

6690. Hence the origin of what are called the *geometrical and natural styles* in landscape-gardening, both evidently founded on the same principle; viz., the love of applause and distinction. The geometrical style has been generally condemned as unnatural and absurd; and so it is, if we look upon it as an imitation of nature: but as it never pretended to this, and, on the contrary, was avowedly a display of the power of art over nature, it ought to be judged, like every other work of man, by the end in view; and if it be considered as designed to distinguish the garden scenery of the man of wealth from the common fortuitous scenery of the country in rude or less cultivated times and places, it will be found admirably calculated for that purpose, and just as natural to man as any other part of his acquired habits or manners. But we will even go farther, and maintain that the geometrical disposition of landscape-scenery has powerful beauties, both of the inherent kind, as that of a long broad avenue; and of general or particular associations, as its suitability to the vicinity of buildings generally, to Gothic architecture, very ancient residences, &c. Disapproving, therefore, of that absolute preference of the modern or natural style, which totally excludes the other, we have, in treating of planting (Book III. Chap. IV.), not lost sight of the geometrical dispositions of trees; and we shall, in considering the present branch of our subject, notice also the dispositions of ground, water, roads, &c. peculiar to the geometrical style. A knowledge of both styles will be desired by the liberal-minded practical designer; and the occasional adoption, in part, at least, of the ancient style, will be dictated by general good taste, as well as by the particular tastes of individuals, and the circumstances of peculiar situations. We shall consider, in succession, the principles of landscape composition; the treatment of the materials of verdant scenery; the union of these materials in forming landscapes; and the union of landscape scenery with arrangements for use and convenience, in forming country residences.

CHAP. I.

Principles of Landscape-Gardening.

6691. *The principles of landscape-gardening*, like those of every other art, are founded on the end in view. "Gardens and buildings," Lord Kaimes observes, "may be destined solely for use, or solely for beauty, or for both. Such variety of destination bestows upon these arts a great command of beauties, complex not less than various. Hence the difficulty of forming an accurate taste in gardening and architecture; and hence, the difference or wavering of taste in these arts, is greater than in any art that has but a single destination." (*Elements of Criticism*, 4th edit. vol. ii. p. 431.) Not to consider landscape-gardening with a view to these different beauties, but to treat it merely as

"the art of creating landscapes," would embrace only a small part of the art of laying out grounds, and leave incomplete a subject which contributes to the immediate comfort and happiness of a great body of the enlightened and opulent in this and in every country; — an art, as the poet Mason observes,

—— "which teaches wealth and pride
"How to obtain their wish — the world's applause."

6692. *The ancient authors on architecture and gardening* have rarely attempted to lay down any general principles of composition. Vitruvius hints obscurely, that the different parts of buildings should bear some proportion among themselves, like that which subsists between the different members of the human body; that the quantities constituting the magnitudes of temples should have certain ratios to one another; and he lays down canons for the individual proportions and collective arrangement of the columns of the different orders. These, however, are not principles, but mechanical rules, formed on very limited associations. The same remarks will apply to the directions respecting the walks, walls, hedges, and borders of the ancient style, laid down by D'Argenville, Clavier, Le Blond, and Switzer. It is in the writings of modern authors, therefore, and chiefly from the enlightened investigations of the Rev. A. Alison, that we are to draw our information as to the principles by which the artists of the ancient style were instinctively guided in their productions.

6693. With respect to *the modern style*, considered as including what belongs to the conveniences of a country residence, as well as the art of creating landscapes, Pope has laid down the three following principles: 1st, To study and display natural beauties; 2d, To conceal defects; and 3d, Never to lose sight of common sense. Whately concurs in these principles, stating the business of a landscape-gardener to be "to select and to apply whatever is great, elegant, or characteristic" in the scenery of nature or art; "to discover and to show all the advantages of the place upon which he is employed; to supply its defects, to correct its faults, and to improve its beauties." Repton, whose *Observations on Landscape-Gardening* bear on the titlepage the assurance that they are "written with a view to establish fixed principles in these arts," enumerates congruity, utility, order, symmetry, scale, proportion, and appropriation, as principles; "if," as he observes, in one place, "there are any principles." G. Mason places the secret of the art in the "nice distinction between contrast and incongruity;" Mason, the poet, invokes "simplicity," probably intending that this beauty should distinguish the English from the Chinese style: simplicity is also the ruling principle of Lord Kaimes; Girardin includes every beauty under "truth and nature," and every rule "under the unity of the whole, and the connection of the parts;" and Shenstone states, "landscape or picturesque gardening" to "consist in pleasing the imagination," by scenes of grandeur, beauty, and variety. Convenience merely has no share there, any farther than as it pleases the imagination. The principles of congruity, and of painting, are those of Price and Knight; and nature, utility, and taste, those of Marshall. From these different theories, as well as from the general objects or end of gardening, there appear to be two principles which enter into its composition; those which regard it as a mixed art, or an art of design, and which are called the principles of relative beauty; and those which regard it as an imitative art, and are called the principles of natural or universal beauty. The ancient or geometric gardening is guided wholly by the former principles; and landscape-gardening, as an imitative art, wholly by the latter: but when landscape-gardening is considered as the art of forming a country residence, its arrangements are influenced by both principles. In conformity with these ideas, and with our plan of treating of both styles, we shall first consider its principles as an inventive or mixed, and secondly as an imitative art.

SECT. I. *Beauties of Landscape-Gardening, as an inventive and mixed Art, and Principles of their Production.*

6694. *Works of art*, Alison observes, may be considered, either in relation to their design or intention — to the nature of their construction for the intended purpose — or to the nature of the end they are destined to serve; and their beauty accordingly will depend, either upon the excellence or wisdom of the design, the fitness or propriety of the construction, or the utility of the end. The considerations of design, of fitness, and of utility, therefore, may be considered as the three great sources of the beauties of works of inventive art. They have been called relative beauties, in opposition to those of nature and imitative art, which are hence denominated natural or independent beauties. There is a third source of beauty common both to arts of invention and imitation, which is that of accidental beauty, or such as is produced by local, arbitrary, or temporary associations. The beauties of objects, whether natural, relative, or accidental, are conveyed to the senses by the different qualities of matter; such as form, sound, colour, smell, and motion; but form is the grand characteristic of matter, and constitutes in a great degree

its essence to our senses. In our remarks, therefore, on the beauties of inventive art, we shall chiefly consider design, fitness, and utility, in regard to form.

6695. *The expression of design* is displayed by such forms and dispositions as shall at once decide that they are works of art. Thus regularity and uniformity are recognised in the rudest works of man, and point out his employment of art and expense in their construction. Hence the lines, surfaces, and forms of geometric gardening should be different, and in some degree opposed to those of general nature. Irregular surfaces, lines, or forms, may be equally useful, may be alike works of art, and, considered with reference to other beauties, may be more agreeable than such as are regular; but, if too prevalent, they might be mistaken for the production of nature, in which case they would lose the beauty of design; but forms perfectly regular, and divisions completely uniform, immediately excite the belief of design, and, with this belief, all the admiration which follows the employment of skill and expense. Ground, in level or regular slopes, or in hills or hollows of symmetrical shapes; woods of right-lined boundaries; trees, and especially such as are foreign to the soil, planted equidistantly in masses, in quincunx, or in straight rows; water in architectural basins, regular canals, or fountains; walks and woods, of uniform width and perfectly straight; and straight walls and hedges; are all easily distinguished from nature's management of these materials, and, consequently, are highly expressive of the hand of man. A valuable paper on the subject of this paragraph will be found in the *Gardener's Magazine*, vol. iii. p. 247. to 252.

6696. *Regular forms are satisfactory*, Stewart observes (*Philosophical Essays*, 238.), "from the principle of a sufficient reason, adopted by Leibnitz. What is it that, in any thing which is merely ornamental, and which at the same time does not profess to be an imitation of nature, renders irregular forms displeasing? Is it not, at least, in part, that irregularities are infinite; and that no circumstance can be imagined which should have decided the choice of the artist in favour of that particular figure which he has selected? The variety of regular figures, it must be acknowledged, is infinite also; but, supposing the choice to be once fixed about the number of sides, no apparent caprice of the artist, in adjusting their relative proportions, presents a disagreeable and inexplicable puzzle to the spectator."

6697. Wherever *symmetry* "is useful to the mind, and may assist its functions, it is agreeable; but wherever symmetry is useless, it becomes distasteful, because it takes away variety: therefore, things that we see in succession ought to have variety, as our minds have no difficulty in comprehending them: those, on the contrary, that we see at one glance, ought to have symmetry; thus at one glance we see the front of a building, a parterre, a temple; in such things there is always a symmetry which satisfies the mind, by the facility it gives of taking in the whole object at once." (*Montesquieu*.)

6698. *The expression of design*, in the progress of the arts, though at first difficult, becomes afterwards easy, and renders regularity and uniformity expressive of only common design. Hence, to confer a character of superiority in works of design, variety would be introduced; and as uniformity was the symbol of design, so uniformity and variety would become the symbols of improved or embellished design. "Regarding, therefore, forms in this light as beautiful merely from their expression of design, the observation of Dr. Hutcheson may perhaps be considered as an axiom with regard to their beauty, viz., that where the uniformity is equal, the beauty of forms is in proportion to their variety; and where their variety is equal, their beauty is in proportion to their uniformity." (*Alison's Essays*, p. 106.) To this stage, in the progress of design, may be referred the architectural ornaments introduced in garden scenery, such as seats, buildings, statues, urns, &c.; and in the later stages of the art, serpentine walks, labyrinths, verdant sculpture, and many other decorations. The variety and embellishment thus conferred on gardens, produced in time many absurdities, that we would not wish to see resorted to in a revival of the ancient style, unless in examples considered solely with a view to imitation. The sculpture of trees, however, might, when first introduced, be greatly admired, even by men of sense, for its novelty, and the discovery of a certain degree of skill in the artist; but as, in our times, it would neither be new nor meritorious, it could scarcely be consistently introduced with a view to embellish design.

6699. *To prevent variety from degenerating into confusion*, and, as Professor Stewart characteristically expresses it, "puzzling the spectator," unity of intention must never be lost sight of. This, indeed, is necessarily implied in every work of art; since, without it, the slightest attempt at design would only end in a chaos of materials.

6700. *Fitness*, or the proper adaptation of means to an end, is the second source of the relative beauty of forms. Considered in relation to the parts of a building, it is generally denominated proportion, and refers to the adequate strength of certain props to bear certain superincumbent parts, &c. In the detail of the ancient, and in scenes of relative beauty in the modern style of gardening, it relates to the magnitude and situation of buildings, and other artificial objects, relative to natural ones; to the extent of the different scenes or constituent parts of a residence, compared with the whole: to the

propriety and congruity of certain objects as ornaments; and, in general, to the adequacy of the means to the end, whatever these means or that end may be.

6701. *Utility* is the third source of the relative beauty of forms. None of the other beauties will compensate for the entire want of utility in any scene of architecture or gardening. Objects at first thought beautiful, soon lose this expression when they are found to be of no use; and others, the first impressions produced by which are disagreeable, are felt to become beautiful in proportion as they are known to be useful. "This species of beauty," Alison observes, "is in itself productive of a much weaker emotion than that which arises from the different sources of ornamental beauty; but it is of a more constant and permanent kind, and much more uniformly fitted to excite the admiration of mankind." (*Essays on Taste*, vol. ii. p. 201.) "To unite these different kinds of beauty; to dignify ornamental forms by use; and to raise merely useful forms into beauty, is the great object of ambition among every class of artists. Wherever both these objects can be obtained, the greatest possible beauty that form can receive will be produced. But as this can very seldom be the case, the following rules seem immediately to present themselves for the direction of the artist:—1. That where the utility of forms is equal, that will be the most beautiful to which the most pleasing expression of form is given. 2. That where those expressions are at variance; when the beauty of the form cannot be produced without sacrificing its utility; that form will be most universally and most permanently beautiful, in which the expression of utility is most fully preserved." (*Essays*, vol. ii. p. 202.) Some of the various modifications of utility, as applied to country residences, may be here enumerated.

6702. *For the purpose of habitation*, for example, good air and water, a genial climate, fertile soil, cheerful prospect, and suitable neighbourhood, &c., are known requisites. Convenience must be joined to use, comforts to conveniences, and luxuries to comforts. Exercise, whether in the shape of walking, riding, or driving, requires to be provided for; and recreation, whether in the common field sports, athletic games, or in botanical, agricultural, and other useful, elegant, or scientific pursuits, must be kept in view: rural sites and amusements might also be enumerated.

6703. *Accidental associations* form the last class of relative beauties, and are "such associations as, instead of being common to all mankind, are peculiar to the individual. They take their rise from education, from peculiar habits of thought, from situation, and from profession; and the beauty they produce is felt only by those whom similar causes have led to the formation of similar associations." (*Stewart's Essays*.) Among these may be reckoned,—

6704. *Classical and other historical associations.* The influence of the former in architecture is well known; the latter often adds charms to a spot, in no respect remarkable to those who are unacquainted with its history. "Classical associations," Stewart observes, "have added immensely to our natural resources, but, at the same time, warped our taste in various instances;" acquiring, as Alison adds, "a superiority over the more permanent principles of beauty, and determining for a time the taste of nations."

6705. *National associations* are also frequently at variance with such as are universal, and have, perhaps, greater influence than any other associations whatever. (*Stewart's Essays*.)

6706. *Personal associations*, or such as arise from the accidental style of natural beauties, to which we have been accustomed in our youth. Many particulars come under this head, which it would be tedious to enumerate; but one mode in which vanity and selfish feeling display themselves, deserves particular notice, as intimately connected with the business of the landscape-gardener. It is that interest which the attachment to property creates in men's minds, "rendering them alive to every trifling recommendation belonging to what is their own, while it blinds them to the most prominent beauties in the property of their neighbours." (*Stewart's Essays*, p. 463.)

6707. *Appropriation*, or such an arrangement as shall, either in reality or appearance, render all, or the greater part of what we see from a country seat our own, is a consequence of personal associations. The simplest way of effecting this, is by shutting out all objects which do not correspond with the idea, by means of walls or plantations. A more refined mode is, by harmonising the scenery; by adopting some of the forms, colours, and arrangements, in our own territory, which appear in those of our neighbours, as seen from the house, or from some particular points of view. According to Whately, "one property of a riding is to extend the idea of a seat, and appropriate a whole country to the mansion." For this purpose, he requires the road of the riding to be different from common roads in form and preservation, and distinguished by accompaniments borrowed from a park or garden, &c. Knight strongly objects to appropriation, and ridicules certain attempts of this sort, made by placing the family arms on the inns and public-houses of the neighbourhood, and on "stones with distances," as, he says, was recommended by one improver. Girardin also objects to the principle; but Repton, and we believe, almost every other professional man, finds it a very principal object of attention. Repton defines appropriation to be, "that command over the landscape visible from the windows, which denotes it to be private property belonging to the place." "A view from a London house into a square or into the park may be cheerful and beautiful, but it wants appropriation; it wants that charm which only belongs to ownership—the secure right of enjoyment, with the power of refusing that others should share our pleasure. The most romantic spot, the most picturesque situations, and the most delightful assemblage of nature's choicest materials, will not long engage our interest without some appropriation; something we can call our own; and, if not our own property, at least that may be endeared to us by calling it our own home." (*Fragments of Landscape-Gardening*, p. 206.) This *cave de s'arrondir* seems to have existed, and the proximity and intermixture of property to have been felt as an evil among landed proprietors from the earliest ages. Ahab desired the field of Naboth, that he might convert it to a garden of herbs (or flower-garden), because it was near to his house; and Marvel, the attorney, says to his patron,—

— "What course take you
(With your good patience) to budge in the manner
Of your neighbour, Master Prigal? As 'tis said,
He will not sell, nor borrow, nor exchange,
And his land lying in the midst of yours,
Is a foul blemish."

MASSEYMAN. *New Way to Pay Old Debt*, act II. scene 1.

"I stick still in the inn of a hired house," writes the amiable Cowley to Evelyn, "without that pleasantest work of human industry, the improvement of something which we can call our own."

SECT. II. *Beauties of Landscape-Gardening, considered as an imitative Art, and Principles of their Production.*

6708. *The chief object of all the imitative arts is the production of natural or universal beauty.* Music, poetry, and painting, are the principal imitative arts; to these has been lately added landscape-gardening, an art which has for its object the production of landscapes by combinations of the actual materials of nature, as landscape-painting has for its object their imitation by combinations of colours. Landscape-gardening has been said "to realise whatever the fancy of the painter has imagined" (*Girardin*); and, "to create a scenery more pure, more harmonious, and more expressive, than any that is to be found in nature herself." (*Alison*.) Such are Alison's ideas of the powers of this art; and such appear, in some degree, to have been those of Whately and Girardin. A more correct idea of its capacities, in our opinion, is suggested by the remark of Horace Walpole, when he represents it as "proud of no other art than that of softening nature's harshness, and copying her graceful touch." It has also been said, that it is "to poetry and painting, what the reality is to the representation." (*Girardin*.) But experience proves, that the former (the reality) is always exceeded by the latter, both in respect to natural and picturesque beauty. Suppose, for example, any given variety of ground, rocks, and distance as the basis, which is to be furnished with wood, water, and buildings, and the rocks shown, or concealed, as the gardener may wish, or as the genius of the place may require, and every other purpose effected which is in the power of gardening to perform. When all this is done, it will be a scene greatly inferior in beauty to the imitative creation of a painter from the same groundwork and materials. As another example, let there be a natural landscape, either of mediocrity or of any given beauty, with every circumstance so arranged as to be alike suitable for both arts; and let a painter and a gardener each attempt to copy it according to his respective art, with or without permission to improve its beauties. Which of the two imitations would be most beautiful, considered in the abstract, and without reference to any selfish or arbitrary association? Decidedly, in our opinion, the production of the painter. In short, no comparison between the powers of landscape-painting and those of landscape-gardening can be instituted, that will not evince the superior powers of the former art. The great source of the beauty of every verdant landscape is wood; and so much of the beauty of all woods depends on accidental circumstances, in their progress from the time of planting till they attain a considerable age, and which circumstances cannot be said practically to be under the control of the gardener, that, however high our aim, however we may study the natural effects of time, and however correctly we may imitate them, at the end of all our labours any wood formed by art will always be far inferior to a natural wood under the same circumstances. For further illustrations, we have only to appeal to such painters as have made landscape their particular study, and who certainly must be considered in this case as the best judges with regard to scenic truth or picturesque beauty.

6709. *To what kind or degree of beauty, then, can landscape-gardening aspire?* To this we answer, that, abstracted from all relations of utility and design, it can seldom succeed in producing any thing higher than picturesque beauty; what we shall call gardenesque beauty, or such a harmonious mixture of forms, colours, lights, and shades, as will be grateful to the sight of men in general; and more particularly to such as have made this beauty in some degree their study. This harmonious assemblage of objects may be grateful and agreeable, without being accompanied by any, or at all events by much, general expression; for example, of gaiety, melancholy, grandeur, simplicity, or elegance; but it may also combine one or more of these poetic or general beauties in a high degree, and this, too, with or without being picturesque. It may recall many other pleasurable emotions, if we admit the considerations of fitness, novelty, or contrast to surrounding scenery, and utility or adaptation to man.

6710. *By gardenesque beauty* is to be understood a kind of scenery, the creation of which is peculiar to gardening. For example, the disposition of the trees of a residence in lines, in geometrical forms, in a country where all the trees around are as nature has disposed them in natural forest scenery, produces that distinctive character of art, which we have called the gardenesque. In like manner, when all the trees of the general face of the country, not laid out in parks or pleasure-grounds, are in geometrical forms or straight lines, then, by planting the trees of a residence in that irregular manner which is characteristic of natural scenery, as distinctive a character is produced as in the former case, and this also we call gardenesque. Suppose a third case, in which it was desired to produce the gardenesque, and yet to preserve the same disposition of the trees that prevailed in the surrounding scenery; in that case, trees not in use in the surrounding scenery are to be employed, by which as distinctive a character is produced as in the two former instances, and this also we call gardenesque. See this subject illustrated in *Gard. Mag.* vol. viii. p. 701.. and in vol. ix. p. 682.

6711. *Such is our opinion of the capacities of landscape-gardening.* If it is lower than that of some authors and artists, we can only say that it has been formed from observation and experience of what actually takes place. The artist may and ought to aim at the highest degree of beauty which his own imagination, the genius of the place, and the views of the owner, will admit of; but let him not proceed with, or hold out to the world, mistaken views of what his art can and cannot perform.

6712. *The principles of imitative landscape-gardening*, in that view of this term which limits it to "the art of creating landscapes of picturesque beauty," we consider, with Girardin, Price, Knight, and other authors, to be those of painting; and in viewing it as adding to picturesque beauty some other natural expression, as of grandeur, decay, melancholy, &c., we consider it, with Pope, Warton, Gray, and Eustace, as requiring, both in the designer and observer, the aid of a poetic mind; that is, of a mind conversant with all those different emotions, or pleasures of imagination, which are called up by certain signs of affecting or interesting qualities, furnished by sounds, motion, buildings, and other objects.

6713. Taking a third view of *imitative landscape-gardening*, as "the art of laying out the grounds of a country-residence," according to the popular opinion, we comprehend under the term, all the above beauties, with those of relative beauty, the principles of which have been the subject of the preceding section. The principles of landscape-gardening, then, as an imitative art, we conclude to be derived from nature, as developed by the principles of landscape-painting; and as recognised by poetic minds, or minds alive to those general beauties or associations which are universally felt in civilised society. We consider this (perhaps, to many, a tedious) development of the principles of landscape-gardening called for by the vague and indefinite manner in which they are spoken of by authors, no less than by artists; and, as a proof of this, we refer our readers to the volumes of Repton; who, whatever may be the merits of his practical taste, has certainly, whenever he has touched on the subject of principles, written in a very unsatisfactory manner. To those who are conversant with the literature of landscape-gardening, it must appear a very useless task to write a book "with a view of establishing fixed principles" in the art, in which, after the publication of the works of Whately, the two Masons, De Lille, Girardin, Price, and Knight, such a passage is to be found as the following:—"If any general principles could be established in this art, I think they might be deduced from the joint considerations of relative fitness or utility, and comparative proportion or scale; the former may be referred to the mind, the latter to the eye." (*Obs. on L. Gardening by H. Repton, Esq.* Introduction, p. 2.) While we disapprove of this vague and unsatisfactory mode of writing, the frequency of which we must regret in this artist's works, we willingly pay tribute to his practical good taste, more especially in architecture.

6714. *As an illustration of the theory of landscape-gardening* which we have adopted, we subjoin a slight analysis of the principles of a composition, expressive of picturesque and natural beauty. For this purpose, it is a matter of indifference, as far as respects picturesque beauty, whether we choose a real or a painted landscape; but, as we mean also to investigate its poetic or general beauty, we shall prefer a reality. We choose, then, a perfect flat, varied by wood, say elms, with a piece of water, and a high wall, forming the angle of a ruined building; it is animated by cows and sheep; its expression is that of melancholy grandeur; and, independently of this beauty, it is picturesque in expression; that is, if painted, it would form a tolerable picture. We shall now proceed to the analysis of such a scene.

6715. *Unity is the first obvious principle* which pervades the picture. No ideas of gaiety or prettiness are excited by such a scene. All the parts unite in forming a whole, which the eye can comprehend at once, and examine without distraction. "La vue," says Girardin, "le plus vagabond de tous les sens, a besoin d'être fixée pour jouir avec plaisir et sans lassitude." Were this principle not prevalent, the groups of trees, the lake, and the building, would only please when considered separately, and the result would be as poor a production as a machine, the wheels of which are accurately finished and nicely polished, but which do not act in concert, so as to effect the intended movement.

6716. *It is true to nature*: that is, the objects or materials are what they appear to be. The trees, which are neither very old nor very young, though in the distance diminished by their remote situation, we discover, by their trunks and contour, to be still trees. They are not shrubs placed near the eye, with a view to produce a false perspective; nor is the fragment of building merely a disguised wall, because it has openings which have once been windows, and it is crowned in one part by battlements. The water is natural, its surface being below the level of the adjoining ground, not raised above it, as is often the case in artificial waters. This completes the truth or reality of the scene. The necessity of adhering to truth is still greater in painting, in which all objects must appear to be natural, not only in form and colour, but also relatively to the forms and colours around them. Objects, especially those whose forms and dimensions are familiar to us, as men or horses, painted of different heights in the same plane; as, for example, in the distance, of the same magnitude as that in which they appear in the foreground, would, from the acquired habit of measuring unknown by known objects, give a falsehood to the scene, and would appear as animals of a different species, or as monsters. It seems to be from the same principle of being true to nature, that the gradation of scene, or what is called distance, is required or at least is so satisfactory in landscape. The mind, after being impressed with the effect of a whole, delights in examining its parts in succession; the more simple and obvious the arrangement of these parts, therefore, the more readily does the mind acquiesce in their effect. The eye of the artist, seizing on the nearest and most remote parts of a scene, readily marks an intermediate or middle distance; no given extent seems necessary for this purpose:

"To make the landscape grateful to the sight,
Three points of distance always should unite;
And, however the view may be confined,
Three marked divisions we shall always find."

The Landscape, by KNEAULT.

6717. *The disposition of the parts* is the next object of analysis, and the enquiry is how in this respect they concur in forming a whole. 1. As to forms, we find that their disposition is in groups or masses. The largest group, for example, is placed towards one side of the picture in the foreground, another towards the opposite side of the middle distance, including the building and the adjoining lake; and the remote, or third distance, consists of a low line of wood, with projecting groups or masses. 2. As to colours, we find only different shades of yellow and green on the trees and ground. 3. As to the light, we find one large and principal light near the middle of the view, diverging into shade as it approaches the sides; the clearest part is the water, and the next clearest the building, and the third light spreads over a broad space of ground, near the water. The groups in the foreground are all in a deep shadow. One of these, near the water, partakes of the principal light; and those in the third distance are distinguished by a sort of neutralisation of light, colour, and shade. Such is the disposition of the groups or parts, in order, in a complex view of the whole, to fix the eye, and to prevent it from being distracted by scattered lights, confusion of forms, and inharmonious colours.

6718. *The connection which subsists between these different parts* is a subordinate but important consideration. 1. They are connected in each distance by a real nearness of situation; and, 2. In the view as a whole, from the one group coming in part before the other, so as to produce connection by apparent proximity. Suppose the reverse to be the case, and that the groups were unconnected either by real or apparent distance of situation; the consequence would be, that each group being surrounded by light, would become a distinct object. The eye would have no resting place, and the assemblage would not compose a whole.

6719. *The relation which subsists between the parts*, composing each individual group, is next to be examined. In regard to the form of the parts of each group; as they are all groups of the same sort of trees, we find one elementary form prevalent, but differing in magnitude, and in combination, by the disposition of the trees, which is contrasted to such a degree, that each group differs in form from the others, without at the same time being of an opposite form.

6720. *In regard to colour*, the same kind of colour prevails in each and in all of the groups, but is varied in degree by the same contrasted disposition. In some parts a yellowish-green prevails, in others a greenish-yellow, in others a russet or red-green, and occasionally a bright green—as on that part of the turf where the light strikes with the greatest force.

6721. *In regard to light and shade*, those parts of the groups which rise above the horizon, and are backed by the sky, are dark, and generally darker than such as are backed by the ground, or by other adjoining groups. The prominent parts of each group are lighter than the retiring parts or recesses among the spray and leaves. These prominent and retiring parts, in the near groups, are very numerous; in the distance they are lost in the general aerial shade of the group. It may be observed, as a general principle, that trees, from their rough surface, and consequently from their imperfect reflection of light, are always comparatively darker than water, buildings, or ground. In creating real landscapes, they serve in some measure as shades, as the other materials mentioned serve as lights.

6722. *The sky, the cows, and the sheep*, must be noticed in order to complete the sketch. Suppose, then, that the sky is merely grey and cloudy, and that the cattle and sheep are grouped in the middle distance, what then will be the expression of the view? We think it would express very little to general observers; but there being nothing glaringly offensive in the arrangement, it would be expressive of beauty to him who had bestowed some attention on the subject of landscapes; for though it exhibits but little harmony of forms and colours, or light and shade, it still possesses enough of these ingredients to render it worth looking at as a picturesque view.

6723. *The general or natural expression of melancholy and grandeur* remains to be accounted for. For this purpose, let the building be the ruins of an ancient castle, whose lofty quadrangular form may be readily imagined from the walls we mentioned as composing a part of the scenery. The character of grandeur, then, is not in this instance communicated to the picture by the picturesque effect of the walls, which have no variety of form, light, or shade in themselves, but by the mental associations to which they give rise in a cultivated mind.

6724. *As another example of picturesque, and poetic, or sentimental expression*, imagine the cattle and sheep removed, the surface of the ground covered by smoothly mown turf, and the luxuriant branches of some of the foreground trees nearly reclining on the ground. The first expression would be that of beautiful or elegant picturesque; the next, that of stillness and consecration to man,—stillness, as being without animal or moving objects; and consecration to man, from the mown surface, greatly heightened by the circumstance of the branches of trees reclining on the ground, which never can happen where sheep or cattle are admitted, and which forms the leading visible distinction between a group of trees in a park, and a group on a mown lawn. It is not from the smoothness of the turf, or any particular mixture of light and shade in the reclining branches, that this expression is produced, but from reflecting on the cause of this appearance.

6725. *As a third example*, imagine, instead of the smooth turf, uncouth rough ground, covered in some places with furze, briars, brambles, and tangled thickets; the water fringed with rushes, and partially concealed by aquatic shrubs; and wild horses and deer forming the animated part of the scene. The expression would be eminently picturesque; but there would also be an expression of wildness, not resulting from the picturesque qualities as such, but from mental reflection on the difference between this scene and one of cultivation.

6726. *As a fourth example*, imagine the view deprived of the lake and the building, and consisting only of the wood and ground, with the heads of a straggling row of willow trees appearing in the middle distance, and the sound of a distant waterfall heard through the trees. Here, to picturesque beauty we have an idea of water—of an immense body of it in the lake or river which supplies the waterfall—and of the rocks, which oppose their powerful obstruction to a body of water. The reader will here remark, how much of the sublime beauty of this scene depends on sound, which can never be included under picturesque beauty. The leading expression is that of sublimity, accompanied by various associations of dignity produced by the rocks, and of grandeur suggested by the stream, after the waters have renewed their tranquil course, and are rolling, as we may imagine, majestically along under the shade of the line of willow trees.

6727. *Other examples*, of a more striking nature, might be adduced; but these instances we consider as better adapted to show the difference between a composition merely picturesque, and one expressive of general or natural beauty, and to prove our position, that both poetry and painting enter into the principles of imitative landscape-gardening. They will also show, how very little the production of natural beauty is within the power of the landscape-gardener. He may display it to more advantage. In the first example of expression for instance, the building, or such parts of it as more obviously show its real character, might be displayed by the removal of some over-obtruding branches; and in the second, a garden seat, and some garden trees, as the lime,

cedar, &c., might add to the idea of consecration to man. In the third, a corn-field or a barn in the distance, would aid the effect by contrast; and in the last, a bridge would determine the situation and reality of the river. But to attempt effecting these expressions by building a ruin, placing a garden-seat in a paddock, or erecting a bridge where there was no water, would, however common in the infancy of the art, be now justly considered ridiculous. Much more, it is true, might be done in improving the picturesque beauty of each of these scenes, provided the trees were already grown to maturity, and too numerous rather than too few; but if the trees were yet to plant, it is evident that only the ground-plans of the masses and groups of trees, and of the breadth of the lawn, could be formed by the artist.

6728. *A very common error, since the introduction of the modern style, has been to suppose that picturesque beauty is the only beauty to be aimed at in laying out grounds: but, so far from this being the case, it will often happen that the alterations required for the purposes of convenience and character, will lessen that beauty, while it increases that of dignity, refinement, and appropriation to man.*

CHAP. II.

Materials of Landscape-Gardening.

6729. *The materials of landscape-gardening, with which we work in order to obtain the desired effect, are the same, whatever style we adopt. Those of nature, are ground, wood, water, and rocks; to these, art has added buildings, roads, walks, fences; and animated or moving objects, sounds, &c., may be considered as accompaniments only partially under our control.*

SECT. I. *Operating on Ground.*

6730. *The operations of art on this ponderous material are necessarily of a very limited description. The most extensive and costly operations to restore or create natural surfaces, even when attended with the desired effect, afford less permanent gratification to personal feeling than most other improvements. If a deformed space has been restored to natural beauty, we are delighted with the effect, while we recollect the difference between the present and the former surface; but when this is forgotten, though the beauty remains, the credit for having produced it is lost. In this respect, the operations on ground, under the ancient style, have a great and striking advantage; for an absolute perfection is to be attained in the formation of geometrical surfaces, and the beauty created is so entirely artificial as never to admit a doubt of its origin. Long, therefore, after the improvement is finished, the credit and the beauty remain to gratify and charm the owner. Improvements on surfaces, whatever may be their object, ought to be made in scenes which are near the eye, or intended to be frequently seen; at a distance they are lost, if the effect be on a small scale; and often better effected by wood, if on one of considerable magnitude. Attempts to remove distant inequalities, by lowering heights and filling up hollows, are very seldom attended by results sufficient to justify the expense incurred; but when art is employed to heighten distant eminences, the success is greater: in the last case, art may be said to act positively; in the former, negatively—to produce or increase a beauty, instead of only removing or lessening a deformity. All operations on ground may be included under—1. Those which have for their object the beauty of art or design; and, 2. Those where natural beauty is intended to be produced.*

6731. *Operations with a view to relative or artificial beauty. The forms in use for this purpose are few and simple. They originate in, and are influenced by, those of the house; and are, for the greater part, bounded by right lines; the surfaces being levels or slopes of different degrees of abruptness. The magnitude as well as form of each of the figures in the ground immediately adjoining a house, or in a detached walled enclosure, should be regulated chiefly by the magnitude of the mansion, or the extent and grandeur of the whole place, though they are often obliged to conform, in some degree, to the natural surface. When the ground slopes from the house in all directions, narrow parallelograms should be the prevailing forms both of the levels and slopes. The broadest level, and greatest perpendicular depth of slope, should generally be placed next the house, and the next broadest level, &c., in succession, till, after three or four levels, and as many slopes are obtained, the artificial surface finally blends with the natural; unless, as is frequently the case in the geometric style, a kitchen-garden wall, or some similar work of art, forms the termination. In this case, separation by some architectural or other accompaniment will, by making a break in the order of forms, admit of adopting, in*

continuation of the artificial surface, such levels and slopes as the character of the scene may require, or a due regard to economy dictate. When the mansion, or scene of operations, is on a surface naturally flat, the levels should be of greater dimensions, and the slopes smaller; and both should be fewer in number. But though parallelograms are the common figures employed, sections of polygons, trapeziums, circles, and curvilinear figures, are frequently admitted. They are used in architectural elevations, and in fortifications, which are the prototypes of this part of ancient gardening; and, therefore, when apparent in the mansion, should be reflected, as it were, by the grounds. The forms to be used are easily determined. The principal difficulty is to arrange them together, so that they may concur in producing a whole, or a good effect. In disposing, connecting, relating, and contrasting them for this purpose, the artist will preserve regularity and uniformity in the complex view of the whole, varying and harmonising the detail according to the degree of beauty and variety he intends to produce. If he has duly prepared his mind by theoretical studies, and practised architectural and landscape drawing, his own feeling of their impression will suggest when he has attained the desired effect; for the models of artificial surfaces which remain of ancient gardens are poor productions compared to what might be created in this way, through the judicious application of the principles of relative beauty. A good deal depends on adjusting the extent of geometrical or architectural surface to the size of the house and surrounding grounds; and in this matter much depends on the regularity or irregularity of the ground plan of the former, and on the evenness or variation of the surface of the latter. A square house on a level, or on a gentle swell, will require least extent of architectural platform around it, and a straggling Gothic castle on an irregular declivity the greatest extent of terraces, angles, ramps, and slopes.

6732. *Natural beauty of ground.* As the right lines and geometrical forms of the architect take the lead in grounds of artificial beauty, so the flowing and broken lines and undefined forms of the landscape-painter take the lead in those of natural beauty. To create them in ground, is generally impracticable and unadvisable; but where they exist concealed by accidental deformities, or incomplete in expression through dulness in their leading features, art may relieve from the impediments to beauty, even though the situation may be at some distance from the eye. In reclusive scenes immediately under view, art may aspire to create beauty even from a tame flat, but especially from its opposite, a flat abounding with deformities. In effecting all those purposes, the same principles apply. The first thing to fix in the mind is the desired surface, or that style of natural ground which is best to be imitated. The next thing is to examine on what parts, forms, and lines, the natural beauty of this ground chiefly depends; if undulating, whether the concave or the convex prevails; if broken ground, whether horizontal and perpendicular, or curved and inclined lines prevail. These are then to be imitated in the improvement, ever keeping in view the important principle of forming a whole.

6733. *The removal of accidental deformities* forms one of the commonest operations on ground. Old quarries and other pits, useless cattle-ponds, open drains, mounds of earth, and marks of ridges, are to be considered of this description. As they have been raised by art, so in dispersing them, the best general rule is to restore the natural surface; but sometimes the remains of fences are so numerous, that advantage may be taken of the earth to be removed, and some variety given to a surface otherwise dull and featureless. If the fence consists of a great number of turns of different lengths, by removing both the mound and part of the surface on each side of the drain, a small winding hollow or vale may be formed; the effect of which may be heightened, by placing the earth removed on adjoining indications of natural eminences; not so as to form knolls, but so as to connect and harmonise with the prevailing idea of expression. The most simple and obvious improvement of exhausted quarries and dry pits, is to plant them; but this, though it will form a series of pleasing scenes, is not always consistent with the general expression to be created, and such groups as would arise from these spots might destroy breadth of light, and connection, independently of excluding distant objects. In this case, they must be filled up by under-growths, or by lowering the adjoining surface in such a way as not to interfere with general effect, and to leave a sufficient descent for the surface-water. Where broken ground enters into the idea of the composition to be effected, open drains, or hollow pits, afford fine sources of picturesque beauty, especially if the ground is dry, or can be readily under-drained. This character, however, can seldom be introduced as an original feature; but in ground naturally leading to abrupt and broken lines, it may be more desirable to improve this expression, than to attempt creating a more polished surface. In cases of this sort, almost every thing depends on the introduction of wood, copse, and verdant roughnesses, to harmonise the broken surface; for mere broken ground, without the character of luxuriance and wildness communicated by wood, is seldom better, on a small scale, than a surface deformed by scars.

6734. *Natural excrescences*, as well as pits, are not uncommon in many grounds which have not been subjected to agricultural improvement. When these are not large, the

process of fallowing with the plough will remove them; when they are of some magnitude, they may often become sources both of polished and picturesque beauty. If they are numerous and favourably distributed, by the removal of some, and the enlargement through that means of others, they may give an impression of undulation, especially if situated on a naturally irregular surface. If on a declivity, and covering rocks or huge stones, a mixture of flowing lines with abruptnesses may be happily introduced.

6735. *A varied but yet dull surface* may often be improved by a skilful artist. By studying the character indicated by nature, it will generally be found, that the deficiency of expression is owing to the hollows being in part clogged up, either naturally or by long continuation under the plough; and the swells lowered in a corresponding degree by the same process. In this case, the obvious improvement is to remove earth from the hollows, and place it on the eminences, ever keeping in view the natural expression, and avoiding to end the improvement, by leaving the hollow gutters, and the eminences pointed ridges. This sort of improvement is not a very obvious one, though often attended with surprising effects, for every foot of depth taken from a hollow, and laid on an adjoining hill, adds two feet to the height of the latter. All these observations will be understood as referring to grounds near the house.

6736. *Distant scenes of a park, as hills, or mountains, are only to be improved by wood*; and these remarks, in so far as they extend, will suggest not what is to be removed, but what must be concealed. Many excellent hints on this part of the subject are to be found in the picturesque tours of Gilpin, referring to ranges of hilly scenery in different parts of the country, of much of which he has given views. With respect to ground as respects garden-scenery, almost the only writer who has treated of it at length is Whately, whose excellent book, so frequently referred to by all succeeding writers on gardening, ought to be in the hands of every man of taste. In the chapter on ground in that work, the author concludes with a salutary caution, which ought ever to be taken in connection with the wisest rules; "a caution which has more than once been alluded to, must always be had in remembrance; never to suffer general considerations to interfere in extraordinarily great effects, which rise superior to all regulations, and perhaps owe part of their force to their deviation from them. Singularity causes at least surprise, and surprise is allied to astonishment. These effects are not, however, attached merely to objects of enormous size; they frequently are produced by a greatness of style and character, within such an extent as ordinary labour may modify, and the compass of a garden include. The caution, therefore, may not be useless within these narrow bounds; but nature proceeds still farther, beyond the utmost verge to which art can follow, and, in scenes licentiously wild, not content with contrast, forces even contradictions to unite. The grotesque, discordant shapes which are often there confusedly tumbled together, might sufficiently justify the remark. But the caprice does not stop here; to mix with such shapes a form perfectly regular, is still more extravagant; and yet the effect is sometimes so wonderful, that we cannot wish the extravagance corrected." (*Obs. on Mod. Gard.*, p. 23.)

SECT. II. *Operating with Wood.*

6737. *Wood produces almost all the grand effects in both styles of improvement*; for trees, whether in scattered forests, thickets, or groups, or in compact geometric squares, avenues, or rows, constitute the greatest charm of every country. Trees improve the outlines of most buildings (*fig. 932.*), and without them the grounds of a residence

932



would often be nothing more than an unmeaning profusion of winding roads or walks. A tree in itself is, indeed, the noblest object of inanimate nature; it combines every species of beauty, from its sublime effect as a whole, to the individual beauty of its leaves;

it exhibits that majestic uniformity and infinite variety which constitute the essence of relative beauty; and the natural expressions of individual species are as various as are their forms and magnitude, their utility to man, and the situations, soils, climates, and other general and accidental circumstances of which they are indications.

6738. *The effect or expression of trees*, individually, and in masses, has been entered on at length in the preceding book; we shall here, therefore, confine ourselves to a few general observations on the effect of planting in the geometric and modern manners.

6739. *In planting in the geometric style*, the first consideration is the nature of the whole or general design; and here, as in the ground, geometric forms will still prevail, and, while the masses reflect forms from the house, or represent squares, triangles, or trapeziums, the more minute parts, characterised by lines rather than forms, such as avenues, rows, clumps, and stars, &c., are contained in parallelograms, squares, or circles. In regard to the parts, masses and avenues should extend from the house in all directions, so far as to diffuse around the character of design; and as much farther in particular directions as the nature of the surface admits of, the distant beauties suggest, and the character of the mansion requires. In disposing these masses, whether on a flat or irregular surface, regard must be had to leave uncovered such a quantity of lawn or turf as shall, at all events, admit a free circulation of air, give breadth of light, and display the form of the large masses of wood. Uniformity and variety as a whole, and use as well as beauty in the parts, must be kept constantly in view. Avenues, alleys, and vistas, should serve as much as possible as roads, walks, lines of fences, or screens of shelter or shade; but where this is not the case, they should point to some distant beauties, or near artificial objects, to be seen at or beyond their termination. The outer extremities of artificial plantations may either join natural woods, other artificial scenes, cultivated lands, or barren heaths or commons.

6740. *When artificial plantations join natural woods*, the avenues, alleys, and circular glades of the former may be continued a certain length in the latter, so that the point where the natural wood begins, and the artificial plantation ends, may not be discoverable. In aid of this effect, the sort of tree which prevails in the natural scenes should also prevail in the adjoining parts of the artificial wood. When artificial scenes join other artificial scenes, nothing can be easier than, by the reciprocal continuation of avenues, strips, or masses, so far to unite the two seats, as to conceal the boundaries of each, while the two mansions will thus each borrow a splendour from the other. There are still existing proofs of the attention paid to this subject in former times, an instance of which occurs in the apparent connection by avenues between Blenheim, Ditchley, and Heythrop, though the last mansion is nearly ten miles distant from the first.

6741. *When artificial scenes join cultivated lands*, if those lands are enclosed, broad strips, hedgerows, square or round clumps in the angles of the fields, with such reciprocal disposition of lines or forms as the case may suggest, will continue the character of artificial plantation; and, where roads are necessary, if utility does not forbid, they should be formed in part as avenues, in continuation of those within the artificial scene.

6742. *When artificial plantations are bounded by barren heaths or commons*, all that can be done is to advance beyond the boundary of the place portions of avenues, and rows of trees of different lengths. Sometimes an inequality, crowned by a clump or thicket, may promote the idea. On other occasions, where the heath or waste may be so bleak as to convey no agreeable expression, and therefore is, of course, struck out entirely from the improved scene, a sort of connection may be given, by advancing strips or rows from the boundary plantation into the heath. Even single or scattered trees, if they can be protected in that situation, will have a tendency to produce that sort of connection required; and, while it gratifies the proprietor's love of appropriation, will please the eye of the traveller, who views the country as a whole, and delights to observe the harmony and beauty of its principal features. Having disposed of the whole, and of the parts, as far as respects their general effect and connection, what remains to be considered is, the sort of tree, manner of disposing the plants, fences, and future management.

6743. *When the object in view is the expression of art and design*, the propriety of employing species of trees different from those which are natural to, or most abound in, the surrounding country, is obvious. In a country of common pine, the spruce and silver fir and cedar afford a choice. In a country of oaks or elms, chestnuts, limes, and planes, form suitable contrasts. Where the plantations are extensive, the value of the timber must always be a principal object; and, therefore, the contrasted trees should be chosen accordingly. Some species, however, are so happily adapted for this style, and as ornamental trees in both styles, that they ought seldom to be omitted except near the house: such, for example, as the horsechestnut, lime, sweet chestnut, plane, Turkey oak, cedar, stone pine, &c. As the four last species mentioned are, in exposed situations, liable to injury from extraordinarily severe winters, a few harder sorts, resembling them in general appearance, should be intermingled in the plantation, to preserve the larger masses in case of accident, but to conform with the general effect in colour and style of

foliage, as well as in form. Different species ought not, in general, to be mixed together in the masses; one, or at most two, conforming varieties are sufficient; more would destroy the breadth of colour of the mass, and the character of its surface. Different masses, avenues, and more minute parts, may, however, be planted with different species of trees; rare sorts may be also introduced in lines, along the front of many of the masses, ranged along stars, crosses, &c. The snowdrop tree, for its beautiful blossoms, and the birch and hazel, for the display of their catkins during winter, are well calculated for walks adapted to that season of the year, and should be planted in front of pines, or other evergreens. Such also is the principal situation for flowering shrubs, and no plants can be more showy than the horsechestnut, common lilac, acacia, guelder rose, Portugal laurel, holly, bird-cherry, *Pyrus*, *Méopilus*, and *laburnum*, in similar situations, and for general purposes. In distributing the species of tree in extensive masses, the same general principles of composition must be attended to, which we have pointed out, as far as respects form. The colours and character of the heads of the trees must be connected, and, at the same time, to a certain degree contrasted, in order to produce an artificial and yet harmonious effect.

6744. Whether the *new varieties of American and other trees*, obtained since the introduction of landscape-gardening, are to be admitted under this style of improvement, may be questioned by some. We answer, certainly; unless where the object is the imitation of an ancient residence: when there can be no doubt that exotic trees will destroy part of the illusion. We do not, however, contend for the revival of the ancient style solely as producing imitations and allusive characters, or on account of its antiquity, but as a distinct mode of gardening. We would therefore not copy its faults or study its defects; but add to its beauties from all the resources furnished by the present improved state of the arts of design, as well as by the continued accession to our stock of trees and shrubs. If, however, a positive imitation of an ancient residence is intended, then the species of tree should be limited to those used in ancient times, as well as the forms and lines of their disposition.

6745. *The manner of disposing the plants* is influenced by the same principle of avowed art; in rows, equidistant masses, in squares, or in quincunx, and in every case so as never to be mistaken for trees or shrubs sprung up accidentally.

6746. *Fences.* Here the ancient style has a great advantage over the modern, in which, as far as respects the imitation of nature, all fences are to be considered as temporary, and, therefore, to a certain degree, looked on as nuisances to be afterwards removed. Besides, their irregular and circuitous line is displeasing to many who do not understand ground-plans, with a view to picturesque beauty, when the trees are grown up. In geometric gardening, fences are to be considered in many cases as objects, and when not regarded in this light, their directions and limits are so minutely pointed out by the determined outline of the plantations, that the eye acquiesces in their situation and use. Fences of any common and economical description are employed to protect the trees of open avenues, open groves, and single open rows. The more common kind are walls, which in the prominent parts ought to be well built of hewn stone, and substantially finished by raised or flat copings, bearing some relation to the copings of the simpler parapets of the house. The gates necessary in these walls, as well as in some sorts of permanent verdant fences, supply occasion for such architectural forms and lines, as are advantageous in reflecting those of the mansion, and strengthening the prevailing idea of dignity, art, and design. Every sort of fence belonging to the modern style may be occasionally employed in the ancient; and besides walls, half-sunken walls, and raised mounds with a walk at top, we may enumerate hedges of holly, yew, laurel, and other shrubs, either simple, or chequered by alternate deciduous or evergreen species, varied by arcades and standards, shorn into shapes, or in their natural growth. Hedges of flowering shrubs may also be introduced; of creepers on open palisades; and various others of great beauty may be invented, or are to be found in books on this style of gardening.

6747. *Management.* In this respect, also, the advantage is greatly in favour of the ancient style; for as all operations of pruning and thinning in the other style should be done under the eye of the landscape-gardener, so all those operations may be performed in the ancient style by any labourer; the object being simply to produce a straight, upright, smooth stem, to a certain height according to circumstances, and to allow each particular tree to attain its full size. Shearing or clipping is always a merely mechanical operation; plain hedges and close alleys require only a line for a guide; and, in the case of arcades or verdant sculpture, there is, or always should be, a frame of trelliswork of correct design to guide the operator. From the comparative brevity of the view which we have here taken of planting under the ancient style, the reader will perceive, that we are far from supposing it to take the lead of the natural method, to which we now proceed, referring for more particular information to Le Blond, and other French authors; and to Switzer's *Ichthyographia Rustica*.

6748. *In planting with a view to natural beauty*, the effect of the whole is also the first

and the grand consideration. All planting, as respects the formation of a country residence, must necessarily be materially influenced by the character and situation of the house, as the capital feature in the composition. To this feature, the leading masses of wood and lawn, answering the end of light and shade in painting, must invite and direct the eye in the general view of the place. Each must embrace it on one or on more sides, and diverge from it in masses suitable to its magnitude, and the extent of the grounds; and in forms and characters of woody surface suitable to the natural situation and the expression to be created. If the mansion is on a declivity, the principal light should embrace the front which looks down, rather than those which look up, or on either side. The views from the windows suggest this arrangement, and will point out in every other situation (whether a flat, a hill, or an irregular surface), on which side or sides the leading masses are to have their origin. To determine their magnitude, form, and number, would be impossible, without a particular case to refer to. To point out their style is sufficient; this must always be irregular like nature, generally stretching along such rising ground as the situation affords; and, like her, always combining a certain degree of uniformity or recognisable shape, even amidst the greatest seeming deviations from this quality of figures. As the house indicates the commencement of the masses, so the character of country surrounding the scene of improvement must determine the limits and style of their termination. If the lands are laid out in regular enclosures, bounded by hedges and hedgerows, fragments of these must prevail in the margin of the park; at least in as many places, and to such a degree, as will produce connection, and, if possible, as much farther as will harmonise the scene within, with the country without. If it be entirely or in part surrounded by forest scenery, the termination is easily and completely effected, by attending to the style of wood and species of tree prevailing without, for a moderate distance within the boundary. If bounded by the sea, or a large lake, an abrupt termination will be as natural as it would be formal on the margin of a cultivated surface. Abrupt terminations, however, are often unavoidable, as in examples of villas, where the owner, having no demesne, has no control beyond his boundary fence. All that can be done, therefore, in such cases, is, to create as much beauty and interest as possible within the given limits. Where one villa joins another, this sort of isolated abruptness is avoided or lessened; and, in the case of suburban villas, it is seldom felt as any deformity; though, even here, connection and general harmony with what is exterior, will add beauty to what is within.

6749. *The details of planting in this style* have already been given at length in the preceding book.

SECT. III. *Operating with Water.*

6750. *Water* is a material of so captivating and interesting a description in the different characters in which it occurs in nature, that no view can be reckoned complete in which it does not compose a feature. It forms a part of every garden in the ancient style, in the various artificial characters which it there assumes of oblong canals, ponds, basins, cascades, and *jets d'eau*; and, in modern improvement, such is the value attached to its effect, that no place is deemed perfect without a river or lake; and such the indiscriminate desire of obtaining ornaments of this description, that nature has been too frequently disregarded in their form and situation. Of the characters which water assumed under the geometric style, we can only observe, that their names convey, in a great degree, an idea of the forms. Their situations were near the mansion; and their marginal accompaniments of masonry, turf walks, and hedges, were determined by the architectural forms and lines of the capital feature in the scene. The choice, from the most intricate and curious fountains to the plain oblong canal, depended on the splendour of the general design; very little on natural situation. The supply was generally obtained from some concealed reservoir.

6751. *To imitate lakes, rivers, or rills, and their accompaniments*, is the object of landscape-gardening; and of each of these natural characters we shall remark the leading circumstances in the originals and the imitations. All water is either running or stagnant. Lakes, ponds, and pools, are of the latter class; rivers, rivulets, and rills, of the former description. In certain situations, lakes may be created where the supply of water is moderate; rivers and rills only when it is abundant. Both characters, when they exist in nature, may be improved by studying the natural characteristics of each species.

6752. *Situation, relatively to the character of the ground's surface*, is the first consideration respecting water, in whatever form it may appear. No situation in which this material may be supposed to exist and expand itself into a body, can be truly natural, that is not a vale, plain, or hollow. Mountain streams are out of the question; and small lakes or pools, in hollows or elevated grounds, are more to be considered as accidental than as general nature. Even artificial lakes or rivers on a considerable scale, to be natural, must either be, or seem to be, situated in the lowest part of the landscape then

under the eye. If otherwise, if placed on the side of a declivity over which the eye can range at the same time, it may be attractive to a stranger at first view ; but the want of truth or fidelity to the thing to be imitated, will soon bring on an increasing aversion to it in the mind of genuine taste.

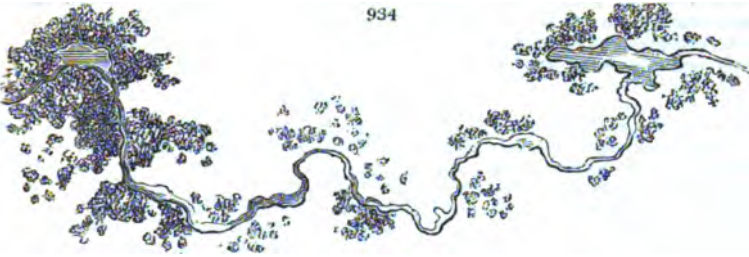
6753. *Ponds* on different levels, seen in the same view, are very objectionable on this principle. The little beauty they display as spots, ill compensates for the want of propriety ; and the leading idea which they suggest, is a question between their present situation and their non-existence. The choice, therefore, as to the situation of water, must ever depend more on natural circumstances than proximity to the mansion. Is then all water to be excluded that is not in the lower grounds ? We have no hesitation in answering this question in the affirmative, so far as respects the principal views, and when a lower level than that in which the water is proposed to be placed is seen in the same view. But in respect to reclusive scenes, which Addison compares to episodes to the general design, we would admit, and even copy the ponds on the sides or even tops of hills, which may be designated accidental beauties of nature. In confined spots they are often a very great ornament ; as a proof of which, we have only to observe some of the suburban villas round the metropolis, where a small piece of water often comes in between the house and the public road with the happiest effect.

6754. *A beautiful lake*, or part of a circuitous body of water, considered as a whole, will be found to exhibit a form, characterised by breadth rather than length ; by that degree of regularity in its outline as a whole, which confers what, in common language, is called shape ; and by that irregularity in the parts of this outline, which produces variety and intricacy. Supposing the situation to be fixed on for the imitation of a lake, the artist is to consider the broadest and most circuitous hollow as his principal mass or breadth of water, which he must extend or diminish according to the extent of aquatic views the place may require. From this he may continue a chain of connected masses of water, or lakes of different magnitudes and shapes, in part suggested by the character of the ground, in part by the facilities of planting near them, and in part by his own views of propriety and beauty. The outline of the plan of the lake is to be varied by the contrasted position of bays, inlets, and smaller indentations, on the same principles which we suggested for varying a mass of wood. To the irregularity of outlines so produced, islands and inlets may be added, on the same principle and for the same objects as thickets and groups. This will complete the character and beauty of the plan of the water.

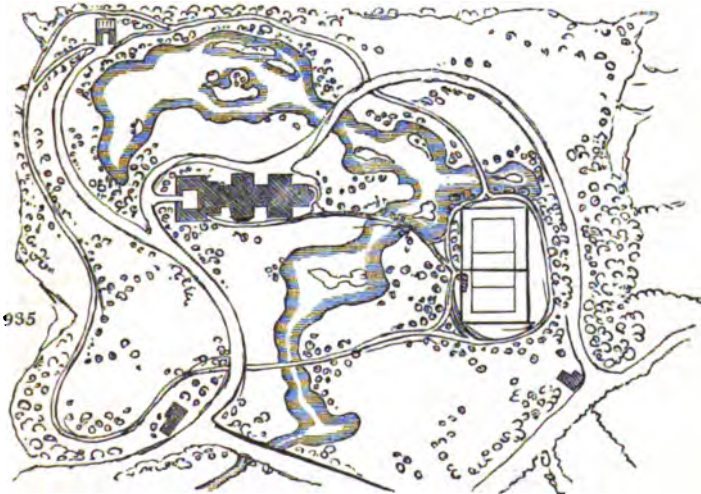
6755. *But the grand effect of water in landscape depends on wood as its accompaniment.* The variety and intricacy of outline, the reflection of forms and colours, the shady recesses and flickering lines of light, all depend on trees. These are not to be sparingly or indiscriminately scattered around the margin, but liberally in some places, for the sake of a contrasted mass of grateful colour or shade, to relieve the brilliancy of the water ; and with discrimination everywhere, to mark the beauties, and heighten the variety of the outline, without destroying breadth of effect, or a formation of a whole, either as respects the water alone, or the entire residence.

6756. *The marginal banks of water in nature are tame or bold, gravelly or sedgy, stony or rocky*, according to the character of the surrounding ground. Art, therefore, must imitate each in its proper place, not always by a studious picturesque arrangement of the marginal accompaniments in each case, but by excavating the ground-work, planting the trees and shrubs, and leaving the rest to the motion of the waves of the water. After the effects of one winter, stones or gravel may be deposited in spots suitable for stony or gravelly shores ; but to enter into this, and many other circumstances in the imitation of lakes, would exceed our present limits. We add two cautions : the first is, in all cases of the beautiful picturesque, so to arrange, by puddling and under-draining, that a marshy appearance may not surround the lake ; and that rushes, and such aquatic plants, may not extend farther than a few feet or yards from the margin of the water. The other respects islands, which are the greatest ornaments to lakes when properly disposed ; but an island which is placed in the centre, or in any situation where it does not connect with other islands, or with the shore, so as to form part of a prominence or recess, is injurious to the effect of the whole.

6757. *Rivers and rills*, we have said, are rather to be improved than created ; for we cannot sympathise with that taste which directs the mimicry of so noble a character as a river, or is satisfied with a nearly stagnated rill. We do not consider the river at Blenheim as an exception, because that piece of water was formed by widening a considerable brook. We allude to those wavy serpentine canals, which are never mistaken for natural scenes, and, in almost every case, might be advantageously exchanged for a lake. A rill, however, may have its course rendered more varied, may be expanded at proper places into regular shapes, and all the alterations accounted for and harmonised by planting. (*fig.* 934.)



6758. *Progress and impetuosity* are the two leading ideas which belong to running waters. The first expression may be heightened by counteracting any tendency to expansion; by removing some of the circuitous and oblong projections of earth or stone in the banks; and sometimes by deepening its bed, or by substituting a more direct line for a circuitous course. The idea of impetuosity is indicated by its effects, in reverberating against high banks, or common banks, on which trees are situated, and may be increased by augmenting the cause or the effect, either by digging and undermining the trees, cutting down the high banks on which the water acts, or placing very slight piers as jetties on the opposite shore. Picturesque additions to the marginal accompaniments both of rivers and rills will readily suggest themselves. Cascades and waterfalls may sometimes be created; and the occasional expansion of natural brooks into pools affords a fine hint for imitation, when this form of water comes within a scene of improvement. One of the greatest improvements that can be made in many places laid out in Brown's time, and subsequently, consists in widening in some places, and varying the margin in others, of those tame serpentine canals, then so much in fashion. By this means, and by adding islands and trees, they may often, without deranging the place as to other details, be rendered highly beautiful at a moderate expense. (*fig. 935.*)



6759. A *waterfall or cascade* is an obvious improvement where a running stream passes through a demesne, and is to be formed by first constructing a bank of masonry, presenting an inclined plane to the current, and rendering it impervious to water by puddling or the use of proper cements, and next varying the ridge of the bank, and the bed of the river below it, with fragments of rock, so chosen and placed, as not to present a character foreign to what nature may be supposed to have produced there. The adjoining ground frequently requires to be raised at such scenes, but may be harmonised by plantation.

6760. Where running water is conducted in forms belonging to the geometric style of gardening, waterfalls and cascades are constructed in the form of crescents, flights of steps, or wavy slopes; all which have excellent effects of their kind when appropriately introduced, as at Chatsworth, Hatton, and many other places.

6761. *A natural stream may sometimes be improved by altering its direction, and bringing it through a more interesting part of the grounds; and we have known an admirable effect produced by bringing a distant river close to the house, even so much so as to wash the base of its terrace-wall.*

SECT. IV. Rocks.

6762. *The imitation of rocks forms no part of the geometric style of gardening; and they are materials of the natural style, equally unsuitable to be created. But though rocks cannot readily be imitated, their expression may sometimes be heightened when desirable, and concealed when disagreeable.*

6763. *The character of rocks may be savage, terrific, sublime, picturesque, or fantastic. By attending to the forms of the milder characters, and their connection with ground and trees, we shall discover whether, and to what extent, they may be improved. Savage rocks are too inhospitable to be permanently admitted, in any extent, near the eye. All rocks convey something of this idea that are not accompanied by vegetation; and, therefore, planting among or near them, is, in every case, an improvement where trees do not exist. All rocks are expressive of dignity; those eminently so, are not greatly varied by projections from their surface: their beauty is to be augmented, either by increasing their surface in height or depth, or by connecting it if too scattered. The removal of a few feet of earth, or part of the bushes or trees from the bottom of a precipice or ridge, and the emplacement of a line of wood along its summit, will increase its real and apparent height; a similar process with respect to the sides will add to the idea of stability and continuation. If the parts are too much scattered, a few trees placed before, or bushes or creepers planted in the intervals between the parts, will connect them, and give the idea of a whole partly concealed. But in this case, a considerable breadth of surface is necessary, at least in one place, otherwise dignity must give way to picturesque beauty. The least indications of rocks that are not very fantastic in their form, even including such whose chief expression is picturesque beauty, are, to a certain degree, expressive of dignity. The slightest indication of a stratum or ledge appearing above the surface, conveys something of this idea, and ought not to be neglected. When they are discovered by alterations in the ground with a view to the formation of roads, fences, and water, or to the erection of buildings, occasional advantage may be taken of their appearance. A road across a declivity may be accompanied by a ledge of rocks instead of a bank of earth. Grounds which are broken and picturesque will display a more sufficient reason for the appearance. The walls of a terrace evidently in part founded on a rock, will give an idea of dryness, dignity, and security to the house; and the margin of a stream displaying even large stones, increases the idea of impetuosity; or, in lakes, of the action of water in washing away the earth. Among imitations of wild scenery, detached stones heighten the illusion, and carry back the mind to the aboriginal state of the country. Loose or detached fragments of rocks may often aid the effect of real or supposed masses. The appearance of a large rude stone near a wooded steep, unless of one evidently rounded by water or art, always leads the mind to the larger mass up the acclivity from which it has been broken and rolled down; if partly sunk in the ground, and concealed by vegetation, the fertility of the imagination considers those parts of great magnitude which lie buried under the surface. All this, however, can only be successfully accomplished in a country which, by the character of its general surface, does not preclude the idea of rocks. On a flat or a champaign country, the want of truth, or seeming truth, would render them disagreeable; and, indeed, did rocks exist in such a landscape, they should be hidden rather than displayed, unless of such extraordinary magnitude and effect, as to form an exception to general principles.*

936



6764. *The judicious distribution of stones, in situations where they are not evidently foreign to the character of soil and surface, may greatly heighten wildness and picturesque beauty. (fig. 936.) Every thing, however, will depend on the manner in which this is done; they must not be merely laid down at random on the surface (a), or formally joined together (b), or merely connected, which, however, is better (c); but grouped with taste (d), and partially concealed by vegetation, and sunk in the soil. (f. g.)*



6765. *Fantastic stones (fig. 937. a) should be avoided in all cases, unless in some peculiar scene; and where there*

are already indications of stratified or regular masses of rock (b), it can never appear natural to place near them round, water-worn stones (c). Where angular and laminated stones are near; or where such as can be quarried in forms suitable for building



938

may be procured, grand effects may be produced; either by using them in forming imitations of nature, or by combining them in a mixed style of artificial form and natural conglomeration; or by some variation of the Cyclopiian or Tirynthian style. (See *Arch. Mag.* vol. i. p. 81.) (fig. 938.)

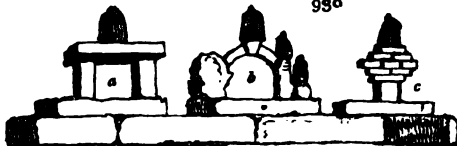
SECT. V. Buildings.

6766. *Buildings*, as materials of scenery, are entirely under the power of man; and, from that circumstance, were carried to an unwarrantable excess in the decline of the ancient and the infancy of the modern style. Improvements on ground are forgotten by their effect; that of planting may be accounted too distant or too slow by ordinary minds; but a building is complete the moment it is finished. It affords immediate satisfaction to the owner; and, being known as a costly object, full credit is given to him for the expense incurred. Thus wealth, confiding in its powers, multiplied garden-buildings to an excess, which ended in creating a disgust, still existing, in some degree, at their appearance in improved scenery. Before proceeding farther, it may be proper to offer some remarks on the style or architecture of buildings.

6767. *It is a common error to consider nothing as architecture but what is Grecian*; to fancy that all architecture must have what are called orders; and to consider the Gothic, Chinese, or Hindoo modes of building, as mere barbarous compositions. Nothing can be more unphilosophical than this mode of viewing the subject; and it may just as well be said that there is no true language in the world but the Greek; that every language ought to correspond with it in the tenses and moods of the verbs, and that every other mode of speech is mere jargon. A style of building, and mode of oral communication, must have a sufficient claim to be considered as complete, when they answer the purposes for which they are intended; and, applying this principle to the architecture and language of different countries, we shall find that each is complete relatively to those countries. That any style of building, or any language, can be universally suitable, is to suppose that the same climate and the same degree of civilisation prevails over the whole globe. Thus, as there are different languages, and different manners and customs, so there are different styles of architecture; and though we may prefer the Grecian, as having been used by the most refined nations of antiquity, let us not hastily reject every other style as devoid of congruity, or unsuitable for being applied to constructions of use or beauty.

6768. *The origin of the different styles of architecture* are usually traced to imitations of temporary structures formed of timber or of rough trees; and thus the Grecian column, with its capital ornamented with foliage, has been called an imitation of the trunk of a palm, with the petioles of its recently dropped leaves still adhering; the Gothic arches and tracery have been likened to wicker-work, or the intersecting branches of an avenue; and the Chinese style to the imitation of a tent supported by bamboo. But the imitation of nature is the last thing that occurs in the progress of improvement; and though the above opinions may not be without their use as a sort of hypothesis for composition; yet it appears much more probable that styles of building have taken their origin, jointly from the materials the country afforded, and the wants of the people. According to this hypothesis, the Grecian may be considered as founded on the use of planks of stone, in the same way as beams of timber (fig. 939. a); the Gothic, by the use of small stones, held

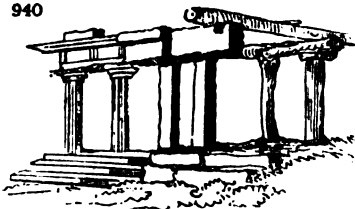
939



together by their position (b), and the Hindoo, by the use of small stones, held together by superincumbent weight (c). The Doric temple (fig. 940.) is easily traced in this way to its prototype of wood; but though the idea is supported by the authority of Vitruvius, it should never be considered as any thing more than mere conjecture.

6769. *The progress which architecture has made in Britain*, in modern times, is matter of greater certainty; and Repton, with his usual taste, has furnished an ingenious vignette (*fig. 941.*), which indicates that the most remote style of domestic architecture was that of the castellated Gothic; to which succeeded the ecclesiastic Gothic; next the style prevalent in the seventeenth century, being a mixture of Gothic and Grecian, commonly called the Elizabethan style; after that the Grecian; and last of all, the Hindoo, just then coming into notice, and

940



which he considered (*Designs for the Pavilion at Brighton, &c. 1810*) as likely to become fashionable. The most suitable style for domestic purposes in Britain, he con-

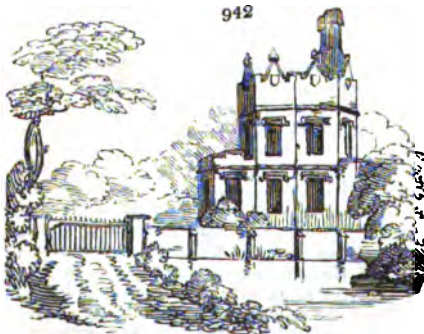
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sidered to be the Gothic, as admitting every description of interior form and arrangement, an unbounded variety in the external forms and lines, and as being favourable to future additions, without deranging the effect or ordonnance of the original composition.

6770. With respect to the *effects of buildings, as component parts of rural scenery*, Shenstone observes, that a landscape, to him, is never complete without a building or rocks; and certainly, considering it merely in the light of a picturesque view, a building, in addition to merely verdant scenery, forms a better picture, by giving a desirable feature or resting-place for the eye. Considered, however, in the light of natural expression, the meanness of root-houses and grottoes, the absurdity of hermits' cells, heathen temples, triumphal arches, mock chapels, &c.; and the inutility of all of them, render them positive deformities in scenes of natural or picturesque beauty. They break in upon repose, simplicity, and all allusion to natural scenery, by their frequency; and suggest ideas of ostentatious vanity in the owner, rather than of propriety and elegance of taste. But though their excess is so general and so obnoxious, some sorts may be occasionally introduced with propriety. Garden-seats are necessary for shade or shelter; bridges, for communication between the banks of rivers or rills; cottages, gate or entrance lodges (*fig. 942.*), as abodes for labourers; and open sheds as places of resort for cattle. Even

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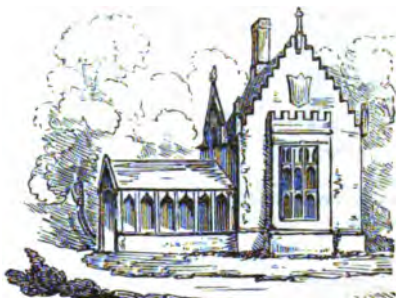
a prospect-tower is a desirable object in a flat country, affording no other means of obtaining a bird's-eye view. A temple, after all, is in many cases but a garden-seat; and if beautiful in itself, and judiciously placed, we can see no objection to its introduction in the garden scene of a princely mansion; certainly none to several, where the geometric style is adopted. To raise a monument in memory of a great public character, or consecrate an urn to private friendship, or parental memory, can hardly be offensive to any mind. A sundial is both a useful and an agreeable object; and statues and busts, in highly polished scenery, by the contrast in the kind of

beauty displayed, recall the mind for a moment, from contemplating the wide range of nature, to admire the hand of art concentrated in a single point. In this view there are various objects of this description admissible in the more polished scenes of gardens, &c., as marble fountains, fragments of antiquity, &c. But when simplicity and natural beauty are the prevailing ideas, all works of art must interfere more or less with those ideas; and unless they can raise up and maintain a more interesting expression, they must be regarded as injurious rather than beautiful.

943



944



6771. But simplicity and nature, continually repeated, become tiresome in their turn, and man is then pleased to recognise the hand of art, if judiciously exercised, even on an artificial ruin (*fig. 943.*); but then it must be so like truth as to interest by the likeness, not by deception, which is disgusting. Artificial ruins, however, need seldom be resorted to while there are so many other architectural and sculptural decorations to which we can have recourse. Nothing gives more general satisfaction than a neat and comfortable picturesque cottage (*fig. 944.*), with a good garden, in neat order and cultivation; and such buildings may always be applied to some useful purpose, even in the grounds of small villas or *fermes ornées*. In more extensive scenes, cottages of different styles may be introduced, from that of the Greenlander or Norwegian to the Hindoo; and there can be no reason why a proprietor, if he chooses to go to the expense, and will attend to the comfort of the interior, should not ornament the dwelling of an upper servant in any style he pleases, even that of a Chinese mandarin.

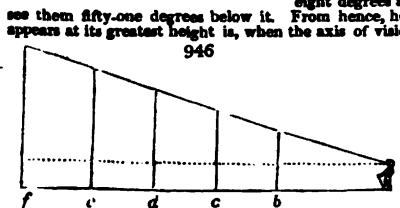
SECT. VI. *Accidental Accompaniments to the Materials of Landscape.*

6772. *Of accidental accompaniments, the first are roads*; and of roads, the principal is the *approach*. The approach, or road to the house, ought to display to advantage the beauties of that part of the place it passes through, and as many other beauties as can be done without showing the principal, which are generally those of the garden-front. In both styles, it ought to ascend to the house rather than descend, and pass along a flat or hollow rather than over inequalities of surface.

6773. *The approach in the geometric style* was usually a wooded avenue, in one or in several lines. In the modern, it is generally a bold, free, gently waving line; every turn of which is, or seems to be, produced either by some variation in the surface, or by the position of a group of trees. It may pass through wood only, or through forest-like scenery. The first view obtained of the house ought to be as favourable as possible, and not of any particular front, but rather an angular view, bosomed in trees. The second, or, if there are two or more, the last view, on a nearer approach, should be distinct, and show the entrance-front, and porch, or portico; the road approaching it at such a distance, obliquely, as that the eye may readily comprehend the whole, and to the greatest advantage.

6774. *In conducting the spectator to view objects, whether by approaches, roads, or walks, it is a matter of some nicety to determine a priori, the exact distance at which he should be permitted to obtain a full view.* There is a certain point of distance from whence every object appears at its greatest magnitude. The apparent height of any object will vary according to its distance, the inclination it makes with the horizon, and our relative elevation or depression. A correspondent of Repton states, that "any two of the above three things continuing the same, the apparent magnitude will decrease with the third, though not in exact proportion to it. Thus, the object being perpendicular to the horizon, and our elevation remaining the same, its apparent height will decrease with the distance. Our elevation and the distance remaining the same, the apparent height of the object will decrease with its inclination to the horizon. The inclination and distance being the same, the angle, or apparent height, will decrease with our elevation or depression, supposing our height was at first the middle point of the object. This last being liable to some exceptions, the general rule is, that the distance from the object, measured by a perpendicular to it, the point at which its apparent height will be greatest is, where the perpendicular from the eye falls upon the centre."

6775. The difficulty in this subject is to know what the conception is that we shall form of the height and magnitude of an object according to different circumstances; its apparent height, as well as its real height, remaining the same. This cannot be reduced to rules, but depends chiefly on a careful comparison of particular instances. One cause, Repton considers, may proceed from the position of the eye itself, which is so placed in most foreheads as to view a certain portion of the hemisphere without any motion of the head. This portion has been variously stated at from sixty to ninety degrees. The eye surveys more in breadth than in height, and more below the axis of vision (fig. 944. a) than above it. Much depends on the projection of the forehead and eyebrows, prominence of the eye, &c. in different individuals; yet the upper angle (a b) will seldom be greater than one half of the lower angle (a c); and Repton ascertained that he could not distinguish objects more than twenty-eight degrees above his axis of vision, though he could distinctly see them fifty-one degrees below it. From hence, he concludes, "that the distance at which an object appears at its greatest height is, when the axis of vision, 945



(fig. 944. a) than above it. Much depends on the projection of the forehead and eyebrows, prominence of the eye, &c. in different individuals; yet the upper angle (a b) will seldom be greater than one half of the lower angle (a c); and Repton ascertained that he could not distinguish objects more than twenty-eight degrees above his axis of vision, though he could distinctly see them fifty-one degrees below it. From hence, he concludes, "that the distance at which an object appears at its greatest height is, when the axis of vision, 946 about thirty degrees; because, under this angle, the eye perceives its full extent without moving the head." Thus, supposing the eye (fig. 944. a) to be five feet six inches from the ground, a tall object (b), at thirty feet distance, will be seen to the height of twenty feet; at fifty feet distance (c), to the height of thirty feet; at seventy feet distance (d), to the height of forty feet; at eighty-seven feet distance (e), to the height of fifty feet; and at a hundred and five feet distance (f), to the height of sixty feet. (Observations on Landscape-Gardening, p. 21.)

6776. The approach in the modern style was well understood by Repton, and the following excellent observations by this artist seem to sum up every thing that can be said on the subject: — The road by which a stranger is supposed to pass through the park or lawn to the house is called an approach; and there seems the same relation betwixt the approach and the house externally, that there is internally betwixt the hall or entrance and the several apartments to which it leads. If the hall be too large or too small, too mean or too much ornamented for the style of the house, there is a manifest incongruity in the architecture, by which good taste will be offended; and if the hall be so situated as not to connect well with the several apartments to which it ought to lead, it will then be defective in point of convenience: so it is with respect to an approach; it ought to be convenient, interesting, and in strict harmony with the character and situation of the mansion to which it belongs.

First, It ought to be a road to the house, and to that principally.

Secondly, If it be not naturally the nearest road possible, it ought artificially to be made impossible to go a nearer.

Thirdly, The artificial obstacles which make this the nearest ought to appear natural.

Fourthly, Where an approach quits the high road, it ought not to break from it at right angles, or in such a manner as to rob the entrance of importance, but rather at some bend of the public road, from which a lodge or gate may be more conspicuous; and where the high road may appear to branch from the approach, rather than the approach from the high road.

Fifthly, After the approach enters the park, it should avoid skirting along its boundary, which betrays the want of extent or unity of property.

Sixthly, The house, unless very large and magnificent, should not be seen at so great a distance as to make it appear much less than it really is.

Seventhly, The first view of the house should be from the most pleasing point of sight.

Eighthly, As soon as the house is visible from the approach, there should be no temptation to quit it (which will ever be the case if the road be at all circuitous), unless sufficient obstacles, such as water or inaccessible ground, appear to justify its course. (*Enquiry into the Changes of Taste in Landscape Gard.*, p. 106.)

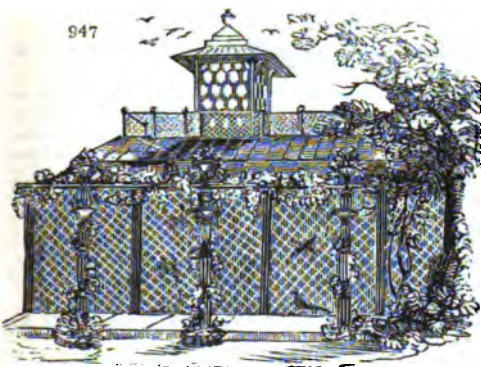
6777. Walks are the next accompaniment to home scenes, without which they cannot be viewed but in particular states of the weather and the surface. They were straight, angular, or in regular curves, in the geometric style, and are in easy natural-like lines in the modern manner. Though avowed objects of art, they ought always to bear a certain analogy to the scenes they pass through; with formal-kept hedges in highly finished scenery, and edges blending with the gravel in the picturesque manner, recommended by Price in more wild scenes. Taste must determine their general course, from the range of objects to be displayed; and their particular turns, from local beauties and accidental circumstances. The principle of a sufficient reason ought never to be lost sight of in laying out walks and roads; that is, no deviation from a straight line should ever appear for which a reason is not given in the position of the ground, the trees, or other accompanying objects.

6778. The finest description of hill or mountain walk is where the path is carried along the declivity on a perfect level, or where it winds round the hill by a gradual and regular ascent, here crossing a smooth slope and there forcing its way through rugged rocks, always preserving the same easy ascent or descent. When the views from such walks are grand and extensive, and especially if they include part of a river, a lake, or the sea seen through a proper foreground of trees, nothing of the kind can be more noble.

6779. Of valley walks, one on the wooded banks of a winding river, with cascades, or running over a rocky bed, the path sometimes accompanying the stream, at other times both retiring, or separating from each other, till the sound of the water is scarcely heard through the wood, and then meeting again, accompanied by open glade or meadow, with the other variations of which such scenery is susceptible, may be reckoned among the finest of the kind.

6780. *Fences* are accompaniments common to both styles of landscape; they are either permanent or temporary, and, in both cases, have been treated of in considering the subject of planting, in the preceding Book.

6781. *Animated nature.* Deer, wild and tame hares, cattle, sheep, game, singing birds, all belong to a residence, and are necessary to complete its beauty. Pheasants and other game, ranging undismayed by man, in garden-scenes, give a high idea of seclusion and removal from common nature; the finer sorts may be retained in appro-



priate structures (*fig. 947.*), and the common left to themselves, but liberally supplied with food. The cawing of rooks, the shrieking of the owl, the screams of peacocks, the notes of birds, are all desirable circumstances in certain situations, and ought to be attended to, by introducing such trees or plants as are favourable to their increase. The smoke of a cottage or a farm-house, the view of a distant village, the spire of a church, a water-mill, or a ruin, all become interesting in certain cases; and, with a thousand other instances of natural

expression, in a great measure beyond the reach of art, will be sought for, and turned to account, by the judicious artist.

CHAP. III.

Union of the Materials of Landscape-Gardening, in forming the constituent Parts of Country Residence.

6782. Having applied the principles of natural and relative beauty to the materials of gardening separately, we shall next apply the same principles to the formation of those scenes of use, convenience, or elegance, which form the constituent parts of a country-residence.

6783. *The mansion and offices* first demand attention, as the central feature of art and refinement. What relates to the design of these groups of buildings belongs to architecture; but the situation, aspect, style, and accompaniments are within our province. In determining the situation, a great variety of circumstances, some of a general, and others of a local or peculiar nature, require to be taken into consideration. Natural shelter, dry subsoil, the view of the house from a distance, and the distant prospect seen from the house, belong to the former; and removal from the boundary of a public road, suitableness of the adjoining grounds for the garden-scenes which accompany mansions, trees already there, or so situated as to aid the effect, &c., belong to the latter. According to Repton, the choice of a situation ought to be founded on — “*First*, The natural character of the surrounding country: *Secondly*, The style, character, and size of the house: *Thirdly*, The aspects or exposure, both with regard to the sun and the prevalent winds of the country: *Fourthly*, The shape of the ground near the house: *Fifthly*, The views from the several apartments: and, *Sixthly*, the numerous objects of comfort; such as a dry soil, a supply of good water, proper space for offices, with various other conveniences essential to a mansion in the country; and which in a town may sometimes be dispensed with, or at least very differently disposed.”

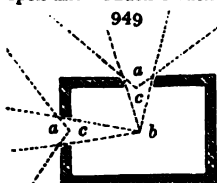
6784. *To arrange these considerations according to their respective weight or influence is hardly possible; “this must depend on a comparison of one with the other, under a variety of circumstances; and even on the partiality of individuals, in affixing different degrees of importance to each consideration. Hence it is obvious, that there can be no danger of sameness in any two designs conducted on principles thus established; since in every different situation some one or more of these considerations must preponderate; and the most rational decision will result from a combined view of all the separate advantages or disadvantages to be foreseen from each. It was the custom of former times, in the choice of domestic situations, to let comfort and convenience prevail over every other consideration. Thus the ancient baronial castles were built on the summits of hills, in times when defence and security suggested the necessity of placing them there; and difficulty of access was a recommendation; but when this necessity no longer existed (as mankind are always apt to fly from one extreme to the other), houses were universally erected in the lowest situations, with a probable design to avoid those inconveniences to which lofty positions had been subject; hence the frequent sites of many large mansions, and particularly abbeys and monasteries, the residence of persons who were willing to sacrifice the beauty of prospect for the more solid and permanent advantages of habitable convenience; amongst which, shelter from wind, and a supply of water for store fishponds, were predominant considerations.”* (*Enquiry, &c.*, p. 83.)

6785. In hilly countries, or in any country where the surface is varied, the choice is neither made in the bottoms (*fig. 948. a*), nor on the summits of the eminences (*c*), but



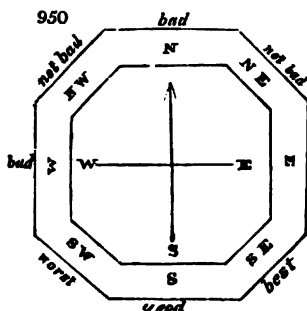
generally on the south-east side of the latter (*b*), on a raised platform, the rising grounds behind being planted both for effect and shelter.

6786. The field of vision, or portion of landscape which the eye will comprehend, is a circumstance frequently mistaken in fixing a situation for a house; since a view seen from the windows of an apartment will materially differ from the same view seen in the open air. Much evidently depends on the thickness of the walls (*fig. 949.*), the width



of the windows (*a*), and the distance of the spectator from the aperture. Near the centre of the room (*b*), the spectator will not enjoy above 20 or 30 degrees of vision; but close to the window (*c*) his eye will take in from 70 to 100 degrees. Hence, to obtain as much of the view from a room as possible, there should not only be windows on two sides of a room, but one in the angle, or an oblique or bow-window on each side, instead of the common form. (*Obs. on Landscape-Gardening, p. 24.*)

6787. The aspect of the principal rooms deserves particular attention in every case, and most so in bleak or exposed situations. The south-east is most commonly the best for



Britain (*fig. 950.*); and the south, and due east, the next best. The south-west, Repton considers the worst, because from that quarter it rains oftener than from any other; and the windows are dimmed, and the views obstructed, by the slightest showers, which will not be perceptible in the windows facing the south or east. A north aspect is gloomy, because deprived of sunshine; but it deserves to be remarked, that woods and other verdant objects look best when viewed from rooms so placed, because all plants are most luxuriant on the side next the sun. (*Fragments on Landscape-Gardening, &c., p. 108.*)

6788. A mansion for the country, if a mere square or oblong, will thus be deficient in point of aspect, and certainly in picturesque beauty, or variety of external forms, lights, and shades. An irregular plan, composed with a combined view to the situation, distant views, best aspects to the principal rooms, effect from different distant points, and as forming a whole with the groups of domestic offices and other architectural appendages or erections, will therefore be the best; and, as the genius of the Gothic style of architecture is better adapted for this irregularity than the simplicity of the Grecian, or the regularity of the Roman styles, it has been justly considered the best for country residences. Another advantage of an irregular style is, that it readily admits of additions in almost any direction.

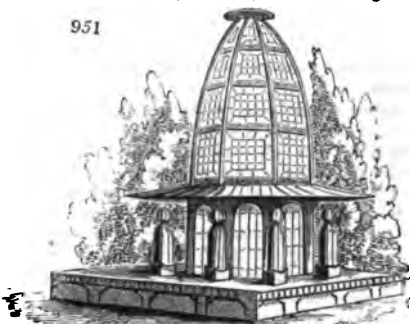
6789. Convenience, as well as effect, require that every house ought to have an entrance-front, and a garden-front; and, in general cases, neither the latter, nor the views from the principal rooms, should be seen fully and completely, but from the windows and garden-scenery. Not to attend to this, is to destroy their contrasted effect, and cloy the appetite, by disclosing all or the greatest part of the beauties at once. The landscape which forms the background to a mansion, the trees which group with it, and the architectural terrace which forms its base, are to be considered as its accompaniments, and influenced more or less by its style. The classic pine and cedar should accompany the Greek and Roman architecture; and the hardy fir, the oak, or the lofty ash, the baronial castle.

6790. Terrace and conservatory. We observed, when treating of ground, and of the ancient style, that the design of the terrace must be jointly influenced by the magnitude and style of the house, the views from its windows (that is, from the eye of a person seated in the middle of the principal rooms), and the views of the house from a distance. In almost every case, more or less of architectural form will enter into these compositions. The level or levels will be supported partly by grassy slopes, but chiefly by stone walls,

harmonising with the lines and forms of the house. These, in the Gothic style, may be furnished by battlements, gateways, oriels, pinnacles, &c.; or, on a very great scale, watch-towers may form very picturesque, characteristic, and useful additions. The Grecian style may, in like manner, be finished by parapets, balustrades, and other Roman appendages.

6791. *The breadth of terraces, and their height relatively to the level of the floor of the living-*

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rooms, must depend jointly on the height of the floor of the living-rooms and the surface of the grounds or country to be seen over them. Too broad or too high a terrace will both have the effect of foreshortening a lawn with a declining surface, or concealing a near valley. The safest mode in doubtful cases is, not to form this appendage till after the principal floor is laid, and then to determine the details of the terrace by trial and correction.

6792. *Narrow terraces* are entirely occupied as promenades, and may be either gravelled or paved: and different levels, when they exist, connected by inclined planes or flights of steps. Where the breadth is more than is requisite for walks, the borders may be kept in turf with groups or marginal strips of flowers and low shrubs. In some cases, the terrace walls may be so extended as to enclose ground sufficient for a level plot to be used as a bowling-green or a flower-garden. These are generally connected with one of the living-rooms, or the conservatory, and to the latter is frequently joined an aviary was designed by Repton for the grounds of the Pavilion at Brighton.

and the entire range of botanic stoves. Or, the aviary may be made an elegant detached building, so placed as to group with the house and other surrounding objects. An elegant structure of this sort (fig. 951.)

was designed by Repton for the grounds of the Pavilion at Brighton.

6793. *The flower-garden* should join both the conservatory and terrace; and, where the botanic stoves do not join the conservatory and the house, they, and also the aviary and other appropriate buildings and decorations, should be placed there. (See 5527. and 5547.)

6794. *The kitchen-garden* should be placed near to, and connected with, the flower-garden, with concealed entrances and roads leading to the domestic offices for culinary purposes, and to the stables and farm-buildings for manure. (See 3210.)

6795. *The situation of the orchard* should, all other circumstances being suitable, be near to the kitchen-garden; and between them may be very properly placed the gardener's house, connected with the furnace, sheds, fruit-rooms, &c. (See 3340.)

6796. *The lawn, or that breadth of mown turf* formed in front of, or extending in different directions from, the garden-front of the house, is, in the geometric style, varied by architectural forms, levels, and slopes; and in the modern, by a picturesque or painter-like disposition of groups, placed so as to connect with the leading masses, and throw the lawn into an agreeable shape or shapes. In very small villas the lawn may embrace the garden or principal front of the house, without the intervention of terrace-scenery, and may be separated from the park, or park-like field, by a light wire fence; but in more extensive scenes it should embrace a terrace, or some avowedly artificial architectural basis to the mansion, and a sunk wall, as a distant separation, will be more dignified and permanent than any iron fence. The park may come close up to the terrace-garden, especially in a flat situation, or where the breadth of the terrace is considerable.

6797. *The shrubbery* generally connects the house and flower-gardens, and forms, strictly speaking, a part of the pleasure-ground scenery. It is a scene in which the object is to arrange a collection of foreign trees and shrubs in a dug border, generally on the north side of a walk, or in dug groups and patches. One very principal consideration is, to connect, partly in appearance only, the dug patches. The distinct unconnected obtusion of such scenes is justly reprobated by Price, who gives excellent instructions for creating the beautiful picturesque among dug groups, and preserving all the polish and appearance of high keeping with the most delicate culture of the plants. (See 5584.)

6798. *The pleasure-ground* is a term applied generally to the kept ground and walks of a residence. Sometimes the walk merely passes, in a winding direction, through glades and groups of common scenery, kept polished by the scythe, and from which cattle, &c., are excluded. At other times it includes a part of, or all, the scenes above mentioned; and may embrace several others, as verdant amphitheatres, labyrinths (fig. 952.), a Linnean, Jussieuan, American, French, or Dutch flower-garden, a garden of native rock, mountain, or aquatic plants, picturesque flower-garden, or a Chinese garden, exhibiting only plants in flower, inserted in the ground, and removed to make room for others when the blossom begins to fade, &c.

6799. *The park* is a space devoted to the growth of timber, pasturage for deer, cattle, and sheep, and to adding grandeur and dignity to the mansion. On its extent and beauty, and on the magnitude and architectural design of the house, chiefly depend the



the whole is much improved by the contrast, and recalls to mind those charming scenes in the woody districts of Germany, where cultivation smiles in the glades and recesses of eternal forests.

6801. *The drive, or riding*, is a road indicated rather than formed, which passes through the most interesting and distant parts of a residence not seen in detail from the walks, and as far into the adjoining lands of wildness or cultivation, as the property of the owner extends. It is also frequently conducted as much farther as the disposition of adjoining proprietors permits, or the general face of the country renders desirable.

6802. *Original arrangement*. Though the above arrangement of the component parts of a residence will be found, in general, the most convenient on a flat surface, or one gently varied, we are far from recommending its universal adoption. Situations are always fertile in suggesting new ideas, which

“Start even from difficulties, strike from chance;”

and a mind already stored with a knowledge of every part of the subject works from principles, and fortuitous suggestions, rather than models. We would rather see an original idea attempted to be executed, than the most beautiful arrangement imitated.

CHAP. IV.

Union of the constituent Scenes in forming Gardens or Residences of particular Character; and laying out of Public Gardens.

6803. *To complete a country residence* is the end of all landscape-gardening, whether imitative or geometric. In the preceding chapter we have given a general idea of the parts or scenes, and their connection, which enter into a complete residence of the first order. We have now to notice their arrangements in different gradations of residences; and these, we must previously acknowledge, are so intimately blended, that we hardly know how to separate them, and give a distinctive character to each; every country gentleman, from the occupier of the cottage, to that of the palace, adopting such luxuriant scenes as suit his particular taste, without reference to any thing but his own desires; and this happy circumstance contributes, perhaps, as much as the difference of situations, to the variety in the beauty and style of British country residences. Mansions, villas, temporary residences, cottages, and public gardens, may be said to include the leading distinctions. Public gardens are much less various than private ones, because there are fewer publics than individuals.

SECT. I. Laying out of Private Gardens or Residences.

6804. *The specific distinctions of private residences* may be considered as the mansion and demesne, the villa, the farm, the temporary residence, and the cottage; but each of these branches out into a number of subspecies and varieties.

6805. *The mansion and demesne.* The characteristic of the mansion and demesne, is the demesne or surrounding lands in tenancy. Any residence of which the dwelling-house is of a higher character than that of the mansion and demesne, as the castle, abbey, and palace, has the same general arrangement in the grounds, and differs chiefly in extent, and in the arrangements of the courts and other exterior appendages of the house.

6806. *As a specimen of this style,* we shall give, from the works of Repton, the arrangement at Michel Grove in Sussex, since destroyed, as a residence, and the land united to the property of the Duke of Norfolk.

6807. "In determining the situation for a large house in the country," says Repton, "there are other circumstances to be considered besides the fences and appendages immediately contiguous. These have so often occurred, that I have established in imagination certain positions for each, which I have never found so capable of being realised as at Michel Grove.

"I would place the house, with the principal front, towards the south-east.

"I would place the offices behind the house; but as they occupy much more space, they will of course spread wider than the front. I would place the stables near the offices. I would place the kitchen-garden near the stables. I would put the home-farm buildings at rather a greater distance from the house; but these several objects should be so connected by back roads as to be easily accessible.

"I would bring the park to the very front of the house.

"I would keep the farm or land in tillage, whether for use or for experiment, behind the house; I would make the dressed pleasure-grounds to the right and left of the house, in places which would screen the unsightly appendages, and form a natural division between the park and the farm, with walks communicating to the garden and the farm."

6808. *The villa* may be nothing more than a park with a house of smaller size than that of the *mansion and demesne*, surrounded by a pleasure-ground, and with the usual gardens. Moderate extent and proximity to other villas constitute the characteristics of this class of residences; but though adjoining lands are not necessary to the character, they do not, where they exist, change it, unless their extent be considerable. Two villas joined together often mutually aid each other in effect, especially as to water and trees. (fig. 953.)



6809. *As a specimen of the mode of planting a villa in the modern style,* we give the vertical profile (fig. 954.) and working plan (fig. 955.), both from our *Illustrations of Landscape-Gardening*, to which work they were contributed by Mr. Joshua Major, landscape-gardener, of Knowstrop, near Leeds. This plan does not represent any place actually laid out. The estate for which it is intended contains about 100 acres. The house will stand on moderately high ground, commanding various and extensive prospects, which form, from the water in the bottom of the valley to the northern extremity, one general bold or convex ascent; on the contrary side of the water, in the adjoining property, the view continues nearly flat for about 80 or 100 yards, and then becomes beautifully varied with hills of different sizes and forms, and enriched with the other picturesque scenery which prevails in the surrounding country:—

- a. House and kitchen yard.
- b. Laundry yard.
- c. Stables and yard.
- d. Farmyard and stock yard.
- e. Ice-house.
- f. Entrance lodges.
- g. Bath and swimming-pond.
- h. Forcing-houses and melon ground.
- i. Winter and summer green-houses, aviaries, &c.
- j. Melonry and reserve ground.
- k. Garden walls.

- l. Iron fencing.
- m. Flower garden, consisting of lawns, and variously formed dug compartments for the reception of flowers and choice shrubs.
- n. Rustic seat, or moss house, with rock-work attached.
- o. Boat houses.
- p. Fisher's hut, or rural retreat.
- q. Dotted line, indicating where a bridge might be erected with good effect, though it would be a useless object.

However, some proprietors, under such circumstances, might prefer ornament to utility; and the water might easily be so formed, with the aid of planting, that a stranger from any fixed point would scarcely doubt its being an object of utility.

- r. Hayfields.
- s. Cornfields.
- t. Paddock or playground.
- u. Sunk fence, to extend the park in appearance.

6810. *The smallest five beds on the lawn* near the house are each to form a mass of the



following kinds: — Common laurels, *laurustinus*, *rhododendrons*, *phillyrea*, *alaternus*, and *pyracanthas*; the other beds are to be varied principally with common laurels, *laurustinus*, *Portugal laurels*, *phillyrea*, *alaternus*, *Cydonia japonica*, *box*, *pyracanthas*, and small patches of any other choice evergreen shrubs. The beds are to retain their form, and be kept in a neat state till the lines are destroyed by the natural growth of the shrubs. Till that period, early flowers may be introduced, in spaces fronting the shrubs.

6811. *The following beds in the flower-garden may be planted in masses: —*

- a. Choice deciduous shrubs.
- b. Roses, including the China kind.
- c. *Cistus*, *Cydonia japonica*, *Chrysanthemum*.
- d. Low-growing choice evergreen shrubs.
- e. *Phillyrea* and *alaternus*.
- f. Low-growing bog plants.
- g. Larger-growing bog plants.

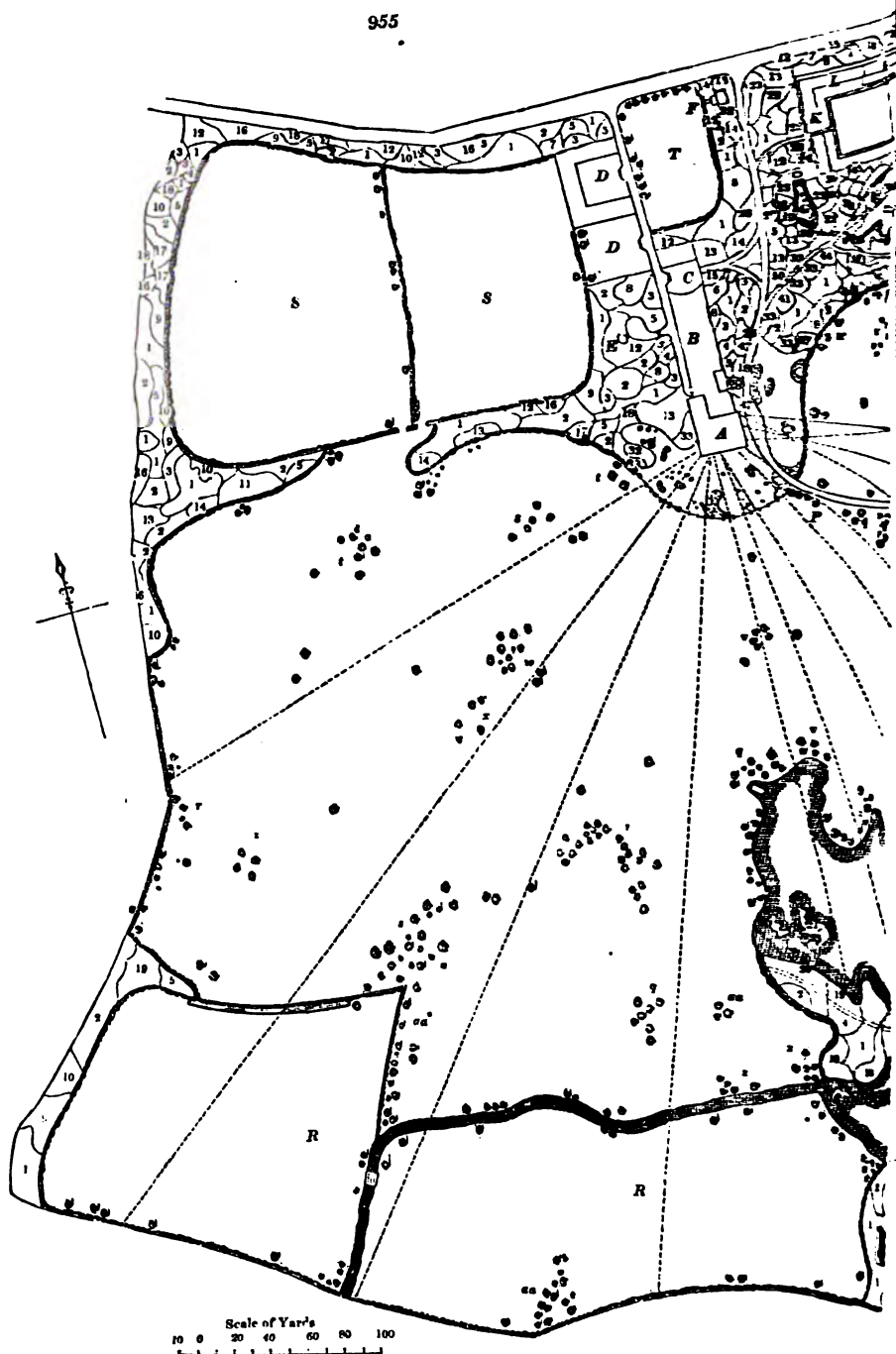
- h. Common laurels, *laurustinus*, and *Portugal laurels*.
- i. Choice shrubs.
- j. Beds for flowers, each kind to be planted in masses. Masses of flowers are also to be introduced in spaces fronting the shrubs in the flower-gar-

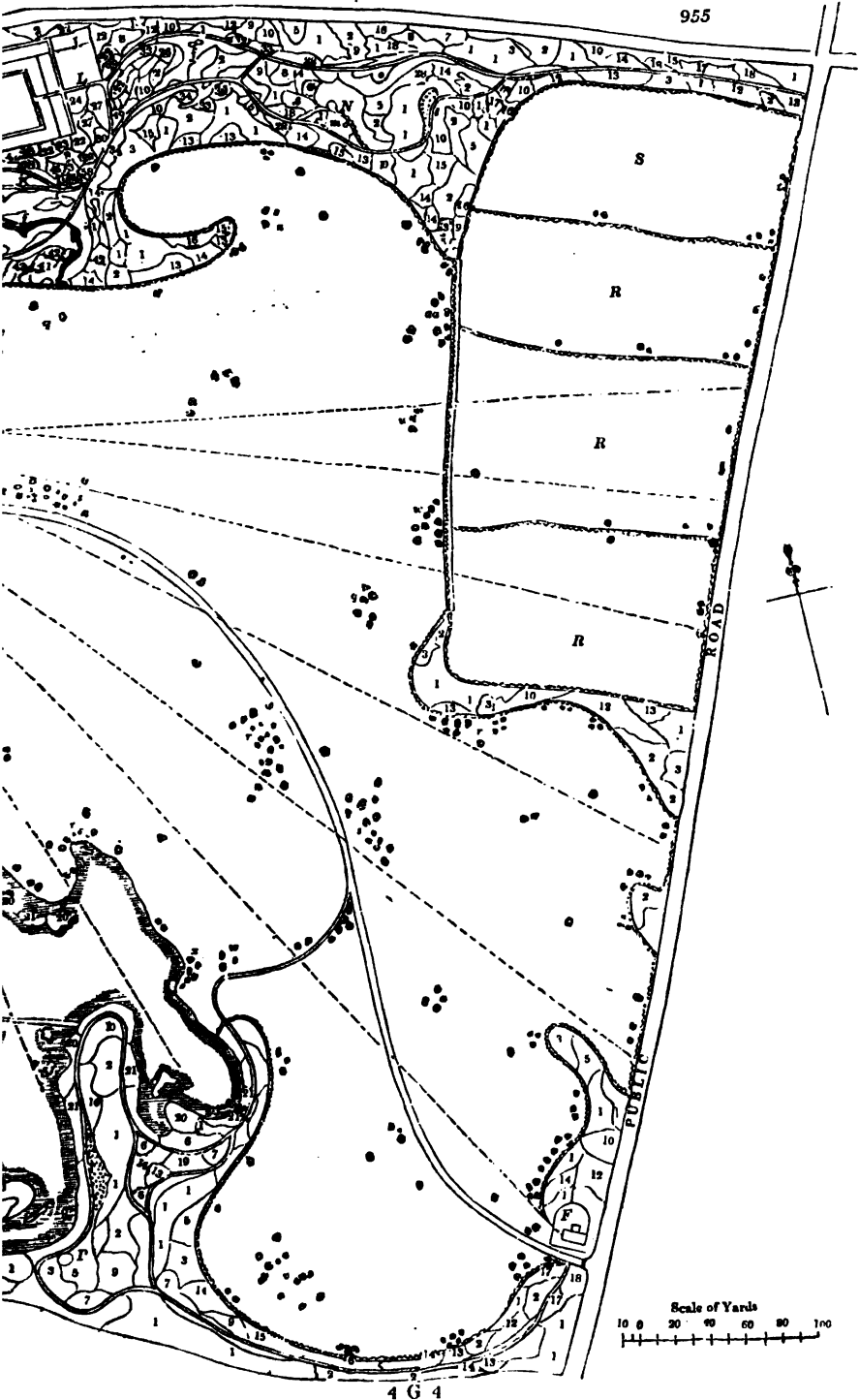
den, especially the larger kinds. In order to keep up the splendour of these masses of the early-flowering kinds, spaces should be left for the introduction of annual flowers, which should be in readiness either in pots or nursery-beds.



6812. Plants for the lawn about the house and flower-garden may be of the following kinds: — *Rhododendron*, dwarf snowy *mespilus*, *pyracantha*, *laurustinus*, common laurel, saddle-leaved tulip tree, dwarf thorn of sorts, roses, and a few arbor-vitæ and junipers near the angles of the house; *Aucuba japonica*, *Cydonia japonica*, *Pyrus spectabilis*, dwarf spreading *savin*, mulberry, cedar of Lebanon, dwarf, weeping, and double-blossomed cherry, &c. A most beautiful variety may be effected by forming holes in groups

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on the lawn for the reception of different-sized garden pots, and by introducing various green-house plants as they happen to be in flower. In the autumn, winter, and early spring months, it will be necessary to have a supply of hardier kinds of plants in pots, which might be of the chrysanthemum tribe, China rose, snowberry, laurustinus, *Asclepias japonica*, China privet, daphne of sorts, *Cydônia japonica*, *Kérria*, *Kálmia*, heath of sorts, rhododendron, double and common furze, and numerous other small evergreen shrubs or early-flowering herbaceous plants may very properly be introduced. In arranging the plants on the lawn, two or three more must be placed in groups, as marked on the plan, so as to form a connection with the principal masses of the same kind, and so as seldom to allow solitary bushes to stand at such a distance as to appear unconnected with others. Care must be taken at the same time not to crowd the lawn, by introducing too many large trees. The system of regular dotting, that is, planting only single trees, must be avoided; and care taken to form unequal spaces, and various forms of lawns among the groups and thickets, so that it may become too intricate for the eye to trace from any one point its whole extent. Irregularly formed larger and smaller masses of crocuses and snowdrops are to be disposed in various parts of the lawn, about the house, and in the flower-garden, taking particular care to avoid stiffness in their forms, by placing smaller patches of different sizes, and occasionally single roots, at different distances from a principal mass; at the same time, so as to have large and variously formed spaces of lawn quite free.

6813. *The rill in the flower-garden is to be furnished with the most valuable aquatic plants*, avoiding those of the wild kinds. The margin may be varied here and there with small masses of curious stones, especially where they can be backed with shrubs, among which may be planted rock plants; and groups should be formed in the water here and there near those on the margin. A portion of some of the groups of stones should appear above, and others should be entirely covered by, the water; it will also be necessary that the bottom of the rivulet should be principally covered with small pebbles, stones, and sand.

6814. *The beds formed in the glades among the forest planting, through which the walks pass on the east side of the house, contain the following shrubs:—*

a. Masses of phillyrea, alaternus, and pyracantha.	plants, or those requiring heath soil.	noile, and other larger-growing plants requiring heath soil.
i. Masses of smaller-growing American	sw. Heath.	e. Rhododendron.
	n. Rhododendron, strawberry tree, mag-	

6815. *The whole of the walks through the pleasure-ground are to be bordered with turf, the narrowest width not less than twelve inches, expanding into various breadths of lawn. The trees in the open park, along the approach, are as follows:—*

p. Variegated hollies.	a. Elms.	v. Sweet chestnuts.	a. Sycamore.	z. Alder and willow.
q. Limes.	i. Walnuts.	w. Pines and firs.	y. Ash.	z. Oak.
r. Beech.	n. Horsechestnuts.			

6816. *Each mass and group in the park is to be occasionally varied with groups of two, three, or more of the next nearest mass; also each mass is to have associates introduced in groups of maple, thorn, holly, elder, crab, furze, &c.; and now and then one or two are to be planted in one hole with the principal trees. Occasionally two, or even three, of the principal trees are to be planted in one hole, with or without shrubs. When it is not convenient to introduce those trees into the park sufficiently large to escape injury from the cattle, it will be necessary to protect them with temporary fencing. Iron hurdles will be found preferable to any other fence, on account of their neat appearance and durability, and also the readiness with which they can be moved from place to place. But, whatever may be the temporary fencing used, the introduction of permanent fencing with hawthorn hedges, which we find too commonly practised, should never be attempted; for though it might be the intention of the designer that these hedges should ultimately be removed; yet it rarely happens, either from want of knowledge of the designer's intention, or from carelessness in those whose business it is to remove them, that they are taken away in any reasonable time. The boundary lines of this property, whether of hawthorn hedges, walls of masonry, or other materials not concealed by forest planting, are to be broken with masses of hawthorn, buckthorn, holly, sloe, furze, wild rose, maple, ivy, &c. The hedgerow trees beyond the park fence are to correspond with the nearest groups or masses.*

6817. *In executing the mode of planting indicated in this plan, it is intended that each mass or kind shall blend into the adjoining masses; for example, two, three, or more of the beech mass (1) may just cross the indicating line into the elm mass (2); and again, at a little distance, two or three more of the elms are to cross the lines among the beeches in a similar manner. The process of planting in this way is to be carried on not only throughout the whole of the forest trees, but also with shrubs and flowers. It may not be improper to observe, that, where ornament is more the object of planting than profit, which necessarily will be the case in a place of no greater extent than the present, the trees may be planted moderately close, by way of nursing each other; and*

that great care should be taken to commence the operation of thinning in time, so that those intended to remain may be allowed to assume their natural shapes. It would add much to the effect of such trees to leave them in groups, with irregular glades of undergrowths or turf between them.

6818. *The following are the trees in the park :—*

1. Beech.	16. Beam tree.	30. Spruces.	45. Broom, yellow and white.
2. Elm.	17. Mountain ash.	31. Spindle tree.	46. Tamarisk.
3. Fir.	18. Acacia.	32. Portugal laurel.	47. Arbor Vitæ, especially the Chinese.
4. Cedar.	19. Birch.	33. Common laurel.	48. Snow-drop tree.
5. Pine.	20. Alder.	34. Laurestinus.	49. Juniper.
6. Cypress.	21. Willow.	35. Rhododendron.	50. Savin.
7. Athenian balsam and Lombardy poplar.	22. Apple.	36. <i>Asculus japonica</i> .	51. Robinia.
8. Pear.	23. Plum.	37. <i>Arbutus</i> .	52. Jasmine.
9. Oak.	24. Cherry.	38. Dwarf almond.	53. Senna.
10. Horsechestnut.	25. Medlar and quince.	39. Privet.	54. Cytisus.
11. Walnut.	26. Thorn, of sorts.	40. Rose.	55. Spiræa.
12. Sycamore.	27. Guelder rose.	41. <i>Pyrus</i> .	56. Dahlias.
13. Lime.	28. Striped holly.	42. Phillyrea.	57. Albina frutes.
14. Spanish chestnut.	29. Lilac.	43. <i>Platanus</i> .	58. Rose.
		44. Kærie.	

A much greater variety might be very properly introduced, or the same plan might be very well executed with much fewer kinds than here enumerated, if it were the wish of the proprietor.

6819. *In the forest planting on the east side of the house, undergrowths are to be introduced in masses of the following kinds :—* Common laurel, Portugal laurel, box, holly, privet, yew, Virginian raspberry, filbert, berberry, elder, buckthorn, furze, wild rose; and clematis, honeysuckle, ivy, and Virginian creeper, as climbers for some of the trees; observing to plant the cultivated and most pleasing kinds near the walls.

6820. *Near the walls may also be planted masses of primroses, cowslips, violets, orchis, wild hyacinths, ferns, and other indigenous plants.* The rest of the forest planting will necessarily require the usual wild undergrowths, such as hazel, dogwood, privet, &c. A few weeping and other willows and alders are to be planted in groups on some of the larger islands in the pond. The dotted straight lines radiating from the house indicate the principal views of the exterior country.

6821. *The vertical profile of this villa residence is represented in fig. 964., which requires no explanation.*

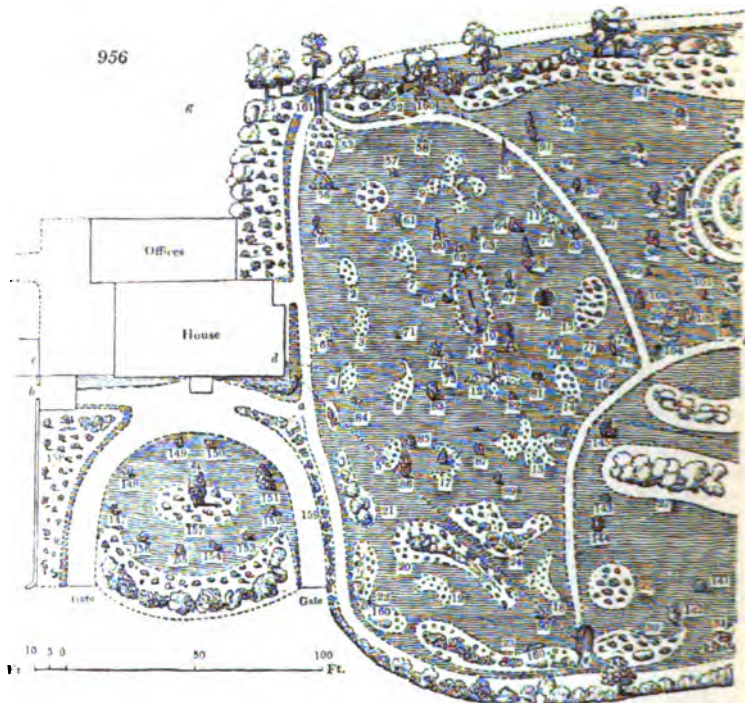
6822. *The villa farm.* A villa being originally a farm-house, we think that the Roman arrangement, in which the farm-offices were joined to the house; or at least were so near to it as to form with it and the domestic offices one group of buildings, might be adopted as the characteristic distinction of this class of residences. The farm-buildings should, in that case, be dignified with more architectural design than when placed at a distance; but still in due subordination to the mansion. Instead of deer, sheep may graze the park on the garden front, separated from the house by an architectural barrier, or, in some situations, by a platform of gravel, and walks and knots of flowers. A glacia of turf, with a light fence below the slope, will be sufficient protection from sheep or cattle, and yet will not impede the view of the lawn from the windows. The entrance front may be approached through grass fields, not separated by common hedges, but by picturesque fences in the modern, and double hedges and slips of planting in the geometric style. All or any part of the other constituent portions of a *mansion and demesne* residence, such as hot-houses, gardens, orchards, pleasure-grounds, &c., may or may not be added, according to its extent, and the particular taste of the proprietor.

6823. *The ferme ornée* differs from a common farm in having a better dwelling-house and neater approach, partly or entirely distinct from that which leads to the offices. It also differs as to the hedges, which are allowed to grow wild and irregular, and are bordered on each side by a broad green drive, and sometimes by a gravel-walk and shrubs. It differs from a villa farm in having no park. A dry hilly soil is best suited for this description of residence, of which there are some fine examples in Surrey, Kent, and the Isle of Wight.

6824. *Temporary residences*, as marine villas, or sporting or shooting boxes, seldom have much land attached. No hot-houses, and but little pleasure-ground, are required. What land there may be, should be applied to use rather than to beauty. Speaking of hunting-boxes, Marshall observes :—"A suite of paddocks should be seen from the house; and if a view of distant covers can be caught, the background will be complete. The stable, the kennel, the leaping-bar, are the appendages, in the construction of which simplicity, substantialness, and convenience should prevail."

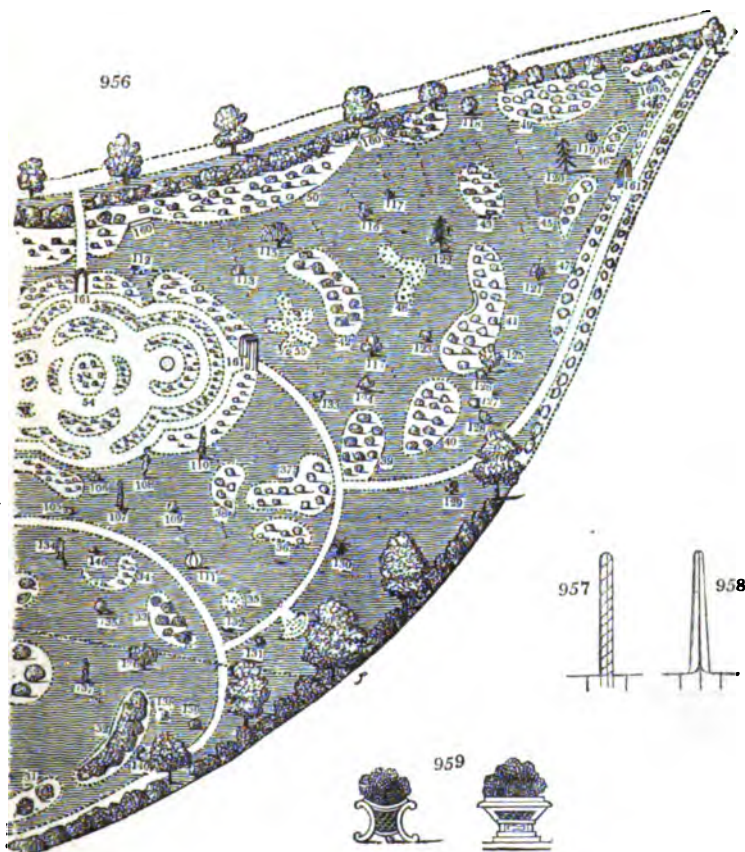
6825. *As an example of a small country villa in which the pleasure-ground is entirely laid out as a flower-garden, we give that of the residence of the Misses Garnier, at Wickham, near Fareham, in Hampshire.* The grounds of this villa are flat, and they present no exterior advantages whatever. Neither is there anything remarkable in the manner in which the beds are disposed, as may be seen by inspecting fig. 956.; but these beds are so judiciously planted, and the order and keeping of the grounds is so superior, that the effect of the whole is most excellent. That effect is fully described in the *Gardener's Magazine*, vol. x. p. 209., from which we make the following extract.

6896. The first view of the garden of the Misses Garnier, when the door marked *a* in the plan (fig. 956.) was opened which looks into it from the garden forming the entrance court, struck us with astonishment and delight; the bold masses of brilliant-coloured flowers in the foreground, and, afterwards, the succession of masses of flowers, with their intervening glades of turf, extending to a considerable distance, till the colours were almost lost in the boundary plantation, produced a landscape of the most brilliant kind. In walking round, we found the walks brimful of gravel, with the turf edging no where deeper than half an inch. The beds, in some places, were planted in masses of one or two species or varieties; in others, by the different species of one genus; and, in some, by a miscellaneous assemblage. The plants were, in all cases, except those of creepers and the kinds planted in masses, placed at such distances from each other, as not to touch when in full growth and bloom, in consequence of which every individual plant was covered with flowers from the base to the summit; but the creepers were sufficiently



1. to 5. Herbaceous plants. 6. Perpetual roses. 7. and 8. Roses edged with pansies. 9. German stocks edged with pansies.
10. Trellis enclosed by herbaceous borders. 11. Delphiniums and digitalises. 12. Calceolarias and potentillas edged with *Viola cornuta*. 13. and 14. Herbaceous plants. 15. Hollyhocks edged by various China roses. 16. *Crotalaria elegans*. 17. American plants, with *Cytisus elongatus* in the centre. 18. *Lobelia* in sort. 19. Collection of best pinks.
20. American and large-growing shrubs, with tree roses forming vista to arch. 21. and 22. Hollies twined with honeysuckles and roses, and blended with flowering shrubs. 23. and 24. American and large-growing shrubs. 25. *Pelargonium*. 26. Roses in the centre, with herbaceous plants in the two borders. 27. and 28. Large shrubs, hollies, &c. 29. American plants edged with *Geranium sanguineum*.
30. to 33. Forest trees, evergreens, and shrubs. 34. *Verbena chamadrifolia*, a bed of. 35. *Salvia splendens*. 36. to 47. Forest trees, evergreens, and flowering shrubs. 48. Hollyhocks. 49. to 53. American shrubs, backed by hollies and honeysuckles, with trees behind, and broken to supply a view of the contiguous ground. 54. Rosary, comprehending a fine collection of roses, enclosed by evergreens, flowering shrubs, &c. 55. Collection of phloxes. 56. *Scarlet arbutus*. 57. *Leonotis Leonurus*. 58. Tree rose. 59. Pedestal of *Caprifolium flexuosum*.
60. *Rosa bracteata*, and *Caprifolium* in sort. 61. *Daphne Dauphinii* (*D. hybrida*), and *Gaultheria procumbens*. 62. *Andrœmeda arbores*. 63. *Fuchsia cœnea*, edged with *Lobelia triquetra*. 64. *Magnolia conspicua*. 65. *Sophora japonica* var. *pœndula*. 66. *Cupressus sempervirens*. 67. *Lupinus mutabilis* var. *Cruckshanksianus*. 68. *Caprifolium*, sorts of, over cross-shaped basket. 69. *Polygala latifolia*.
70. *Yucca glauca*. 71. *Halimodendron argenteum*. 72. *Hydrangea hortensis*. 73. *Persea phœnicea*. 74. Basket of *Verbena chamadrifolia*. 75. Tripod basket of *pelargonium*. 76. *Correa speciosa*. 77. *Yucca aloëfolia*. 78. *Magnolia Soulangiana*. 79. *Rhododendron*

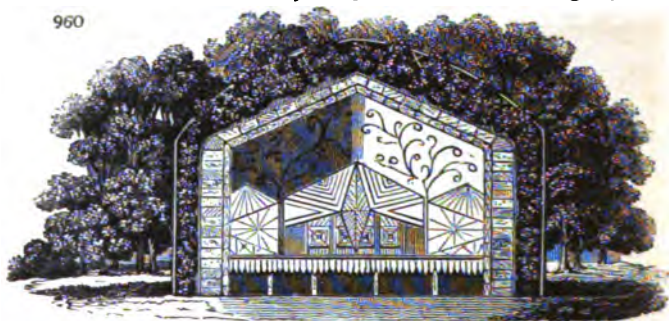
close together to cover the whole of the beds with their foliage. Pelargoniums, china asters, stocks, and other plants intended to display masses of flower of one colour, were also planted so as to cover the entire bed. The woody plants consist of roses, climbers, and twiners, with rhododendrons, azaleas, and other American and peat-earth shrubs, and of the larger exotic shrubs and flowering trees. The roses are displayed in a rosary, in



- catavbiense. 80. Basket of plants in pots. 81. *Cytisus purpureus*, standard. 82. *Kalmia latifolia*. 83. *Palitrus aculeatus*. 84. Tree rose. 85. *Photinia serrulata*. 86. *Schubertia disticha*. 87. *Brugmansia suaveolens*. 88. *Berberis Aquifolium*. 89. *Kolreuteria paniculata*. 90. *Cytisus elongatus*. 91. Upright cypress. 92. *Tecoma capensis* pyramidalis. 93. Tree rose. 94. *Amelanchier Botryopium*. 95. *Fuchsia arborea*. 96. *Magnolia tripetala*. 97. Basket of pelargoniums. 98. *Ligustrum lucidum*. 99. *Mimulus glutinosus*. 100. *Juniperus virginiana*. 101. *Crataegus Asaroides*. 102. *Pæonia Moutan* papaveracea. 103. Obelisk clothed with *A'pice tuberosa*. 104. *Tropæolum tricolorum*. 105. *Rhododendron alta-clerense*. 106. *Kalmia latifolia*. 107. *Periploca græca*. 108. *Rhododendron arboreum*. 109. *Pæonia Moutan*. 110. *Cupressus sempervirens* horizontalis. 111. Cross basket of *Caprifolium gratum*. 112. *Rhododendron Smithii*. 113. *Chionanthus virginica*. 114. *Xanthoxylum cava* Hérculis. 115. Weeping ash. 116. *Broussonetia papyrifera*. 117. *Cerasus nigra*. 118. Large holly. 119. *Pibarnum strictum*. 120. Hemlock spruce (*Pinus canadensis*). 121. Holly. 122. *Cedrus Libani*. 123. *Rhododendron atropurpureum*. 124. *Gymnocladus canadensis*. 125. *A'cer Pædo-Platanus*. 126. Holly. 127. *Pinus Cembra*. 128. *A'rbutus procera*. 129. *Pibarnum lucidum*. 130. *Phoridium ténax*. 131. Camellia, sorts of. 132. *Fuchsia grandiflora*. 133. Basket of Russian stocks. 134. *Rosa Boursaultii*, pedestal. 135. *Aralia spinosa*. 136. *Tilia europæa*. 137. *Atragene australis*, pedestal. 138. *A'bies excelsa*. 139. *Rhododendron ponticum*. 140. *Piptanthus nepalensis*. 141. *Hydrangea hortensis*. 142. Tree rose. 143. *Rhododendron maximum*. 144. *A'lex myrtifolia*. 145. *Pæonia Moutan*. 146. *Sophora japonica* pendula. 147. *Eriobotrya japonica*. 148. Tree rose. 149. *Magnolia glauca*. 150. *Coragana frutescens*. 151. *Magnolia grandiflora*. 152. Tree rose. 153. *Maclura aurantiaca*. 154. Tree rose. 155. *Catalpa syriaca*. 156. Noleto rose. 157. *Laetia nobilis*, with georginas. 158. Six tree roses, with herbaceous plants; evergreens near the house. 159. Hollies, honeysuckles, China roses, herbaceous plants in front. 160. Seats. 161. Trellised arches.

masses on the lawn, or singly as standards; the climbers cover trellised arches, or supports of trelliswork (fig. 957.), or of three or four iron rods, as shown in fig. 958.; the twiners run up poles; the low American shrubs are partly disposed in masses, and partly as single plants; and the larger shrubs and ornamental trees are distributed along the margin of the garden, and also scattered throughout, as will appear by the details of the ground plan. From the drawingroom window at *d*, there is a vista to the trellised arch *e*, and another to an old oak tree at *f*. The kitchen-garden is entered by the door marked *b* in the plan (fig. 956.); and there is a green-house at *c*, besides pits, frames, &c.; and a reserve garden at *g*, for keeping up a stock of herbaceous plants, roses, &c., for the lawn or flower-garden. The trees on the walls of the kitchen-garden are trained with the greatest neatness, and completely cover the wall from the ground to the coping; the wall borders were, when we saw them, very slightly cropped, and in some places not cropped at all. Every part was in the best order; and, indeed, there was an appearance of freshness, health, and vigour in all the gardens and scenery, which, joined to the fineness of the day, completed the effect of their gaiety and beauty.

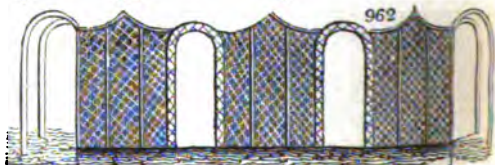
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6827. There are a few buildings, and artificial ornaments, in these grounds, of a simple rustic description, such as the seat formed of moss and hazel rods (fig. 960.); trellised arches for climbers (figs. 961. and 962.); rustic vases (fig. 959.); and iron rods for roses and other slender-growing shrubs. (fig. 957. and 958.)



961



962

6828. A parsonage, or parochial schoolmaster's house, it may be here observed, affords in various points of view, the finest opportunities of displaying taste and enjoying happiness, provided the occupant, with Cowley, prefers a small style of living to a great one. "A little convenient estate, a little cheerful house, a little company, and a very little feast," are the desiderata of this amiable man. The quantity of land added to a parsonage house, or to what we trust will in a short time be a similar description of residence, the parish schoolmaster's house, ought not to be less than what will keep a horse and cow, and supply vegetables and fruit for a large family. At all events, it should not generally be less, even where a cow and horse are not kept, than two or three acres; because, in the case of the national schoolmaster's house, there must, according to the most approved systems (see Mrs. Austin's *Report*, &c., and our *Des Etablissements*, &c.), be sufficient garden ground for instructing the boys in the common practices of gardening and agriculture. Now, in the space of two or three acres, by contriving to have no duplicates of either ligneous or herbaceous plants, but such as are of immediate culinary or dessert use, there may be an arboretum, a fruticetum, and a Jussieucan herbaceous ground, such as will exhibit an epitome of the whole cultivated Flora of Great Britain. That no description of dwelling affords greater facilities for displaying the cottage style of building than a parsonage, Mr. F. P. Robertson has shown in his numerous published designs. We here give one as a specimen (fig. 963.); and a number of designs for ornamental cottages, schoolmasters' houses, parsonages, and small villas, in various styles, will be found in our *Encyclopædia of Cottage, Farm, and Villa Architecture*, by Mr. Barry, Mr. Fowler, Mr. Lamb, Mr. Perry, Mr. Verdes, and other eminent architects.



6829. *As an example of a parsonage residence in which the culture of rare and beautiful plants is carried to a high degree of perfection, we give that of the Rev. Thomas Garnier, at Bishopstoke Vicarage, Hampshire. This is a place of an acre or two, on a bank facing the south, remarkable for its wall, covered with choice half-hardy plants, and its lawn, ornamented with the finest American shrubs and most select trees. It is a perfect gem of botanical beauty in the foreground, heightened in effect by interesting gleams of distant scenery, seen between and over fine oaks and elms, on the lower part of the declivity. Fig. 964. is a view of the vicarage house. A farther account of this*



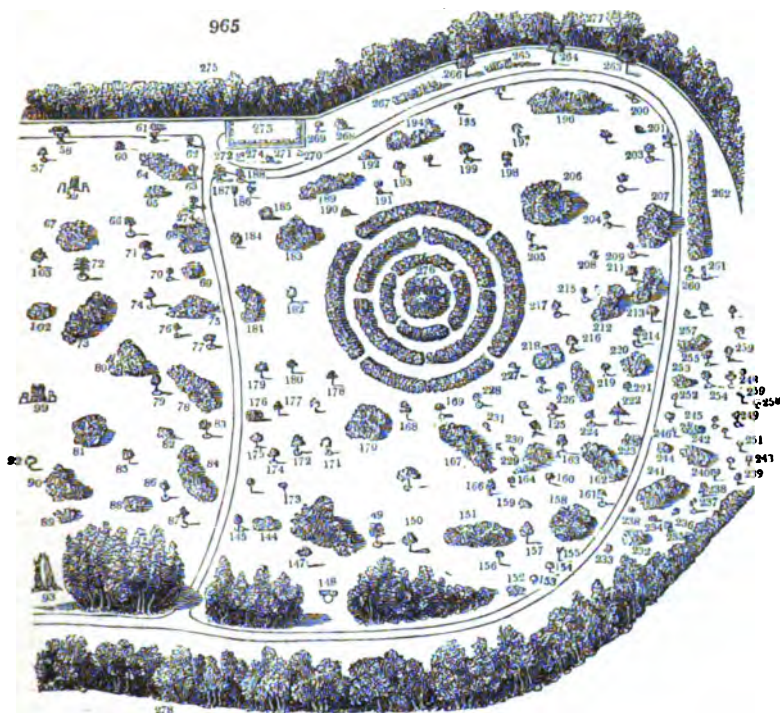
interesting residence, and the mode of culture and management adopted with the half-hardy plants, and the American and other peat earth shrubs, will be found in *Gard. Mag.*, vol. x. p. 124. The details of the garden, so exceedingly rich in choice plants, will be found in the references to the ground plan. (*fig. 965.*)

1. *Rhododendron maximum*, new. 2. Pink-flowering thorn. 3. Bed of a variety of choice roses.
4. Bed of pinks in summer, China asters in autumn. 5. *Cornus florida*. 6. *Rhododendron*, a new variety. 7. *Rhododendron catawbiense*. 8. Small bed of *Verbena chamædrifolia*.
9. Large azalea.
10. *Arbutus*. 11. Portugal laurel. 12. *Laurustinus*. 13. Bed of heartsease. 14. Variegated *rhododendron*. 15. *Rhododendron dabricum atro-virens*. 16. Large narrow-leaved bay.
17. *Rhododendron ponticum*. 18. Two superb elms. 19. Bed of a variety of herbaceous plants.
20. *Ashles ledifolia* (*indica alba*). 21. Round bed of herbaceous plants. 22. *Rhododendron ponticum*. 23. *Rhododendron hybrid*. 24. *Rhododendron hybrid*. 25. Oval bed of pelargoniums, stocks, and sorts of *Rosa odorata*. 26. *Laurustinus*. 27. *Rhododendron roseum*. 28. *Kalmia latifolia*. 29. Clump of American plants.
30. *Humea elegans*. 31. Oval bed of choice herbaceous plants. 32. Large *Rhododendron arbutum*.
33. *Pæonia Moutan*. 34. *Rhododendron alta-clerense*. 35. *Magnolia grandiflora*, 26 ft. square.
- Growing under veranda:—36. *Camellia japonica myrsinifolia*. *Camellia* striped, orange-leaved myrtle, and citron. 37. Magnificent broad-leaved myrtle. 38. *Camellia japonica strorubra*.
39. *Camellia japonica*, double white. 40. *Camellia japonica Pomponia*. 41. *Camellia japonica pæoniiflora*, and double striped; and stand of pelargoniums.
42. *Magnolia grandiflora*. 43. *Rosa Banksie*. 44. *Magnolia purpurea*. 45. *Jasminum revolutum*.
46. *Magnolia grandiflora*, 30 ft. high. 47. *Noisette rose*. 48. Long bank of the choicest American plants, chiefly consisting of the new hybrid *rhododendrons*, and including all the new varieties of *Ashles indica*. 49. *Piburnum lœcidum*.
50. *Asclepias japonica*. 51. Vase containing pelargoniums, blue lobelias, and *Lophspermum erubescens*.
52. *Rhododendron catawbiense*, variety. 53. Standard *Magnolia grandiflora*. 54. Vase, con-

965



- taining scarlet pelargoniums and *Maurandya Barclayana*. 55. Standard *Camellia japonica*.
 56. *Azalea rhododendron*, hybrid. 57. *Magnolia purpurea*. 58. Vase, containing pelargoniums, and *Fertena chamedrifolia*. 59. Very large elm, with seats.
 60. *Rhododendron arboreum*. 61. Vase of scarlet pelargoniums, and pink *Maurandya* [? *semper-forensis*]. 62. *Ficus elastica*. 63. Red cedar. *Juniperus virginiana*. 64. Bed of pinks in summer, China asters in autumn. 65. *Adonis japonica*. 66. *Nerium plenum* [? *N. Oleander* var. *splendens*]. 67. Round bed of scarlet and white varieties of georgina. 68. Oval bed of herbaceous plants. 69. *Fuchsia gracilis*. 70. *Chionanthus* [?] *vilgida*. 71. *Berberis diversifolia*. 72. *Yucca gloriosa*. 73. Oval bed of *Rosa odorata* and of Calvert's Noisette roses. 74. *Pinus Webbiana*. 75. Oval bed of tree and dwarf roses. 76. *Azalea indica alba*. 77. Large standard single-flowered camellia. 78. Oval bed of varieties of hybrid rhododendrons and azaleas. 79. *Rhododendron arboreum*.
 80. Large mass of rhododendrons. 81. Round bed of choice azaleas. 82. *Rhododendron magnoliifolium*. 83. *Azalea nudiflora coccinea*. 84. Bed of varieties of georgina. 85. *Ligustrum ibicidum*. 86. *Kalmia latifolia*. 87. *Aristotelia Mécquei*, new variety. 88. Bed of hydrangeas. 89. *Araucaria imbricata*.
 90. Clump of rhododendrons. 91. Round bed of georginas. 92. *Edwardsia grandiflora*. 93. Three fine elms in a group. 94. *Photinia serrulata*. 95. Large vase. 96. *Rhododendron microphyllum*. 97. Very large rhododendron. 98. Oval bed of choice herbaceous plants. 99. A very large spreading oak tree, with seats.
 100. Bed of choice herbaceous plants. 101. *Magnolia auriculata*. 102. *Malachodendron ovatum*. 103. *Magnolia glauca*. 104. Very large clump of rhododendrons. 105. *Cotoneaster microphylla*. 106. Bed of sorts of Chinese chrysanthemums. 107. *Rhododendron azalea*, hybrid. 108. Bed of twelve of Calvert's new varieties of *Rosa odorata* and standard perpetuals. 109. *Gordonia pubescens*.
 110. *Dracena australis*. 111. Standard *Cydonia japonica*. 112. *Azalea*. 113. Bed of choice azaleas. 114. *Magnolia citriflora*. 115. *Paeonia Moutan rosea*. 116. *Pyrus spectabilis*, large. 117. *Edwardsia grandiflora*. 118. Large arbutus. 119. *Daphne ponicia*.
 120. *Chimonanthus fragrans*. 121. Large *Rhododendron catawbiense*. 122. Large rhododendron and large bay tree. 123. *Kalmia latifolia*. 124. Oval bed of choice herbaceous plants. 125. *Magnolia conspicua*. 126. *Magnolia cordata*. 127. Round bed of *Lobelia fulgens* and of double tuberous. 128. *Magnolia maxima*. 129. *Eriobotrya japonica*.
 130. Round bed of tree and dwarf roses. 131. *Magnolia Thompsoniana*. 132. *Magnolia purpurea*. 133. *Magnolia macrophylla*. 134. Oval bed of dwarf georginas. 135. *Arbutus procera*. 136. *Magnolia acuminata*. 137. Clump of rhododendrons. 138. Bed of pelargoniums, border of German stocks. 139. Covered seat made with reeds.
 140. *Fuchsia microphylla*. 141. *Rhododendron Smithii*. 142. Clump of evergreens and rhododendrons. 143. Oval bed of choice azaleas. 144. Round bed of camellias. 145. *Paeonia Moutan papaveracea*. 146. Bed of rhododendrons. 147. *Yucca gloriosa*. 148. Horsechestnut, with a seat. 149. Deciduous cypress.
 150. Myrtle. 151. Oval bed of herbaceous varieties of *Paeonia*. 152. Portugal laurel. 153. *Kalmia latifolia*. 154. *Rhododendron maximum*, new variety. 155. *Azalea indica alba*. 156. *Cupressus lusitanica*. 157. *Magnolia glauca*. 158. Round bed of azaleas. 159. Weeping willow.



160. *Berberis fasciculata*. 161. *Osmunda regalis*. 162. Oval bed of herbaceous plants. 163. *Pinus occidentalis*. 164. Oval bed of Calvert's Noisettes. 165. *Rhododendron arboreum* maximum. 166. *Rhododendron roseum*. 167. Oval bed of herbaceous plants. 168. *Aristotelia Mdequi*. 169. *Magnolia purpurea*. 170. Bed for georginas. 171. *Arceuthobium brasiliana*. 172. *Dracæna ovata*. 173. Cedar of Lebanon. 174. *Magnolia glauca*. 175. *Faccinium uliginosum*. 176. *Rhododendron maximum*, old variety. 177. *Kalmia latifolia*. 178. Single red camellia, 5 ft. high. 179. *Rhododendron alta-clerense*. 180. *Magnolia tripetala*. 181. Oval bed of *Cydonia japonica*, red and white. 182. Large azalea. 183. Round bed of georginas. 184. *Magnolia Thomsoniana*. 185. Round bed of *Verbena chamædrifolia* and of *Thunbergia alata*. 186. *Ribes sanguineum*. 187. *Rhododendron ponticum*. 188. *Rhododendron*. 189. Oval bed of azaleas. 190. Bed of *Verbena venosa*. 191. *Sophora japonica* pèndula. 192. *Æsculus rubicunda* (rosea Bot. Reg.) 193. *Robinia hispida* arborea. 194. Bed of herbaceous plants. 195. *Chionanthus maritima*. 196. Oval clump of rhododendrons. 197. *A'rbutus longifolia*. 198. *Cratægus acerolus*. 199. *Rhododendron catawbiense*. 200. Myrtle. 201. Large yellow azalea. 202. Variegated holly. 203. *Broussonetia papyrifera*. 204. *Chionanthus virginica*. 205. *Juniperus bermudiana*. 206. Round bed of azaleas. 207. Large American bed. 208. Late-flowering azalea. 209. *Magnolia auriculata*. 210. Oval bed of varieties of *Lobelia*. 211. *Sophora japonica*. 212. Oval bed of flowers. 213. *Erica arborea*. 214. *Rhododendron*, new variety. 215. *Rhododendron*. 216. *Raphiolepis indica*. 217. *U'lex myrtilloides*. 218. Bed of anemone-flowered georginas. 219. *Cunninghamia lanceolata*. 220. Round bed of varieties of pelargoniums. 221. *Diospyros Lotus*. 222. *Gleditsia hirsuta*. 223. *Rhododendron maximum*, new variety. 224. Large *Kalmia latifolia*. 225. *Prinos nepalensis*. 226. *Catalpa syriensis*. 227. *Rhamnus latifolia*. 228. Chinese arbor-vitæ, *Thuja orientalis*. 229. *Berberis fasciculata*. 230. Large *Magnolia tripetala*. 231. *Cupressus pèndula* [? Schubertia disticha pèndula.] 232. Round bed of lily of the valley. 233. Myrtle. 234. *Hydrangea*. 235. *Rhododendron*, new variety. 236. *Arbutus*. 237. Bed of Scotch roses. 238. *Rhododendron*. 239. *Schinus*. 240. Holly. 241. Oval bed of American plants. 242. Bed of dark China rose. 243. *Lidum latifolium*. 244. *Rhododendron*. 245. Round bed of sorts of *Erica*. 246. *Eugenia*. 247. *Rhododendron*. 248. *Rhododendron*, a new variety. 249. *Davalia denticulata*. 250. *Yucca gloriosa*. 251. Variegated rhododendron. 252. *Pavia discolor*. 253. Round clump of American plants. 254. *Magnolia cordata*. 255. *U'lex stricta*. 256. *A'rbutus speciosa*. 257. Oval bed of China roses. 258. Azalea. 259. *Rhododendron*. 260. Seedling rhododendron. 261. *Ammofrène buxifolia*. 262. Large bed of rhododendrons. 263. Dark *Ribes sanguineum*. 264. *Virgilia lutea*. 265. Dwarf hollyhocks. 266. *Pyrus nepalensis*. 267. Bed of hollyhocks. 268. Round bed of *Lobelia speciosa*, &c. 269. *Laburnum*. 270. *Rhododendron*, in varieties. 271. Bed of double tulips in spring, and scarlet pelargoniums in summer. 272. Bed of single tulips in spring, and of heliotropes in summer. 273. Conservatory. 274. *Cytisus purpureus*. 275. The wall, covered with a collection of clematis plants. 276. The inner circle, occupied by tree roses and dwarf georginas; the two next circles, different sorts of dwarf roses; outer circle, collection of herbaceous plants of the brightest colours. 277. Fence of evergreens. 278. Shrubbery of evergreens and large trees. 279. Entrance to kitchen-garden, with trellis. 280. Covered seat of wood. 281. Undulating ground, with large trees.

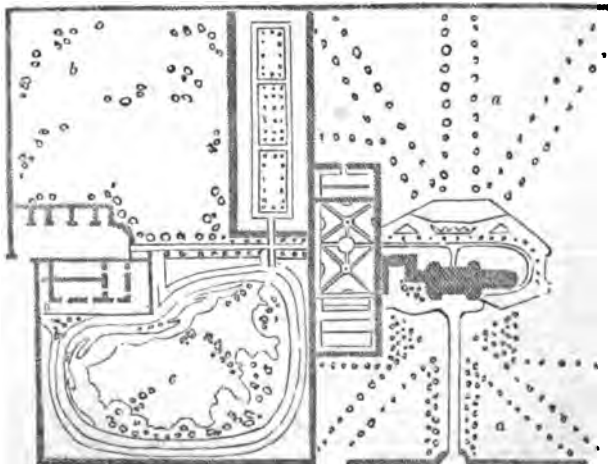
6830. *A cottage ornée*, we think, might be characterised by the garden-front opening into a picturesque orchard or a lawn, varied by groups of fruit trees; instead of into a lawn or park planted with forest trees. It may contain any part of the scenes of the villa, at the will of the owner. If the situation of the house is elevated, so as to give a view from the principal rooms of a great part of the farm, it will be more desirable. A desirable foundation for this improvement is an old English farmhouse; by adding to which one or two principal rooms, a very interesting residence may be formed at little expense.

6831. *Cottage en verger*. An agreeable variety of this species, sometimes adopted in France, consists in surrounding an enclosed space of one or two acres, with an irregular strip of walnut, cherry, chestnut, and other tall-growing trees, which produce both fruit and timber; and then planting the interior space with the finer sorts of fruit trees (especially pears and plums) as standards, on turf. Winding walks are led through the whole, and groups of flowers and kitchen-vegetables introduced.

6832. *The citizen's villa* is a spot of one or more acres laid out in lawn and shrubbery, but without a kitchen-garden. As the space is very limited, being often under an acre, only the most select trees, shrubs, and flowers should be employed; and great part of the trees and shrubs should be evergreens. Seats and other decorations may be introduced of the most select designs, and best workmanship; and, what is of the greatest consequence, none but a good gardener should be employed, in order to preserve the whole in the highest order and keeping, at every season of the year. Gardens or residences of this sort are almost peculiar to the neighbourhood of London; and the occupant procures his culinary productions and fruits cheaper and better than he can grow them, from that first of all gardens, *Covent Garden*.

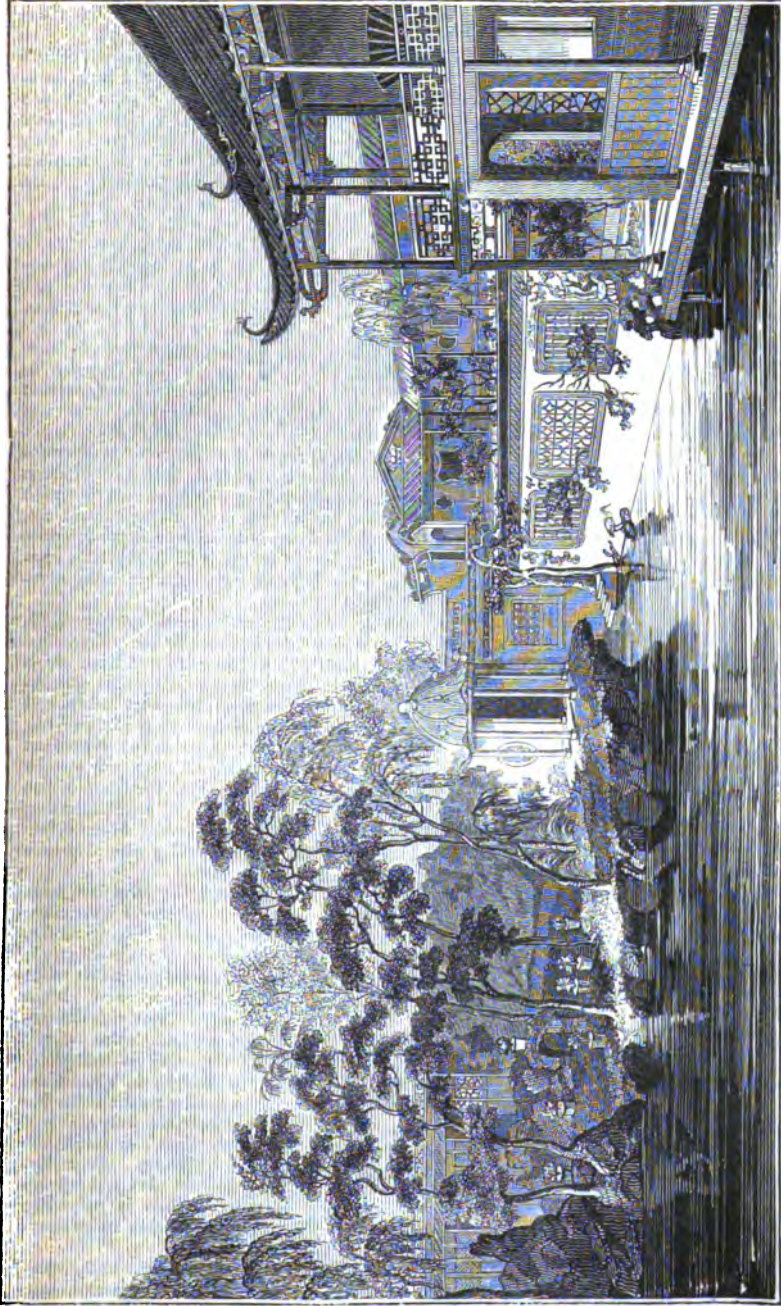
6833. As a citizen's villa in the Chinese style, we refer to fig. 967., which is a view of the house and grounds of Conséqua, a wealthy Hong merchant in Canton, who died in 1823. Conséqua's garden was one of the finest in Canton about the year 1812, when the present view was taken for Sir George Staunton, by whose son, the present Sir George Thomas Staunton, it and several others were kindly lent to us. We do not present this villa as one to be imitated; but the gardener, by observing the distribution of the rocks, the vases of plants, and the trees, may derive many useful hints for laying out grounds in the Chinese style, or for making the most of small spots in town. The vases of flowers in Conséqua's garden were continually being changed; so that, though it was situated in the midst of a town, it had all the freshness of the country. The grand secret, indeed, of making the most of gardens in towns, is to grow the plants in the country, and to bring them to town only to flower; or, to renew them continually from public markets. Some interesting particulars respecting this celebrated Chinese gentleman will be found in a biographical notice of him in the tenth volume of the *Gardener's Magazine*.

6834. *The suburban villa* (fig. 966.) is of limited extent, but contains a small



kitchen-garden and stables, with a field planted either in the ancient style (a), or modern style (b); with a neat lawn, and groups of flowers (c). Such villas are occupied more by professional men and artists, than by the lesser merchants and rich tradesmen, who (those of the metropolis at least) prefer the citizen's villa. When two or more of such villas can be formed adjoining

each other, the happiest effects may be produced if their owners act in concert at their first planting; and a sort of community of scenery may be enjoyed, without lessening individual privacy and comfort. On the contrary, a gain might result to each pro-



prietor rather than otherwise; for if two villas, adjoining each other, are laid out in the modern style, then, by placing the masses of wood of the one, against the masses of the other, less ground would require to be occupied in plantation by each. Office-

buildings might be placed against, or near, office-buildings, so as to be shut out, or partially concealed, with less than the usual quantity of trees; and so on. In the ancient

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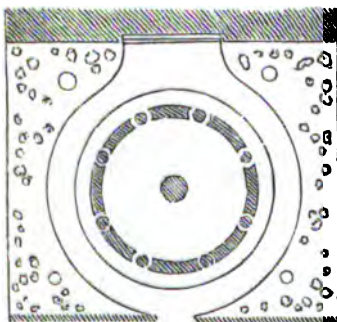
style, avenues and vistas might be contrived to pass through each other's grounds, and the ornamental objects which formed their termination, serving both parties, only half the usual number would require to be erected by each.

6835. *The suburban house* (fig. 968.) is a large commodious dwelling, in a village-like collection of houses, or streets, on the outskirts of the metropolis, or of large towns; and occupied as the constant residence of

wealthy professional men or merchants. It has carriage-entrance to the house and stables in front, and a small kitchen-garden behind.

6836. *The house with carriage-entrance* (fig. 969.) occurs very commonly in the suburban streets of large cities: it contains a small garden behind, not, however, sufficient to employ a gardener, and it is without

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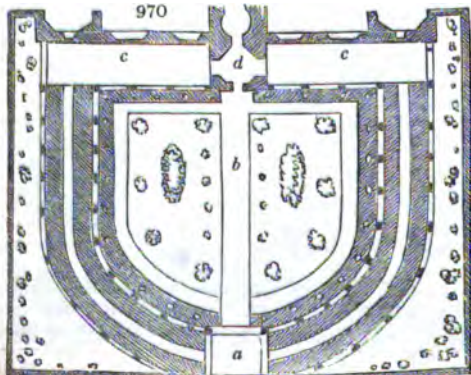
by shrubs and a few trees, and the central circle of turf is ornamented with baskets of flowers or roses; having in the middle a statue, sundial, fountain, pond, or a cedar or other evergreen tree.

6837. *The house with covered entrance* (fig. 970.) is similarly situated to the other, but generally farther from town, to and from which the occupant passes by the local public conveyances. It contains a garden-court before, and a garden behind the house, like the other; but the former is entered by a porch (a), connected with the house by means of a glass or opaque roofed passage (b); and along the front of the house is an open veranda (c) communicating with a vestibule (d). This sort of suburban house is well suited for invalids, who may take

exercise, and enjoy the plants under the glass roofs in rainy weather.

6838. *The house and conservatory* (fig. 971.) is similarly situated to the last, with one or two wings (a and b), as conservatories; or, the one a conservatory, and the other a botanic stove, or a vinery. These communicate with the two principal living-rooms,

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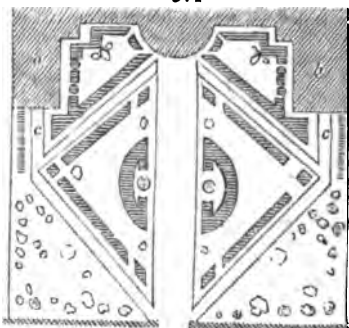


and also with the fore-court(c); the latter entrance is that made use of by the gardener. Heat is supplied from the underground offices of the house; and if the latter is heated by hot air, in Sylvester's excellent manner, or by the more simple operation of hot water, it will be accomplished so much the more readily and effectually. They may be also lighted up by gas, if there is a public gasometer in the neighbourhood.

6839. *The house and flower-garden entrance* requires a more airy situation than either of the three last varieties; and is generally situated in some road or street, a mile or two from town, or in some suburban

generally situated in some road or street, a mile or two from town, or in some suburban

hamlet. The flowers may be variously arranged, and may be either florists' flowers or herbaceous perennials, with a mixture of dwarf ornamental shrubs. A very complete mode is to grow the flowers in the garden behind the house, and bring them to the front as they come in flower. This sort of residence is well suited for retired tradesmen, who act as their own gardeners; and some fine examples are to be found at Hammersmith, Hampstead, and round Manchester.

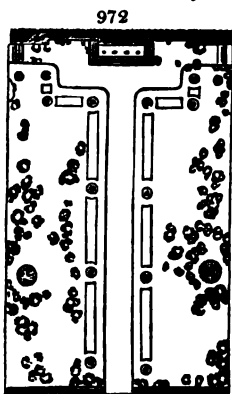


The French and Dutch, and also the Germans, excel in this kind of garden, and produce the most pleasing effects by a judicious combination of very few species of flowers. They take care to select such as are showy, of brilliant and distinct simple colours, as white and scarlet lilies, red and white roses, nasturtium, candytuft, daisy, larkspur, &c. They admit few yellows, or small scattered flowering plants; but study to have masses of the same colours and forms, contrasted by different colours also in masses. There are

many fine gardens of this sort in Picardy and the Netherlands, and some in Hanover.

6840. *The house and French parterre* can hardly be considered a distinct variety from the last; though it differs in this, that the front garden of the latter contains turf around the flower-compartments, whereas the former is composed entirely of earth, and gravel, edged with box, or some other plant.

6841. *The common front garden* (fig. 972.) is a variety so well known as to require no



description; but, like the six preceding varieties, it is introduced here chiefly to suggest, that these humble scenes may be greatly improved in design, and also in cultivation and keeping. There is little danger of the gardens of the wealthy being neglected; but it is of great importance to the advancement of gardening, that the art should be displayed to as great perfection as possible in those gardens which are most universal; which are continually under the eye of a large city population; which are seen by the whole country inhabitants, when they visit the towns; and which chiefly come under the eye of foreigners.

6842. *The farmer's garden* should not be placed adjoining the rick-yard, on account of the straw liable to be blown into it: and should be well enclosed, to exclude poultry, pigs, and other domestic animals. Supposing the farm buildings to occupy three sides of a square, the farm-house to be placed in the middle of the south side, and the rick-yard to be placed beyond the north side; then the kitchen garden may be placed adjoining the east or west side of the square; the grass-orchard, which may also be the drying-ground, and area for rearing young poultry, on the opposite and corresponding side; and a small flower-garden may serve as an entrance-court to the farm-house. But in the case of farmeries on a larger scale, where the house is detached from the court of offices, the three gardens should be united by a small portion of lawn, and a pond, so as to form about an acre (more or less, according to circumstances), of garden and pleasure-ground round the house. The part destined for the growth of culinary vegetables should be laid out in right-lined plots and borders; the orchard trees planted in rows or quincunx; and the flowers and flowering shrubs arranged in groups or in beds on turf. The most useful and prolific fruit trees should be chosen; including some plants of hops, and one or two walnut or chestnut trees in the exposed side of the orchard, if the climate is such as will ripen their fruits. No class of men have it in their power to form and cultivate a garden at less expense than farmers; but, unfortunately, few farmers have a taste for the subject; perhaps, because gardening is not sufficiently contrasted to agriculture, to afford the farmer that sort of relief sought for in recreative and pleasurable pursuits.

6843. *The labourer's cottage and garden.* This may be reckoned too humble a country residence for the consideration of the landscape-gardener, but we conceive it to be of very great importance to the general good, that these should be improved, and the condition of their inhabitants ameliorated. What we shall advance is founded on the principle, that whatever renders the cottager more comfortable and happy at home, will render him a better servant and subject, and in every respect a more valuable member of society.

Besides, one of the most constantly occurring objects in the country is the labourer's cottage, whether detached by the roadside, or grouped in hamlets and villages; and, therefore, to render such buildings and their scenery more ornamental, must, independently of every other consideration, be a very laudable object.

6844. *The accommodation contained in the cottage*, and the size of the garden, should, no doubt, be regulated by the family of the cottager, and the facilities afforded him by his line of employment to live well, or bring up a large family, &c. But we shall take the lowest case that can occur, and state what we consider to be the minimum of accommodation, which a humane employer in England would wish to be enjoyed by his serving labourer, even if he had no other family than his wife.

6845. *The whole space to be enclosed*, including the garden and the site of the house, cannot be less than one eighth part of a statute acre. The cottage should, if possible, be placed in the centre, fronting the south-east, by which means, if it be a square or a parallelogram, the sun will shine on each of the four sides a part of every day in the year. Its floor should be raised two steps above the level of the garden; its principal windows to the south-east. A gutter should be placed under the eaves, to prevent the ground, at the base of the walls, from receiving extreme moisture, and thus rendering the interior damp and unwholesome. The cottage should consist of the following parts:—

6846. *A porch* to throw off the rain from the steps of the door, and prevent it from being blown in by the wind. On the smallest scale, two broad boards, or two slates or flag-stones, placed pediment-wise over the door, will suffice.

6847. *A lobby, broad passage*, or other space inside the door, to contain lumber, fuel, garden tools, and to serve as a place for washing, or working at coarse work, &c.

6848. *A cooking and living room* entered by the lobby or outer room; the fireplace, with an oven and small boiler, both included in a cast-iron grate.

6849. *A sleeping-room* over the living-room, and entered by a stair from the lobby or outer room.

6850. *A garret*, or children or lodger's sleeping-room, or small room for any purpose, over the lobby or outer room.

6851. *A pantry*, taken off the lobby, with a small window to the north-west.

6852. *A closet*, for utensils and articles used in the living-room, taken off that room, with a window to the north-west or south-east.

6853. *A hen-roost*, forming part of the garret over the lobby, and entered by a poultry-ladder, placed against a small opening near the bottom of the outer wall.

6854. *In the garden should be a well*, with a pump, if deep; unless some other source of good water is near.

6855. *A water-closet*, placed in a hidden part of the garden, behind the house, so contrived that the visiter may neither be seen from the windows of the cottage nor the public road, with a going and returning, or an incidental approach, instead of the direct *cul de sac* paths which commonly lead to such places.

6856. *A pigsty*, attached to the north-east or south-west front.

6857. *A dung-hill*, or a small spot adjoining the pigsty, surrounded by a dwarf wall.

6858. *A niche in the wall* of the south-east front of the house, to hold two or more beehives, with two iron bars, joined and hinged at one end, and with a staple at the other, to lock them up to prevent stealing.

6859. *The surrounding fence* may be a wall, close pales, a holly, thorn, sloe-thorn, or damson-plum hedge, according to circumstances; if a hedge of any kind, then standard plum, pear, apple, or cherry trees, may be planted in it; if a wall, the same sorts may be trained against it. Next to the fence, a border should be carried round the whole; a similar border may be formed round the house; and the area for culture will then be thrown into two compartments, one behind the house, and one in front of it. The compartments may be surrounded with a line of gooseberries and currants, and a few standard apples or plums (as being the two most useful cottage fruits) scattered over the whole. Against the house may be planted currants, pears, or a vine, according to the situation and climate. Honeysuckles and monthly roses may be planted next the porch; ivy against the water-closet; and the scented clematis against the pigsty. The border round the house should be devoted to savoury pot-herbs, as parsley, thyme, mint, chives, &c., and to flowers and low flowering shrubs. The surrounding border, under the wall or hedge, should be devoted to early and late culinary crops, as early potatoes, peas, turnips, kidneybeans, &c. No forest trees, especially the ash and elm, should be planted in, or, if possible, even near, the cottager's garden; as these are ruinous to crops; the first, both by its shade and roots, and the latter by its roots, which spread rapidly to a great extent, close under the surface. The oak is the tree the least injurious to gardens.

6860. *Variation may be made in this extent of accommodation*, by adopting a different form for the ground-plan of the plot; by different inclinations of surfaces, kinds of fence, sort of materials used for the roof and walls of the house, colouring of the walls, and, above all, by adopting different styles of architecture. But whatever is done in this respect, no attempt at ornament or picturesque effect should be made which is at variance with comfort: latticed windows are cold and comfortless; chimney-flues tortured in their direction, with a view to fixing the stack of chimney-tops in some particular point, occasion smoky apartments. A variety of other deviations from common practice, made to gratify the eye of the beholder, without any reference to the inhabitant, might be mentioned; but we shall only add, that whatever is most comfortable and durable will please the best in the long run. That every reasonable comfort within is compatible with an architectural or picturesque exterior, we have rendered obvious in our *Encyclopædia of Architecture*, and in our *Architectural Magazine*: and we here give four designs; one (*fig. 973.*) a bailiff's cottage, serving also as a porter's lodge, erected in the north of Ireland; another (*fig. 974.*) a gardener's house, designed by Mr. Lamb for a gentleman in the south of England; the third a gardener's house, erected at Redleaf, near Tunbridge Wells, the seat of William Wells, Esq.; a residence which, in point of scenery, of a choice collection of plants in the grounds, of pictures in the house, and



973

of the very highest keeping throughout, is, perhaps, the finest small place in England; and the fourth (*fig. 977.*) a small lodge, also designed by Mr. Lamb, for a villa in Kent. The bailiff's cottage, serving also as a porter's lodge, was erected in Ireland, and is taken from that excellent work, Hunt's *Tudor Architecture*. "It is designed," Mr. Hunt observes, "rather to produce an agreeable and picturesque effect, than to

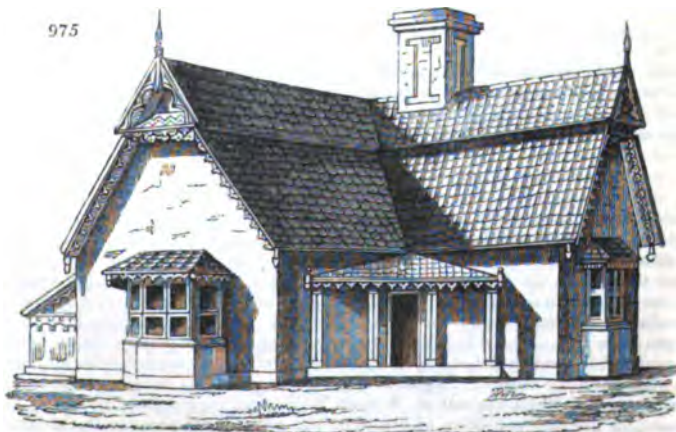
974

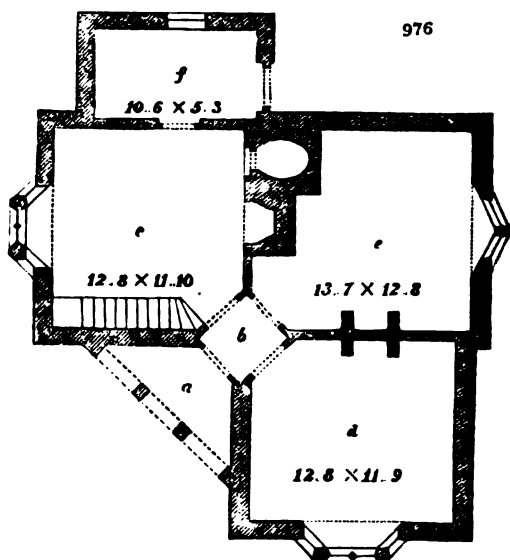


accord with any fixed rules or customs of art: such, indeed, was the practice towards the latter end of the sixteenth century, when it would appear that, like the fashion of the present day, every man wished to display his taste and learning in architecture. The entrance to the park is formed by a

simple wooden gate, within an arched aperture, strengthened by buttresses; which, as they are obviously useful, may be appropriately introduced." (p. 87.) The ground plan of *fig. 974.* is in the form of a cross; one projection forming the front entrance, and containing a lobby and staircase, and the opposite one containing a back kitchen. On entering the main body of the house, there are a kitchen to the left, and a parlour to the right. The staircase leads down to two good cellars, and up to four bed-rooms. The gardener's house at Redleaf (*fig. 975*) was erected from the design of the proprietors

975





976

who not only made the general sketch, but the working drawings of all the parts. The work was executed by his own carpenter and bricklayer, from materials found on the estate. The plan is somewhat different from that here given (*fig. 976.*), which contains an entrance porch, *a*; lobby, *b*; kitchen, *c*; parlour, *d*; family bed-room, *e*; and dairy, *f*. From the kitchen a staircase leads to three sleeping-rooms in the roof, and down to the cellar, pantry, &c. A shed for fuel, which in that part of Kent is chiefly wood, and other necessary conveniences, are placed at a short distance. The plan of *fig. 977.* is very simple. The porch, or lobby, has two doors, and between them a staircase. The door on the one hand opens into a kitchen, and that on the other

into a parlour, having a small bed-room adjoining. The staircase leads up to two garret bed-rooms and a closet, all lighted from the roof, and down to two good cellars. These

cellars are not only of great use throughout the year for keeping beer, and as lumber rooms; but, in winter, they are also valuable for preserving roots, such as potatoes, carrots, &c.; and, in summer, for keeping various articles of food and drink cool and fresh. Cellars should never be wanting in cottages.



977

SECT. II. Public Gardens.

6861. *Public gardens* are designed for recreation, instruction, or commercial purposes. The first include equestrian and pedestrian promenades; the second, botanic and experimental gardens; and the third, public nurseries, market-gardens, florists' gardens, orchards, seed-gardens, and herb-gardens.

SUBSECT. 1. Public Gardens for Recreation.

6862. *Public parks, or equestrian promenades*, are valuable appendages to large cities. Extent and a free air are the principal requisites, and the roads should be arranged so as to produce few intersections; but at the same time so as carriages may make either the tour of the whole scene, or adopt a shorter tour at pleasure. In the course of long roads, there ought to be occasional bays or side expansions, to admit of carriages separating from the course, halting, or turning. Where such promenades are very extensive, they should be furnished with places of accommodation and refreshment, both for men and horses; and this is a valuable part of their arrangement for occasional visitors from a distance, or in hired vehicles. Our continental neighbours have hitherto greatly excelled us in this department of gardening; almost every town of consequence having its promenades for the citizens *à cheval* and also *au pied*. Till the commencement of the nineteenth century, Hyde Park, London, and a spot called the Meadows, near Edinburgh, were the

only equestrian gardens in Britain; and neither were well arranged: but in 1810, the Regent's Park was commenced from a suggestion of W. Fordyce, Esq., the then surveyor of woods and forests, and it has become a scene worthy of the metropolis. It is only to be regretted, that the space available for the public is so much curtailed by interspersed villas, and surrounding rows of houses and gardens: for though, from the number of trees, the wealthy citizen who can view the scenery from his horse or coach may recognise the park character, yet, by rendering so great an extent of the surface private property, the wanderings of the pedestrian are limited, and his views of the scenery confined.

6863. *A general profile of the public garden at Magdeburg* is given p. 142., fig. 92., and fig. 978. is a working plan of the same garden, explaining the reasons for the different details, and showing the disposition, and the kinds of the trees and shrubs. The situation which was intended for this garden is marked in the plan, fig. 978., with a broad line, and contains fifty-seven acres; but, this not being thought sufficient, and more land being promised, M. Lenné made his plan for laying out the garden without confining it within that boundary. One of the principal objects was to combine with a beautiful garden fine views of the surrounding country; and to attain this object the garden was extended to 120 acres; a space sufficient to accommodate 30,000 persons. The point *a* is thirty-two feet above the usual level of the river; and is not only the highest land in the garden, but in the whole neighbourhood. From that point the river Elbe may be seen for a great distance, approaching the town from the south; and departing from it on the opposite side. The handsomest part of the town is seen, extending in a half circle, between the two lines *a a*; and it has, in conjunction with the quay and the bridge, a most pleasing effect. In the direction *b b*, a part of Frederickstadt, the bridge and the Fürsterwall, are seen over the lower parts of various masses of trees and shrubs. In the line *c c*, the Dome, a sublime monument of old German architecture, presents itself to the greatest advantage. The steep heights of the ramparts, which will be spoken of afterwards, lie between the two lines *d d* and *e e*. On the side of this, and particularly in the line *f f*, is the village Sudenberg; from this to *g g* is an extensive plain of arable and pasture land, which surrounds the town. In very clear weather the lofty summit of the Brocken may be distinguished in the line *h h*. The view is enlivened, in the direction of the line *i i*, towards the picturesque village of Burkau, by its embracing the public promenade. In front are the farmyards *b* and *c*; and over the river several others are observable in the direction *k k*. In a place designed entirely for pleasure, it is desirable to conceal all appearance of fortifications. The ground sinks towards the glacia, but rises on the opposite side; which is admirably adapted for the plantation (*d*) of free and high growing trees, behind which the ramparts are perfectly concealed. This plantation is 220 fathoms from the point *a*, which is sufficiently low not to obstruct the view of the distant landscape; and also high enough to afford shelter against the rough north winds. The view of the whole town and the river is very striking from the point *g*; and the plantations *f*, which are scattered before the rows of these high trees, give breadth of appearance. The various falling and rising of these plantations clumped behind each other, the grove-like planted trees on an undulated surface, and the manifold outlines of the rows of trees themselves, abolish every stiff appearance, and give the whole the form and character of a varied forest plantation. This, in such a situation, will be like an outer court to the point *g*, where a temple will be erected; which, in combination with the reservoir *h*, will form a well-arranged scene. To bring the picturesque views which the town and river exhibit in contact with the garden scenery, all this ground between the river and the highest points is planted. Near this, a little rivulet, which comes from the other side of the height, is divided into two large branches, or rather arms, to form an island; and at this side at *f*, is a port, where pleasure-boats may land visitors coming by water. Various walks are made along the bank of the river, and the plantations on the plain between it and the highest points are not so dense, and the grass plots are larger than on the other side of the garden; the openings in these plantations being so arranged as to direct the eye to the views of the distant country, and to combine them with the gardens. In consequence of this, the Dome, the bridge, the Fürsterwall or Frederickstadt, a suburb, are seen from the different points, *a*, *c*, *m*, *g*, and *x*; and, in order that there may be nothing to intercept these vistas, the clumps (*k*) are kept low, by being planted with underwood; a different arrangement was necessary on the opposite side, where more dense plantations are required, to make it appear as if the garden extended to the village of Burkau. The most pleasing of the small lakes, which are formed by the occasional expansion of the rivulet as it passes through the valley, are exposed to the view; whilst others are partially hidden by the plantations, which, in combination with the grass, make them appear larger than they really are. A very agreeable contrast is afforded by the high-road which passes through this part of the garden, as the regular rows of fruit trees which line its sides offer a variety to the less formal plantations of the garden. The building, *l*, which is seen from several different points of view, is partly surrounded by two clear

lakes and various plantations. In the middle distance are seen the farmyard, and the Bleckenburg; and the whole view is terminated by the village of Burkau. Although the

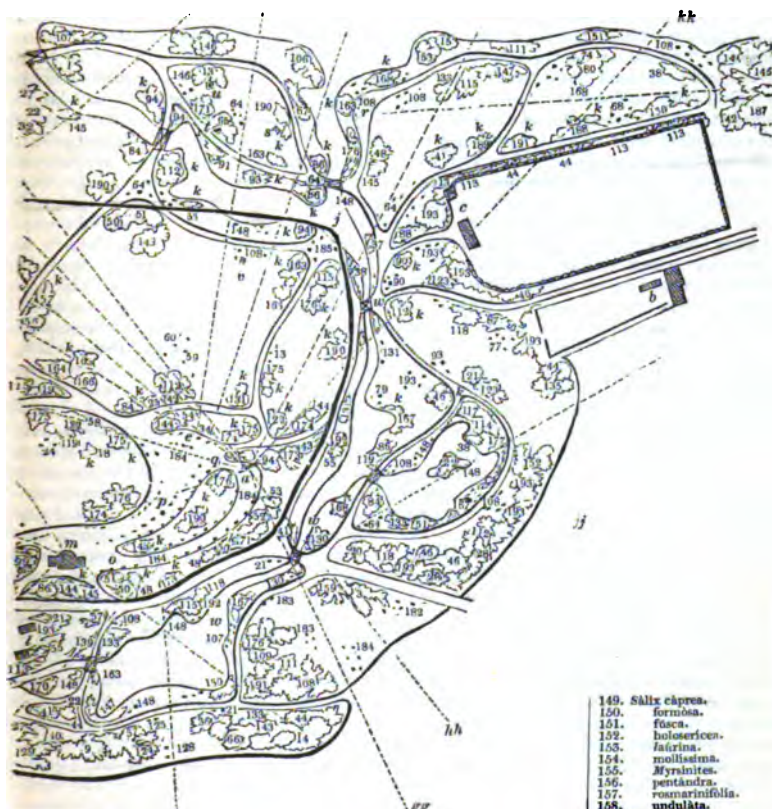
978



- | | | | |
|---|--|--|---|
| 1. <i>Acer campestre</i> . | 31. <i>Betula alba</i> . | 41. <i>Corylus avellana</i> . | 61. <i>Ornus americana</i> . |
| 2. <i>Ascyrum</i> . | 32. <i>Cedrus deodora</i> . | 42. <i>Kalmia latifolia</i> L. pl. | 62. <i>Prickles discolor</i> (sc-p-
tara). |
| 3. <i>Quercus fraxinifolia</i> . | 33. <i>Ficus radicans</i> . | 43. <i>Coronilla flammula</i> . | 63. <i>exaltat</i> . |
| 4. <i>Acer striatum</i> . | 34. <i>Broussonetia papyrifera</i> . | 44. <i>Corylus americana</i> . | 64. <i>exaltat</i> <i>pinnatifida</i> . |
| 5. <i>Platanus</i> . | 35. <i>Euphorbia frutescens</i> . | 45. <i>Cypripedium</i> . | 65. <i>lanceolata</i> . |
| 6. <i>Salix variegata</i> . | 36. <i>Carpinus betulus</i> . | 46. <i>Cydonia vulgaris</i> . | 66. <i>Ornus europaea</i> . |
| 7. <i>Pseudo-Platanus</i> . | 37. <i>Americana</i> . | 47. <i>Cytisus alpinus</i> . | 67. <i>Prickles pubescens</i> . |
| 8. <i>Saccharinum</i> . | 38. <i>Castanea vesca</i> . | 48. <i>Australis</i> . | 68. <i>Ornus reticulata</i> . |
| 9. <i>Salix</i> . | 39. <i>Ceanothus americanus</i> . | 49. <i>capitata</i> . | 69. <i>Prickles umbellata</i> . |
| 10. <i>Pavia flava</i> . | 40. <i>Citrus occidentalis</i> . | 50. <i>elongata</i> . | 70. <i>amplicollis</i> (Astruc-
pallia). |
| 11. <i>Æsculus Hippocasta-</i>
<i>nium</i> . | 41. <i>Cephalanthus occident-</i>
<i>alis</i> . | 51. <i>Laburnum</i> . | 71. <i>Gaultheria</i> . |
| 12. <i>Pavia rubra</i> . | 42. <i>Cercis Siliquastrum</i> . | 52. <i>nigrum</i> . | 72. <i>Gleditsia triacanthos</i> . |
| 13. <i>Alnus glandulosa</i> . | 43. <i>Clematis glauca</i> . | 53. <i>acutifolia</i> . | 73. <i>Hamamelis virginica</i> . |
| 14. <i>Alnus glutinosa</i> . | 44. <i>Vitis</i> . | 54. <i>Diospyros</i> . | 74. <i>Hippophae rhamnoides</i> . |
| 15. <i>lucida</i> . | 45. <i>Vitis</i> . | 55. <i>Elmagnus angustifolia</i> . | 75. <i>Styracis</i> . |
| 16. <i>Amorpha fruticosa</i> . | 46. <i>Calceola arborescens</i> . | 56. <i>Eudonymus atropur-</i>
<i>pureus</i> . | 76. <i>Juglans cinerea</i> . |
| 17. <i>pubescens</i> . | 47. <i>crucifera</i> . | 57. <i>europæus</i> . | 77. <i>nigra</i> . |
| 18. <i>Amygdalus nana</i> . | 48. <i>Cornus alba</i> . | 58. <i>latifolia</i> . | 78. <i>Juniperus Sabina</i> . |
| 19. <i>Berberis canadensis</i> . | 49. <i>florida</i> . | 59. <i>syriaca</i> . | 79. <i>virginiana</i> . |
| 20. <i>vulgaris</i> . | 50. <i>mascula</i> . | 60. <i>styracifera</i> . | |

dull flat of the arable land is partly hidden by the plantations in the garden, it is not intended to conceal it entirely; it belongs rather to the design followed in laying out this

978



0 100 200 300 400 ft.

80. *Ligustrum vulgare*.
81. *Liriodendron tulipifera*.
82. *Loniceræ*, species.
83. *castanea*.
84. *tatarica*.
85. *Kydonium*.
86. *Lycium barbarum*.
87. *Crotaegus coccinea*.
88. *Cotoneaster vulgaris*.
89. *Crotaegus Crataegus*.
90. *Oxyacantha cordata*.
91. *Oxy. cordata rubra*.
92. *Pyracantha*.
93. *Myrica carifera*.
94. *Philadelphus coronarius*.
95. *A. bina coccinea*.
96. *alba*.
97. *canadensis*.

98. *Pinus inops*.
99. *Larix europæa*.
100. *A. bina nigra*.
101. *Picea*.
102. *Pinus rigida*.
103. *serotina*.
104. *Strobilus*.
105. *Platanus occidentalis*.
106. *Populus alba*.
107. *candicans*.
108. *dilatata*.
109. *gracilis*.
110. *monilifera*.
111. *tremula*.
112. *Cerasus Mahaleb*.
113. *Padus*.
114. *serotina*.
115. *virginiana*.
116. *Ptelea trifoliata*.

117. *Amelanchier vulgaris*.
118. *Pyrus A. v.*.
119. *beccabacca*.
120. *ovata*.
121. *Polluxia*.
122. *speciosa*.
123. *terminalis*.
124. *Quercus coccinea*.
125. *montana*.
126. *palustris*.
127. *Prunus*.
128. *rubra*.
129. *tinctoria*.
130. *Rhamnus catharticus*.
131. *Rhus coccinea*.
132. *glabra*.
133. *typhina*.
134. *Ribes alpinum*.
135. *sacrum*.
136. *floridum*.
137. *peccatum*.
138. *Carex arborescens*.
139. *Halmodendron argenteum*.
140. *Robinia hispida*.
141. *Pseud-Achæa var. infernalis*.
142. *Pseud-Achæa viscosa*.
143. *Alnus*, species.
144. *Alnus odoratus*.
145. *Salix alba*.
146. *argentea*.
147. *babylonica*.

149. *Salix caprea*.
150. *formosa*.
151. *fusca*.
152. *holosericea*.
153. *laetifolia*.
154. *mollissima*.
155. *Myricites*.
156. *pentandra*.
157. *rosmarinifolia*.
158. *undulata*.
159. *Sambucus nigra*.
160. *racemosa*.
161. *Sophora japonica*.
162. *Spiraea fuscescens*.
163. *Spiraea diamedrifolia*.
164. *crenata*.
165. *hypericifolia*.
166. *laetifolia*.
167. *opulifolia*.
168. *salicifolia*.
169. *sortifolia*.
170. *Spiraea trilobata*.
171. *Staphylea pinnata*.
172. *trifolia*.
173. *Symphoricarpos glomerata*.
174. *Syringa chinensis*.
175. *perica*.
176. *vulgaris*.
177. *Tamarix gallica*.
178. *germanica*.
179. *Taxus beccabacca*.
180. *Thalictrum occidentale*.
181. *orientalis*.
182. *Tilia alba*.
183. *americana*.
184. *europæa*.
185. *Ulmus americana*.
186. *campetris*.
187. *effusa*.
188. *Fibretum lentina*.
189. *Ostrya*.
190. *Op. rosea*.
191. *crumifolium*.
192. *Prun. species*.
193. Different sorts of fruit trees.

garden to have occasional openings, which are so arranged that the scattered houses and villages of the plain may be seen; and these, in the time of the harvest, afford a cheerful and enlivening spectacle. In the interior of the garden, the principal objects are, 1st, The general rendezvous, with the public saloon, *m*; and, 2dly, the border and offices of the garden. It is a great object, in laying out a public garden, not to compel the promenading multitude to crowd together in one place, but to enable them to disperse in different directions, and to meet again, as their inclination may direct them. In *fig. 92. p. 142.*, two parts are distinguishable; one between the road to Schönebeck, the island, the Elbe, and the glais; and the other, on the west and south sides of these places. The former part differs from the latter in its elevation, and hence a level in it was chosen as a centre for collecting the company. Near this point, at *s*, is a commodious walk on to the eminence. From *c*, a steeper walk leads to the highest point, *a*. Sheltered from the western winds, there is a second place, *p*, which, in the continuation of the ascending walk, *s*, forms itself into a platform; and, although not the highest point, affords views of the most pleasing parts of the garden. On the point *m* the public saloon is erected; this saloon seems, on viewing the plan, to be rather too near the high road to Schönebeck, but the elevation on which the saloon stands is fourteen feet higher than the road; and from this circumstance, by affording a fine view of a cheerful scene, it adds a new charm to the garden. The space between the saloon and the platform is planted with various rows of trees, under the shade of which the people may walk, or sit down; and this seems to answer better to the nature of such a place, than to divide the space allotted for the company by bushes and small plantations: retired places, however, should not be wanting for the assembling of small parties. Every public garden requires a certain distinction to be conferred on it by buildings and other monuments, to show that it belongs to an energetic community: the temple at *g*, which is seen from several different places, answers this purpose perfectly. The island affords situations for monuments to the memory of persons of Magdeburg, who have contributed to the welfare of the community, or who have encouraged art and science. The places where such monuments could be erected with the greatest advantage to the whole are marked *s, t, u*, in *fig. 978.* If busts should be employed, *v*, on the island, would be the most fitting place for them. The island, with its bridges and small port, is particularly designed as a foreground to the plateau, *e*; and the landing-place of the boats here, and the ships, in the same direction, in the wharf near the town, as seen at a distance, are pleasing views to the inhabitants of Magdeburg. In the second part of the gardens, the plantations have quite a different character. Instead of the openings being large, and the plantations partly formed of underwood, close-growing and lofty trees are used. A public garden ought to be contrived so as to suit different inclinations. Some wish to see and be seen, while others prefer the solitary paths: both are provided for by having the centre more open than the various shady walks, which wind along the valley. The water which was brought through this part is formed into natural-looking cascades, *w*, by its fall over the different steps which form the ponds; this contributes greatly to forming pleasing views, and affords coolness in hot weather. The plantations on the elevations, and in the distant parts of the garden, consist chiefly of forest trees and shrubs; while, near the buildings, fruit and ornamental trees and shrubs are used, which, in addition to the beauties of their variously coloured foliage, afford new charms by their spring and autumn productions of flowers and fruits. Besides the views already mentioned, there are in *fig. 978.* several others which show the combination of the single clumps into a grand whole: the manner in which the plantations are formed is shown by the numbers in *fig. 978.*, which refer to the accompanying list.

6864. *Boulevards* (*Boulevard, Fr.*, or round work; a bulwark, or great bastion, or rampart, generally round). Many of the continental cities have a species of equestrian promenade within their boundaries, which is deserving of imitation. These are broad roads, accompanied by rows of trees, near the margin of the city, originally formed on the ramparts, or surrounding fortifications, and completely encircling it. They are highly interesting promenades, especially to a stranger, to whom they give an idea of the topography and most remarkable points of the scene in the most agreeable manner. The boulevards at Paris, Vienna, and Moscow, are particularly to be admired in these respects.

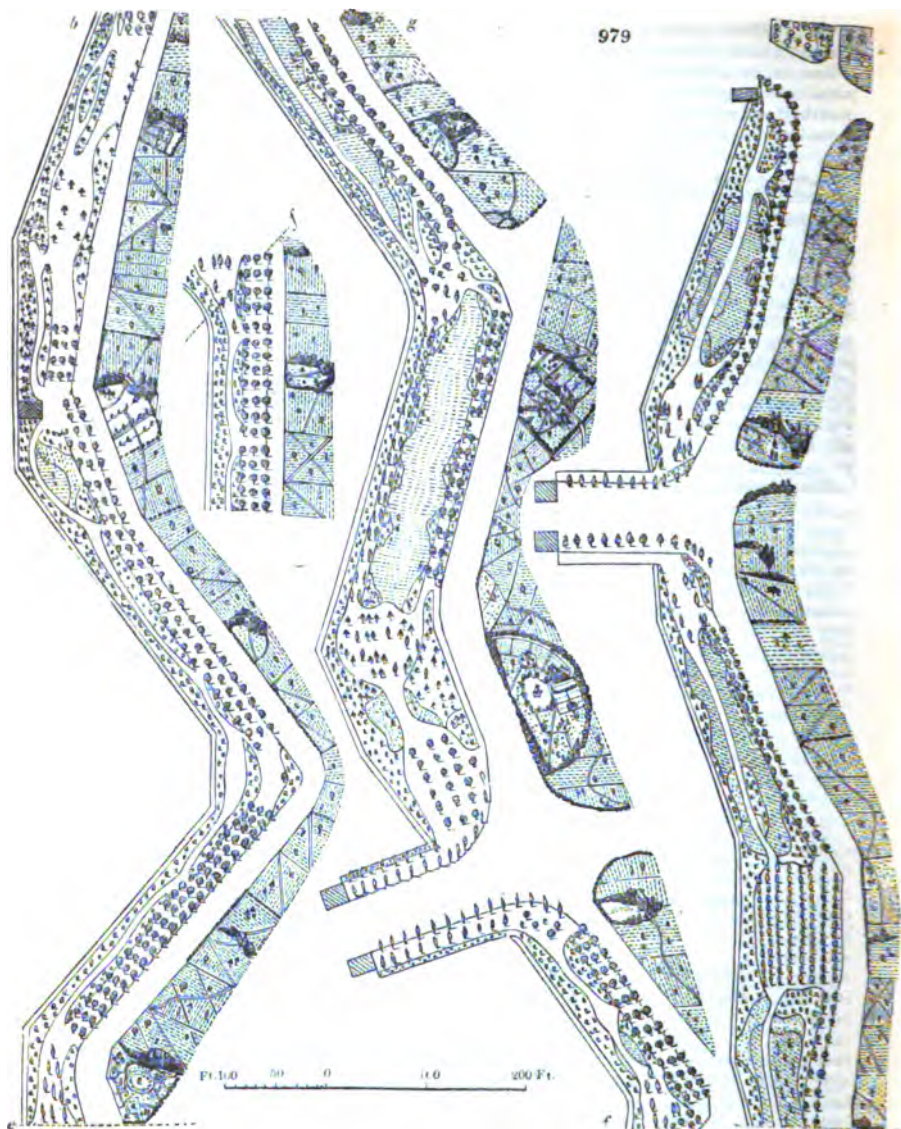
6865. *A promenade might be formed in the margin of London*, of a very interesting kind, by continuing the street called the New Road through Hyde Park, entering close to where Kensington Gardens leave off, proceeding thence across the Serpentine River, and coming out exactly opposite Sloane Street: then along this street and part of the King's Road, to the road leading to Vauxhall Bridge; from this bridge along roads already formed, and, as may be seen by the map, well suited to lead to Blackheath; then turn towards London through Greenwich Park, so as to display the best views of the metropolis over Greenwich Hospital; form a viaduct or road, on a cast-iron colonnade, across the river, sufficiently high to admit ships in full sail to pass under: descend this.

and join the City Road, which joins the New Road, and completes the circle. This course which, with the exception of the bridge, might be formed at no great expense or derangement of property, would give a grand view of the metropolis; and, by now and then deviating from the direct road and returning to it, Kensington Gardens, Hammer-smith Nursery, the King's Road Gardens, Chelsea Garden, the garden of the Messrs. Loddiges at Hackney, the Regent's Park, Highgate, Hampstead, and all the most interesting garden scenery, and objects close to London, might be rapidly glanced at in one day. (See *Gard. Mag.*, vol. i. p. 280.)

6866. *Mountain promenade.* One of the finest equestrian promenades that can be imagined might be formed on the hill of Arthur's Seat at Edinburgh. From the base at Holyrood Park, let a road ascend winding round the hill, including the appendage of Salisbury Craigs, and the knoll to the east if desirable, to the summit, at a rise not greater than two inches in six feet. Having arrived at the highest point, let it wind down again at a similar slope, intersecting the other road, and arriving also at Holyrood Park. Then let or sell the ground to individuals to build on or plant, each according to his taste. The slope of the road would be found so gradual that a two-wheeled carriage might be driven up or down at a trot, which can be done on the road over the Simplon, where the slope is two inches and a half in six feet. Taking the height of the hill from the park at 700 feet, this would give less than five miles of ascending promenade, and the same number descending. By the formation of these two roads, hundreds of the finest situations in the world, for summer villas and cottages, would be formed, and probably in time let or sold, so as to more than cover the expense, both of purchasing the hill as it now is, and forming the roads in the very best manner. (*Ibid.*, vol. viii. p. 362.)

6867. *Public gardens, or pedestrian promenades.* These, with very few exceptions, have been in all ages and countries laid out in the geometric style. The Academus at Athens is an ancient example; and the summer garden at Petersburg a modern one. Even in China, where irregularity in gardening is so much desired in general, Ellis (*Journal of the Embassy of 1816*) informs us, that "the Fatsee gardens at Canton, the resort of the fashionables, consist of straight walks;" and however much English gardening has been praised and copied by private persons on the continent of Europe, yet, with the exception of the English garden at Munich, that of Magdeburg, and a few others, the rest are very properly in straight lines. The object of public gardens is less to display beautiful scenery than to afford a free wholesome air, and an ample uninterrupted promenade, cool and shaded in summer, and warm and sheltered in spring and winter. In a limited extent, the combination of these objects must be attempted in one principal walk, which, for that purpose, should as much as possible be laid out in a north and south direction. In more extensive scenes, covered walks may be devoted to summer, and east and west open walks, to spring and winter. The broad open, and narrow covered avenues of the ancient style, are valuable resources on a large scale; these conjoined, and laid out in a south and north direction, give in the centre an open, sheltered, sunshine walk in mid-winter; and a close or covered avenue being laid out along each side of the open central one, will afford shady walks for summer, and occasional places of retreat from casual showers in spring. Oxford and Cambridge afford some fine open and covered avenues, though far inferior to many on the Continent.

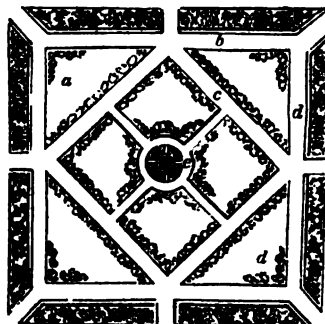
6868. *The public garden at Frankfurt*, laid out by Zeyer of Schwesingen, between 1807 and 1811, has been described § 685; and an idea of the details may be obtained by inspecting fig. 377. In order to give the details of fig. 145 p. 197, with accuracy and distinctness, that figure is divided into sections by dotted lines, marked a, a, a, c, d, e, b, f, g, and A. M. Rins most obligingly furnished us with plans on a large scale of each of these sections; but, from the space which they would necessarily occupy in this work, we have limited ourselves to giving the sections e, b, f, g, A, which include the Bockenheimer, St. Gallus, and Unter Mayn gates. To give an idea of the manner of planting, it must be observed, that masses of broad-leaved trees were never planted together, but they were always more or less mixed with narrow-leaved trees, and that care was taken to avoid having all light or all dark coloured foliage in any of the masses. The same observations apply to the colours and forms of the herbaceous plants; and their masses should be contrived so that the plants placed together may flower nearly at the same time, accord well with their situation, and contrast with some other sort. The following groups of shrubs, and the manner of their arrangement, deserve particular notice; viz., *Prunus Pædus* at the back, and *Syringa vulgaris* in the front; *Cercis Siliquastrum* behind, and *Caragana arborea* or *Kerria japonica* fl. in front; *Robinia hispida* behind, and *Philadelphus coronarius* in front; *Cornus mascula* at the back, and *Daphne Mezereum* fl. rubr. in the front; *Viburnum Opulus* at the back, and *Spiræa consuetata* in the front, &c. &c. "Of large trees for grouping, the best are the lime tree, the elm, the walnut, the poplar, the Norway spruce, the larch, and the cedar, &c. Very fine groups for water may be formed of the weeping willow, Norway spruce, and Italian poplar; also the *Fraxinus americana* with *Populus tremula*; and the contrast between the majestic ash and the ever-trembling poplar is very great and interesting." The flower-beds, so abundant in these gardens, are principally large masses of one or more sorts. In many places, instead of a bare plot of turf, flowers are substituted; as, for instance, *Rosa odorata*, *Delphinium Ajacis*, *Flola tricolor*, or the different sorts of *Dianthus*, *Bellis perennis*, *Primula varia*, &c. There are also groups of *Tigridia Pavonia*, *Asclepias tuberosa*, *Lycalis fûgens*, &c. In the pinetum are usually planted peonies, anemones, and ranunculuses, &c. There is annually a beautiful and splendid group of *Anarantus tricolor* and bicolor, growing to the height of five feet. In front of these amarantuses are placed red and yellow varieties of cockscomb of distinguished beauty and size. Intermixed are plants of *Lobelia Erinus*, which, with their blue flowers, spread over all the ground. Unprotected groups of flowers must be avoided as much as possible, particularly when arranged in large circles: they should in order to give the proper effect, be always united with shrubs. Every year



newly planted groups of flowers appear, and often of no common worth, such as hyacinths, pelargoniums, tulips, anemones, ranunculus, roses, the newest tender annuals, fine assortments of balsams, Matthiola annua, &c.; in short, every thing which will suit the climate. An overseer or gardener is stationed between each of the town gates, to keep the grounds in order. All the shrubs are carefully pruned back in winter; and, after the spring has set in, every part is cleaned, all the groups dug round, flower-beds laid out, and all necessary work done. All this, which is performed in March, furnishes employment for 100 men for from four to six weeks. The same workmen are, therefore, chosen every year, and discharged when all that was to be done is finished. Some assistants are also added to the overseers during the summer, for watering the flowers, &c. These gardens have been noticed with the highest approbation by Mr. Spence, in the *Gardener's Magazine*; by Bulwer, in his *Pilgrims of the Rhine*; by Mrs. Trollope, in her *Belgium and Germany*; and, above all, by that accomplished woman and elegant and enlightened critic Mrs. Jameson, in her *Sketches and Views, &c.* The Frankfurt gardens are unquestionably well calculated to produce variety, in consequence of the great number of parts into which the plantations are divided; and the continually changing position of the spectator, in consequence of all the walks being irregular, winding, crooked, or zigzag in their direction. To have laid out such walks on a flat surface, would have been intolerably affected; but on these ramparts they could not have been laid out otherwise. The beauties, therefore, which have resulted from these fortuitous circumstances are the more admired, since they show the skill of the landscape-gardener in eliciting the greatest beauties where they were the least to be expected.

6869. *Public squares*, of such magnitude as to admit of being laid out in ample walks, open and shady, are almost peculiar to Britain. The grand object is to get as extended a line of uninterrupted promenade as is possible within the given limits. A walk parallel to the boundary fence, and at a short distance within it, evidently includes the maximum of extent; but if the enclosure is small, the rapid succession of angles and turns becomes extremely disagreeable, and continually breaks in upon the *pas des promeneurs*, the conversation of a party, or individual contemplation. The angles, therefore, must be avoided, by *rounding them off* in a large square; in a small one, by forming the walk into a circle; and in a small parallelogram, by adopting an oval form. In laying out a large square (*fig. 980.*), four objects ought to be kept in view. 1. Sufficient open space (*a*), both of lawn and walk, so that the parents, looking from the windows of the houses which surround the square, may not long at a time lose sight of their children: 2. An open walk, exposed to the sun, for winter and spring (*b*): 3. A walk shaded by trees, but airy for summer (*c*): 4. Resting-places (*d*); and a central covered seat and retreat (*e*), which, being nearly equidistant from every point, may be readily gained in case of a sudden shower, &c. The statues of eminent

980



public men are obvious and appropriate decorations for squares.

6870. *Russel Square*, laid out from a design of Repton in 1810, is one of the most complete in these respects in London. It has been objected to as over-planted; but this is only a piece of vulgar injustice, applied indiscriminately to every rural artist, all of whom, as a matter of course, conclude, that when magnitude effects the purposes of number, the superfluous plants will be rooted out.

6871. *Sloane Square* is very ingeniously laid out as a botanic garden, by which means the surrounding inhabitants have an easy opportunity of blending recreation with instruction. This plot being a parallelogram or long square, and the ground being low, Repton proposed to form it into a winding valley, containing a piece of water: the walks to be winding, the trees grouped, and the whole contrived so as to produce an appearance of nature in the midst of art: but his advice was not complied with. The late poet Laureate, *Pope (Essays)*, purposed to lay out a square in imitation of a wild overgrown quarry or gravel-pit, and plant it with thorns, hollies, furze, brambles, ferns, &c. This mode he would adopt on account of the contrast which it would produce to suburban garden scenery generally.

6872. *Edward's Square*, Kensington, was laid out, in 1819, in groups and winding walks, in a manner different from most other squares, by Aigito, an eminent landscape-painter. A small city square might be laid out in terraces, like the *Isola Bella*, or the gardens of Babylon, and the space beneath usefully disposed of as vaults for goods.

SUBJECT. 2. *Public Gardens of Instruction.*

6873. *Botanic gardens.* The primary object of botanic gardens is to exhibit a collection of plants for the improvement of botanical science; a secondary object to exhibit living specimens of such plants as are useful in medicine, agriculture, and other arts; and a third is, or ought to be, the acclimatising of foreign plants, and their dissemination over the country. In choosing a situation for a botanic garden, the leading object must be proximity to the town, city, or university to which it is to belong; and the next, if attainable, a variety of surface and soil, to aid the necessary formation of composts and aspects for different plants. In general, however, there is little choice in these respects, it being sufficiently difficult to procure an adequate extent of surface of any kind near large towns. As the leading object or feature in the view of a botanic garden is the range of hot-houses, and as these must always face the south, it is generally desirable that ground on the north side of the principal public street or road by which it is to be approached, should be preferred to ground on the south side. In the latter case, the hot-houses must be approached from behind, and then the spectator must turn round to look at them, by which their grand effect is lost.

6874. *The extent* requisite for a botanic garden depends upon that of the collection intended to be formed; as well as on the magnitude to which the tree-plants are intended to be grown. A good deal will depend also on whether tender exotics are to be principal or secondary objects of collection, and also on the manner of growing the hardy herbaceous plants. An immense collection of herbaceous plants may be included in a small space, if the soil is loamy, and rather inclined to moisture; and if the plants are separated from each other in the rows by bricks or thin tiles, which at once completely divides them and assists their growth, so as to admit a great number being planted on the same space. The extent of the Chelsea garden is little more than three acres; that of the original Liverpool garden is five acres; and in both are extensive collections. Messrs. Loddiges have above a thousand species of herbaceous plants, which they keep constantly in small pots, set on beds of scoria. These occupy very little space, and the plants thrive well. Of course the larger-growing kinds are excluded.

6875. *The form* of a botanic garden is a matter of very little consequence: where the extent is small, a square or parallelogram may undoubtedly be made to contain most plants; but where it exceeds four or five acres, any form will answer; and, indeed, if there is a sufficient quantity of ground, the more irregular the form, so much the more variety will there be in the circumferential walks of the garden.

6876. *In laying out the area* of a botanic garden, the objects already mentioned, and various others, must be kept in view. If it be merely desired to have a general collec-

tion, then a surrounding border for the trees and shrubs, internal compartments for the beds of herbaceous plants, and a space at one end or side for the hot-houses, frames, compost-yard, &c. will be sufficient; surrounding the whole with a walk, which may also cross the garden in one or more places. Such a walk, to display in succession every remarkable feature, is essential to all gardens, whatever may be their extent or kind.

6877. In a complete botanic garden, the following seem to be the requisites:—

1. A curator's house, with seed-room, office for business, library of reference, herbarium, room for lectures or observations. This is most generally situated at or near the entrance of the garden. Some consider it desirable to place a lodge at the entrance for the under-gardeners, and to place the curator's house with its accompaniments as above, in connection with the range of hot-houses.
2. A range of hot-houses, either in one line, or in a semicircle, circle, square, half square, &c., according to taste, and other circumstances; with back sheds for all the usual purposes of such, including rooms for the journeyman, where there is no lodge; and lodgings for one man, even if there is a lodge, in order to attend to the fires.
3. An adjoining arrangement of pits and frames, but not in front of the range of hot-houses, as in a nursery.
4. A compost ground for all the usual purposes.
5. An apartment, including a bog, pond, spring, and salt-water cisterns, for marine signs.
6. A rock-work and underneath pendant walks, tunnels, vaults, and caves, open in different degrees and directions, for the growth of mosses, ferns, fungi, &c.

7. Borders, shaded and kept moist in different degrees in ferns and other appropriate plants.
8. A forest-ground, shaded by trees or walks, and containing stumps and roots of trees of different kinds, and other means for the preservation, as far as art will go, of a collection of scarce or hardy fungi, edible, and poisonous.
9. An American or log-wood ground, either a border, or connected groups, or a composite figure surrounded by walls.
10. An estuvarium, or parrel area, for setting out the greenhouse plants in summer. In the pavement ought to be laid, for iron rods connected with wires, for tying up the taller and more flexible plants.
11. A grass-ground or grass-plot for bringing all the grasses together.
12. A compartment for the plants used in medicine, according to the Pharmacopœia of the different universities, &c.
13. A compartment for the hardy poisonous plants.
14. Compartments for the plants and trees used in agriculture, dyeing, and other branches of general economy.
15. A compartment for florists' and border flowers.
16. A compartment, or, what is generally preferable, surrounding border or belt, for trees and shrubs.

6878. Various other sub-arrangements or compartments of this nature may be contrived, as for creeping plants, climbing natives of particular countries, succulents, bulbs, &c.; and the association of plants in this way by strong natural and artificial (alluding to their use) affinities, is well calculated to facilitate both their culture and study. The most complete arrangements of this kind are to be found in the Paris, Dublin Society's, and Glasgow Gardens. The size and shape of these sub-arrangements will, of course, be various, which will add greatly to the interest of the walks. They will, in general, be most advantageously placed round the outskirts of the garden, within the marginal plantation, and should be separated by different sorts of rustic walls, or mounds of rockwork, hedges, thickets of evergreens, and other means. They should all be connected by a walk so constructed that a general spectator may see each scene without being obliged to enter minutely into it; and that, while none can escape the botanist, he may have an easy opportunity of entering minutely into each or any of them.

6879. The central or principal part of the ground should be devoted to one general arrangement of all the phanerogamous plants, including hardy exotic trees and natives. The trees may be kept dwarfed, by being propagated from cuttings, or layers, and by planting in pots, and pruning; and the stove and other exotics will, of course, only be plunged in their appropriate places for a few weeks in the warmest part of each summer, as in the Paris garden. Every plant ought to have its name painted on strong cast-iron tallies, on a bevelled face, in letters so large as to be legible without stooping. If to the name, systematic and English, could be added the Linnæan and Jusseuean class, native country, and time of flowering, it would obviously greatly facilitate the peripatetic study of plants. The tallies, once placed there, should never be removed, except when the arrangement is to be enlarged, because the name will show that the plant exists, or ought to exist, somewhere in the garden; and will or ought to be placed there in the proper season. Such a collection should, in short, be a transcript of the catalogue of the garden; some of the Filices, and most of the Fungi, Alge, and Mûci excepted.

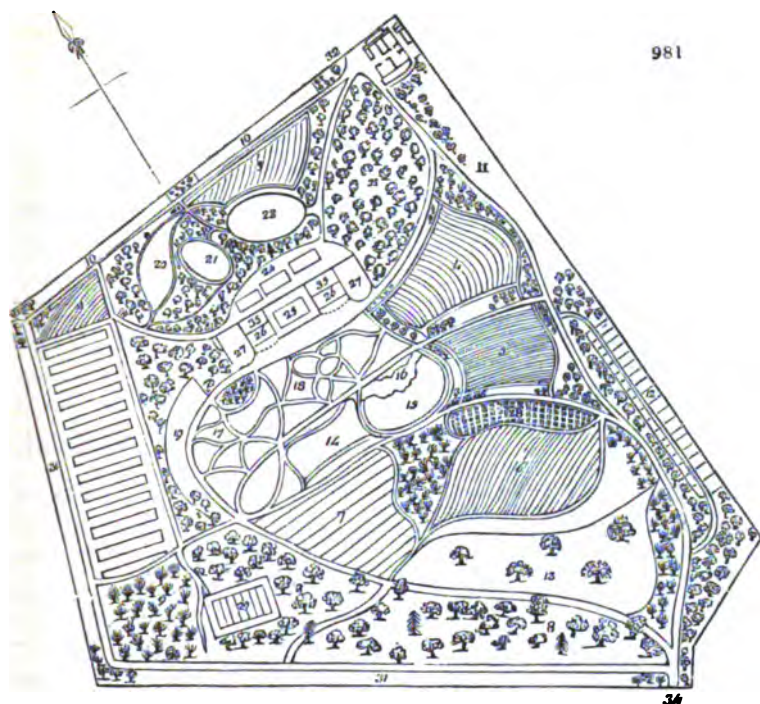
6880. Whether the arrangement in the compartments or main area of such a general collection ought to be Jusseuean or Linnæan, must depend on the opinion of those concerned; we think the former.

6881. The botanical arrangement in the hot-houses, and, as far as practicable, in the different subsidiary or habitat arrangements, should, in our opinion, decidedly be Jusseuean, as presenting the strongest natural affinities; and as being calculated to promote variety in general appearance, facility in recollecting names, and often being most convenient as to kind of culture.

6882. The Glasgow Botanic Garden (fig. 379.) owes its origin to a great measure to the exertions of T. Hopkir, Esq. Jun. of Dalbeth, a gentleman attached to botany, advantageously known as the author of *Anomalies of Plants*, and who has long cultivated a collection amounting to 3000 species. It contains eight acres, and is the joint property of the College and a number of subscribers, who are incorporated under the title of the Royal Botanic Institution of Glasgow. The plan combines variation of landscape and scientific arrangement in a very eminent degree. It was devised by a committee of subscribers, and chiefly by T. Hopkir and R. Austin, an eminent nurseryman. The following are the details:—

1. A general collection of herbaceous plants.
2. A collection of grasses.
3. A Linnæan arrangement.
4. Arrangement according to the natural method of Jusseu, &c.
5. British plants, with edgings of common heath (*Calluna vulgaris*), which bears clipping like common box.
6. Medical plants.
7. Plants used in agriculture or commerce.

8. Forest trees.
9. Willows.
10. Borders for annuals.
11. Collection of biennials.
12. Reculent vegetables, fruits, &c.
13. Grass lawn.
14. American borders.
15. Aquarium.
16. Rockwork.
17. Collection of mosses.
18. Borders for florists' flowers as plants common to the
19. Border for bulbs.
20. Collection of variegated plants.
21. Alpine plants.
22. Green-house ground.
23. Shrubs.
24. Perching-beds, frames, &c.
25. Green-houses.
26. Stoves.
27. Stove; a conservatory, on the west end.
28. Medical plants in quantity, for sale.



29. Enclosure for cultivating rare plants.
 30. and 31. Duplicate borders.
 32. North entrance from the Sandyford road, with the lodge and lecture-room.
 33. Queen Mary's yew, propagated from the famous tree at Craikston Castle twenty years ago.
 34. South entrance from Dumbarton road.
 35. Under-gardener's rooms and potting-sheds.
 On the enclosing wall, which is ten feet high, and also in the adjacent department (12), the most approved sorts of hardy fruit trees are cultivated; so that this garden, like that of Paris,

will combine horticultural with botanical instruction. The plan was executed under the direction of Stewart Murray, the present very intelligent curator of the garden. It was begun in May, 1817, and completed in two years. The total sum subscribed by the members of this institution amounted to nearly 11,000*l.* T. Hopkirk presented to it the whole of his collection; and through his exertions, and those of the other proprietors, and especially of that distinguished botanist, Dr. W. J. Hooker, the college professor of botany, the garden, in 1821, contained upwards of 9000 species.

SUBJECT. 3. Commercial Gardens.

6883. *Public nursery-gardens* come first in order. In choosing a situation for a nursery, two points are to be considered, fitness as to the disposal of the produce, and fitness as to shelter, aspect, and soil. Where it is intended to attempt a general nursery business, regard must be had to the leading roads of the district, the means of carriage by land or water, and the kind of objects that will be most in demand, whether seedlings, fruit trees, or tender exotics, or all of these. Where a local business is to be commenced, it is evident much will depend on the choice of a conspicuous situation in some line of road of general resort, and as near as possible to some town or city. As far as respects shelter, aspect, and soil, the remarks already submitted in reference to private nurseries (6486.) may suffice. The best general soil is evidently a free tender loam; and the best general aspect or exposure, one inclining to the north; as precocity is no advantage in a nursery, but the contrary; and all seedlings and tender plants will be the safer till they come up, and come up more vigorously, when brought on not so much by the direct rays of the sun as by his indirect influence on the atmosphere. Another great advantage of a northern exposure is, that plants and trees may be taken up, as well as planted, later in the season, than in one of a contrary nature. Grafting, also, making good deficiencies, and other nursery operations, which are generally deferred to the last moment, may be done with less injury to the trees and plants.

6884. *The extent of a nursery* must depend on the means of the occupier, and the probable extent of the market. It will also depend, in some degree, on the kind of articles to be chiefly cultivated, and the mode of cultivation to be pursued. Where manure is scarce, such a system of alternate nursery and market-garden crops must be adopted as shall preserve the ground in heart; but where manure is more abundant, the severe crops may succeed one another more closely. Where thorns and seedling forest trees are to be

the principal articles grown, it is evident less ground will be required than when transplanted forest trees are to be the chief kind produced.

6885. *In laying out a nursery*, the objects to be cultivated, and the kind of business to be expected, must be leading guides in the design, and the duration of the tenure will naturally have a material influence on the execution. The following seem objects desirable for a complete nursery : —

6886. *A dwelling-house* for the master ; this in a nursery for local demand, and in which public attraction is an object, ought to be placed near the road ; and at the same time as centrally as possible in other respects. In general, the living-rooms ought to be elevated, so that their windows may command, as far as practicable, the whole nursery.

6887. *A seed-shop* and counting-house, or office, which should be connected with the house for the master's convenience ; but, at the same time, have each distinct entrance. The counting-house should have a good clock, and a rope or chain communicating to a bell placed over, or in some conspicuous situation for regulating the hours of labour ; also a speaking-pipe to the packing-court and centre of the hot-houses.

6888. *A journeyman's living-room*, and a number of sleeping-rooms for the whole or a part of the journeymen employed by the year, or otherwise, communicating with the packing-court ; or in some cases, on a small scale, occupying part of the ground-floor of the house. From this appendage should be a speaking-pipe and bell, to communicate with the counting-house and the master's sleeping-room.

6889. *A tool-house*, sufficiently commodious and properly arranged, communicating with the seed-shop. The tools should be at least weekly examined by the foreman before paying the men. The larger number-sticks or tallies, not in use, should also be kept here.

6890. *A museum and herbarium-room*, in which models (in plaster, Roman cement, or papier mâché) of all the fruits, and dried specimens of all or most of the plants grown in the nursery, should be kept, in order to show to purchasers, in seasons when the plants to be purchased are not in fruit or in flower.

6891. *Packing-sheds*, surrounding a part or three sides of a packing-court, one of these being open to, or commanded by, the windows of the office and common living-room of the house. Over these should be a range of seed and store lofts.

6892. *A stable, cart-shed, cowhouse, and pigsty*, if such conveniences are desired, communicating on one side with the packing-court, and on the other with the wall ; a coal-shed, a horsedung-heap, and other similar objects in the back area of the dwelling-house.

6893. *A store-ground, or laying-in-ground*, three or more times the size of the packing-court, in which plants taken up may be laid in by the heels, so as to be ready for sale or packing.

6894. *A plot for the hot-houses*, square, octagonal, or polygonal in the circumference or boundary, and the central part for the pits, and all the framing, hand-glasses, &c., with space sufficient for setting out the green-house plants during summer. If the whole boundary cannot be at once, or perhaps not at all, covered with glass, the naked part may be a wall for training fruit trees, and the north border may be devoted to auricula frames or stages, striking cuttings, &c. But in a general nursery, the whole of the boundary of a square may be very properly covered with glass, facing the centre ; that of northern aspect being well adapted for striking plants, and preserving or retarding such as are in flower. The exterior of this boundary line should be arranged for pots, potting, tan-furnace, and general working sheds ; or, if this be not wanted on the south side, that part of the wall may be devoted to the training of fruit trees.

6895. *A compost-ground* for different sorts of earths, gravel, manure, and the rubbish-heap.

6896. *A rotting-ground* for depositing tree seeds, in layers of sand or ashes, in order to rot off their external coats, and promote the decay of nuts or other hard covers of seeds.

6897. *A parterre* for the culture and display of such of the border and florists' flowers as are grown in the nursery, and for a specimen of rockwork, a flower-stage, aquarium, apary, and covered seat for visitors.

6898. *The main area of the nursery* should be laid out, as nearly as the circumstances will admit, in parallelograms, of any convenient dimensions, but not wider than the ordinary length of a garden-line, say under 150 feet, which allows of a row sufficiently long for any purpose. The chief reason for the parallelogram form is, that all rectangular figures are most easily cultivated and measured, and the reason for their being all of the same size is, that the master may, after a little experience, form a tolerably accurate idea of the quantity of every kind of nursery labour requisite for a plot of this shape and size. Thus, supposing each division to contain half an acre ; then one man will dig it in one day, trench it in two days, hoe it, if in wide rows, in a fourth of a day, if in narrow rows, in half a day. A woman, if in beds, will weed it, if very thick of weeds, in two days ; if thin of weeds, in one day, and so on. The compartments should, as much as possible, be cropped with one general class or kind, and by rotation. As, for example, for seven years : 1st, Break up from grass with turnips after trenching ; 2d, Transplanted forest trees, two years ; 3d, Green crop, one year ; 4th, Annual flowers for seed, one year ; 5th, Seedlings, one year ; 6th, Transplanted fruit trees, four years ; 7th, Bedded thorns, two years ; and so on. Some compartments must be set apart for common stools ; and if the circumferential borders are not sufficient or proper for stools of rare or peculiar sorts, others must be contrived by means of hedges, pales, or walls, to produce shelter and shade for cuttings, fit situations for bog-earth borders, American stools, bog plants in general, and similar purposes. If the borders are all of the same width, say ten or twelve feet, it will simplify all future calculations, as in the compartments.

6899. *A grand central, and a circumferential walk*, with some cross walks, should be contrived, to display the whole nursery to the best advantage. A narrow or common-sized border should accompany these walks, except where the broad circumferential border comes in ; and in the narrow borders should be displayed single specimens of all the more rare trees and shrubs grown either from seed, or by other means, for sale, and of all the perennial, biennial, and annual border-flowers sold to the public in the form of

plants, roots, or seeds. Those may be excepted which are grown in the flower garden, rockwork, and aquarium.

6900. *A nursery-orchard* should be formed of some compartments near the house; and in these, one or two plants of each of the hardy standard fruit trees should be planted, in order to come into bearing, and admit of proving the kinds; and from which alone the grafts and buds should be taken (unless on the introduction of new and valuable sorts, in which case such grafts-as can be got must be taken till some of the progeny moved to the nursery-orchard come into a bearing state), which are to be used in the nursery. This orchard should be surrounded by a wall, on which specimens of such sorts of plums, cherries, and pears, may be grown, as do not ripen well as standards; the harder sorts of grapes, and peaches, nectarines, and apricots. The tenderer sorts of vines, and some few peaches, which are tender in the northern counties, may be grown, one of a sort, under each rafter in the range of hot-houses.

6901. *The compartments for stools of every description, and the borders for cuttings*, should be as near the house as possible; as on these, men are employed a greater number of days in the year than on any other of the compartments, and it is therefore desirable that such compartments should be more immediately under the eye of the master.

6902. *Fruit-tree and seed-bed compartments* should come next; then transplanted shrubs; next young forest trees transplanted; and, in the most distant parts, the larger forest trees, as requiring least culture of all. But a proper attention to rotation will not admit of this arrangement being completely attended to; and to keep the ground in good heart is as essential to success as keeping the men at work.

6903. *In some of the principal London nurseries* which have risen to their present eminence by degrees; and where consequently one building or additional object has been added to another as wanted, without having any general plan in view, the greatest confusion in appearance, and a considerable loss of labour, are the final result. The best way in such a case is to pull down great part of the hot-houses and outbuildings, and rearrange the whole on some plan which will admit of a regular tour of inspection, either by the master or stranger visitants. A fine example of this is given at the establishment of the Messrs. Loddiges; whose arrangement, and mode of displaying the whole to strangers, is of the most perfect description.

6904. *The Hackney nursery* (fig. 980.), or commercial botanic garden, affords an example of a small irregular spot, laid out both with due consideration as to effect, botanical science, and economy as to culture. The entrance (a) leads to the range of hot-houses, and commences with the stores (b), proceeds to the grand palm-house (c), thence to the dry-store bulbs, and other articles (d), to the double camellia-house (e), and the green-house plants (f). The area enclosed by these buildings is devoted to the culture of plants in pits and frames, to beds of rare American and herbaceous plants, and to collections in pots ready for sale. The outside space on the north side (g) is used as a depository for soils, pots, and other agents of culture; and for propagating pits (h), and nursery plantations of delicate articles. The visitant having arrived at the end of the artificial climates, next enters on the course of the arboretum (i i i), which is arranged alphabetically, and occupies one side of a winding walk, till it has exhausted all the trees and shrubs which will grow in the open air, with the exception of some of the more common species, of the roses, and American select shrubs. This walk crosses a public lane (k), on an elevated bridge, and, entering an irregular piece of ground, winds round it till it terminates in an American ground in the centre (m), composed of a series of revolutions of grass walks, with intervening beds of bog earth, displaying a complete collection. The arboretum alphabet is only carried along the right hand of the arboretum walk (i i i), and on the left hand is a complete collection of roses for a certain length, and then herbaceous plants for the rest of the space. The beauty of this arrangement is, that there is no interruption to the series when once entered on, while at the same time any of the genera along the winding paths may be gone to at once by small paths, which occur here and there across the borders. A visitant wishing to see the American collection only, will proceed at once to its commencement (l), and wind along it till he arrives at its termination (m), and so on. The arboretum contains a number of species

and varieties not before introduced, or hitherto neglected in this country. Every species commences with a named specimen, left to attain its natural size and shape next the walk; behind, in a line, are stools for laying or stocks for grafting, and the next two or three lines are devoted to the reception of the young plants till sold or disposed of. This mode saves much trouble in culture, and at once shows the purchaser the sort of tree he is to get, and assures him that he is getting its real progeny. The names of the trees and American shrubs, and the numbers of the herbaceous plants and roses, are painted on the ends of bricks, which are let half their length into the ground, in an oblique manner, so as their ends may meet the eye at a favourable angle,

6905. *Of florists' gardens* there are two sorts; the first for the purpose of forcing flowers in pots, for drawing-room gardens, and raising others in the open air for the flower-market; and the second for the propagation and culture of florists' flowers, in order to vend their bulbs and plants. Both should be situated near a large town, as a market for the produce of the first kind; and to insure visitors to the flower-shows of the second. A low situation, if possible near the sea, but at all events with a humid atmosphere, is to be preferred for the culture of bulbs; and no florists' flower will thrive in an atmosphere impregnated with coal smoke. Very little skill is necessary for laying out either of these gardens, to those who understand the culture they require. The hot-house, pit, and frame departments should be kept together; close to them the compost, dung, and tan grounds or sheds; next the ground where pots of roses, &c., are plunged; and the most distant parts remain to be devoted to the culture of flowers or flowering shrubs in the open ground. For the convenience both of culture, without treading on the plants, and of gathering the flowers, the whole is generally laid out in beds: sometimes with box-edgings, but more commonly without any, which, for bulbs and plants to be annually removed, admits of more effectual culture.

6906. *Market-gardens* are of two kinds; those cultivated by manual labour, and those wholly or in part by the plough. In choosing a fit situation for a market-garden, regard must not only be had to the requisites for a good kitchen-garden, as to shelter, soil, water, &c. (3210. to 3315.), but to the probable market kind of produce to be grown, &c. The extent must depend jointly on these circumstances and the capital to be employed. The smallest extent of surface and capital is that in which a man performs the whole of the labour himself, and this so entirely depends on the articles cultivated, the nature of the soil, and mode of culture, that it may vary from one to two acres, and, where grain and seed crops are introduced, to a greater number. As to the quantity of ground which a man of capital may manage by this way, no limits can well be assigned to an active and vigilant master. Some London gardens of this description, entirely cultivated by manual labour, exceed 100 acres. In laying out a market-garden there cannot be said to be any thing peculiar: the general points of order, distinctness of compartments, and keeping the plots as much as possible in squares and parallelograms, are of obvious importance.

6907. *Public orchards* are of various kinds; garden orchards, where the ground is cultivated and cropped with culinary vegetables or small fruits; arable orchards, where the trees are in rows, and the spaces between in aration; and pasture orchards, where the trees are scattered over pasture lands. In fixing on a situation for either kind, the three chief points are soil, subsoil, and shelter, which have been already considered in treating on private orchards, as well as the planting and kinds of fruit trees.

6908. *Physic or herb gardens*, if for growing aquatic herbs, as mint, should be situated in a low moist soil; if for aromatic herbs, as lavender, rosemary, &c., on a dry poor soil; and if for roses and similar plants, which produce flower-leaves for the distiller, the soil should be loamy and rich. In laying out this kind of garden, the only point in which skill is requisite, is the contrivance of a system of irrigation for the mints.

6909. *Seed gardens*, or seed farms, require a dry soil; and two should never be situated together, if destined for seeds which will injure each other by cross fecundation. All the art required for these gardens consists in cropping, so as to insure seeds true to their kind. Indeed, the culture is by far the most important consideration, not only in this, but in the four preceding descriptions of public gardens; and this is still more the case with respect to *gardens for peculiar crops*, as for the bulbs of white lily, rhubarb-roots, liquorice, &c.; which, as to laying out, require no farther notice.

CHAP. V.

Practitioners of Landscape-Gardening.

6910. *The practice of landscape-gardening* has been thought such a simple business, that every proprietor might perform it for himself. The same thing, indeed, may be said of the practice of medicine, law, or cookery; for every one can prescribe a cure, decide a quarrel, or boil an egg. "Improvements may be suggested by any one," Repton observes, "but the professor only acquires a knowledge of effects before they are produced, and a facility in producing them, by various methods, expedients, and resources, the result of study, observation, and experience. He knows what can and what cannot be accomplished within certain limits. He ought to know what to adopt, and what to reject; he must endeavour to accommodate his plans to the wishes of the person who consults him, although in some cases they may not strictly accord with his own taste."

(*Observ. on Landsc. Gard.*, p. 10.) A more wise plan than that of doubting on the subject would be to have the separate opinions of different landscape-gardeners and architects; for no opinion need be followed if disapproved of, while the probability is, that there would be something valuable in each; and the proprietor might finally, aided by the artist he preferred, decide for himself, never, however, forgetting the idea of a consistent and beautiful whole. As to the expense of opinions, Girardin observes on this subject, "N'alles pas le regarder; il vous en coûtera bien davantage pour des variations, et des retouches continuelles."

6911. *The intimate connection between landscape-gardening and architecture*; the propriety and advantage of the joint consultations of the landscape-gardener and the architect, as to the situation, aspect, and style of the house; together with the almost unavoidable encroachments of the former on the latter, by designing and executing garden-buildings, has given rise to an opinion, that the landscape-gardener ought to combine the functions of the architect. Repton justifies the idea, by referring to the many excellent houses built by Brown, with no other knowledge than that acquired by observation of all the best houses; and of Kent, who was at once landscape-gardener, architect, and historical painter. We are of opinion, that, in the case of garden-buildings and small villas, or ornamented cottages, the knowledge both of the theory and practice of architecture, which it is necessary every landscape-gardener should possess, may sometimes enable him to combine the duties of both professions; but such are the advantages of a division of labour, in the fine, as well as in the useful arts, that in all more extensive buildings, and, indeed, even in those we have mentioned, we would recommend the employment of a regular architect, jointly with a landscape-gardener, as a surgeon consults with a physician in important cases. The duties of the landscape-gardener resolve themselves into the formation of a plan or design, and the carrying of it into execution.

SECT. I. *Study of the given Situation and Circumstances, and Formation of a Plan of Improvement.*

6912. Whatever may be the *situation and circumstances* where the opinion of a landscape-gardener is desired, he should be furnished with a written or verbal instruction as to the points to which he should chiefly direct his attention; with a complete map of the estate, and an accurate detailed history and description of its localities and peculiarities. From these, from topographical and county surveys, and a residence of a few days or weeks, according to the extent of the subject and season of the year (spring, before the leaves expand, being the most favourable time), he will be able to procure every requisite information, and to establish in his memory every thing relating to the situation and vicinity. He is then, and not before, to embody and mature his ideas of improvement; directing his attention first to the situation and aspect of the house and offices, the extent of the park, and the placing of the kitchen-garden; next to the general masses of wood; and then, successively, to the breadth of lawn, the situation and character of water, the pleasure-ground, farm, and other details. Before making up his mind on any part of the subject, he will often find it of importance to have sections taken of the grounds in different directions, levels of springs, and rills, &c.; and most frequently he will have occasion for stakes, for marking out lines on the ground; of flagstaffs or poles, from six to fifty feet high, to represent the effect of trees (*fig. 981.*) and other objects; of strips



of white sheeting, to show the effect of water, by forming a white outline on a perfect level; of frames partially covered with boards, to show the effect of buildings; and he may even require boring-irons, or pits dug, in order to enquire into the nature of the subsoil. Being furnished with a plan of the present state of the grounds (such as *fig. 636.*), he will, as he makes up his mind on particular improvements, mark them down on this map in pencil, and, when the whole is finally adjusted, he will put them in red, or in any distinguishing colour. And on one or more general or panoramic views (*fig. 638.*), as well as on the particular views which he may have taken on dif

ferent spots, he will also mark in red the outlines that will be made by the improvements adapted to the different situations. In addition to these, he will show the effect, by geometrical sections taken in different directions across the grounds (*fig. 634.*), to show the ground's surface. His next operation is to make a vertical profile (*figs. 638-640.*), showing the effect of the whole, supposing the alterations to be fifteen or twenty years completed, with corresponding panoramic or general views, and with particular landscapes.

6913. It remains for him to give *reasons in writing* for all that he proposes; a practice which no employer or artist should ever omit to have done; as such opinions remain as data, to be referred to concerning the management and future effects, as well as in point of present or future justification of the taste, both of the artist and proprietor. These reasons may be arranged in the following order:—1. Recapitulating the given instructions; 2. The characteristic features, and other details, of the given situation and vicinage; 3. A description of, with the reasons for, the general outline of improvement; 4. The description of, with the reasons for, the detail; 5. An outline of the future management; 6. Directions for the execution; and, 7. An estimate of the expense.

6914. *In all these discussions* proper references should be made to the maps and sketches. Simple language should, of course, be employed in describing future effects; but, above all, simple sketches, which owe little of their effect to shading, and none to colouring, or finishing, are essentially necessary.

6915. *Girardin* seems to have been the first who suggested this mode of obtaining an opinion systematically; and his remarks on the fallacious effect of beautiful drawings instead of outlines, are well deserving of attention. "Vous tâchez même que cette esquisse ne soit qu'un simple trait, et ne présente d'abord que les formes principales des objets, et la disposition générale des grandes masses de votre ensemble. Un dessin bien fini ne manquera pas de vous séduire par l'agrément de la touche d'un habile artiste; vous vous déterminerez d'après un dessin dont vous ne réusirez peut-être pas à obtenir l'effet dans la nature, et il faut bien mieux avoir à gagner qu'à perdre dans l'exécution."

6916. *Repton* has the merit of employing this system elegantly and extensively in England, and of adopting, instead of one entire landscape to show the previous taste, and another to show the effect of the alterations, a slip of paper of the size and shape of those parts of the landscape which require alteration. This is fixed at one edge of the entire landscape, and lies flat over part of it, so that when lifted up it shows the full effect. It must be confessed, however, that, though an elegant mode, it is not perfectly fair, since the view in which the cut paper forms a part can never look so well as the other, even from the mere circumstance of the bounding line of the paper. For some cases, however, it may be used, though in general it will be found, that two entire landscapes afford the most impartial means of judging of the effects of an improvement. The discussion and sketches of the place and improvements being finished, and bound in a book, the ground or working plan is to be put on canvass, or copied on parchment, for the common use of the gardener, or whoever sets out the work; and the profile put on rollers, to be preserved along with the book of *notitia*. These being delivered to the proprietor, he will determine, after mature deliberation, whether or not he will adopt the whole, or any part of the improvement, previously consulting those friends whose taste or judgment he considers adequate to forming a judicious opinion on the whole, or any one part of the subject. "Lorsque l'esquisse de votre ensemble a-ra faite, alors vous réflécherez, vous concerterez, vous discuterez avec des gens de goût, l'ordonnance générale de la disposition qu'elle vous présente." In this example of forming a plan, we have had in view a dull and nearly flat site, where nothing has been done; but it is evident that the same general principles are applicable to such places as are to be altered, diminished, or enlarged.

6917. *By a general plan, accompanied by others more detailed*, of the kitchen-garden, pleasure-grounds, terrace, &c., and by the explanatory details of the book of *notitia*, any gardener of ordinary intelligence may execute the most intricate design, and if this design has been carefully formed from inspecting the premises, and proper general views have been minutely taken from different points, the landscape-gardener may show the effect of future improvements with confidence, and leave behind him the *Notitia*, or *Book of Improvements*, or, in other words, such plans, sections, views, and written instructions, as may enable the gardener gradually to produce them, with nearly as much certainty as an architect directs a builder to raise an elevation of masonry. Distantly situated proprietors, ambitious of displaying some refinement of ideas on rural matters, might in this way first procure, and then work to, a general plan; instead, as is often the case at present, of working according to their own crude notions; and producing scenes which afford no pleasure to any one but their owner, and only to him while he remains *in statu quo* as to taste.

SECT. II. Carrying a Plan into Execution.

6918. *Whether a plan be carried into execution by contractors, or by the proprietor at his own risk*, must depend on circumstances, both respecting the knowledge, taste, and leisure of the proprietor, and the nature and extent of the improvements. Where an entirely new house and grounds are to be created, the employing of an eminent substantial contractor for the buildings, and another for the ground operations, will be found the most speedy and certain as to expense; the work, in both cases, being liable to be regularly examined at stated periods by a neutral surveyor, accompanied by the original designers of the improvements. If this mode be not adopted, the whole or greater part may be done under the eye of the owner and his steward; as many parts as possible being let by the job. We shall take a cursory view of the chief objects of alteration or addition; and indicate some things in each, which may in most cases be

more profitably done by the job, premising, that, whenever the cost or intricacy of any piece of work is considerable, unless a contractor of some respectability is employed, the work is much better done by the labourers of the proprietor.

6919. *Buildings.* All alterations or new erections may be readily estimated and executed by contract, and, almost in every case, at less expense to the proprietor. The mere difference between the trade price and the gentleman's price of the materials and labour, and between the hours kept, and quantity of work done in a given time by a journeyman to a master-tradesman, and to a gentleman, will (if the former should, by error in estimating, find no other gain) afford a certain profit to the tradesman; and thus, suppose a contractor to estimate a piece of work at 1000*l.*, which the proprietor, changing his mind, instead of letting to the contractor, executes himself, and finds the amount 1100*l.*, the contractor, had he got the job, would have actually had a profit, and the owner been a gainer of 100*l.* Every one who has had much to do with building, or with laying out grounds, must be well aware of this fact. The mansion, domestic and farming offices, garden-walls, and hot-houses, may be all separately contracted for; and all the details for this purpose, from the communications of professional men of science and experience, will be found in our *Encyclopedia of Cottage, Farm, and Villa Architecture*.

6920. *Ground.* The removal of ground, fences, or digging, may in every case be let by the job, and with decided advantage to both parties. The extent of particular contracts should, of course, be in proportion to the responsibility of the contracting parties.

6921. *Planting.* The enclosures and the preparation of the soil may, in all extensive cases, be executed by contract; but the planting or insertion of the plants, on which so much depends, should uniformly be done by day-work; excepting, however, those cases in which a respectable nurseryman will engage to put in a certain number of plants of a certain kind, size, and age, and maintain them there for at least three years. In some extensive cases, the land may be prepared by fallowing, which the adjoining farmers will generally undertake at a very moderate price per acre. In most cases, the contractor for fences, of whatever description, should undertake to uphold them for a given number of years; and in cases of thorn-hedges, or other live fences, until they become sufficient barriers.

6922. *Road and walk making* may frequently be contracted for; but in this case, as in every other, much will depend on the skill, activity, and experience of the gardener or general overseer. This subject will be found illustrated at greater length, and in a manner incompatible with the nature of this work, in our forthcoming *Encyclopedia of Landscape-Gardening*.

PART IV.

STATISTICS OF BRITISH GARDENING.

6923. AFTER having considered gardening as to its history, as to the scientific principles on which it is founded, and the application of these principles to the different branches of practice; it remains only to take a *statistical survey and estimate* of its present state and future progress in the British Isles.

BOOK I.

PRESENT STATE OF GARDENING IN THE BRITISH ISLES.

6924. *The present state of British gardening*, as to knowledge, has been the subject of PARTS II. and III. of this work; but its importance, in the general economy of society, can only be learned by a statement of the manner in which it is actually carried on; the modifications to which it has given rise in the pursuits of those who have embraced the art as a source of livelihood; the kinds of gardens employed by men of different orders in the state; and the private or professional police, and public laws relative to gardeners and gardens. In the preceding editions of this work, we included a chapter enumerating the principal gardens of Britain arranged according to the counties in which they were situated; and also a chapter on the bibliography of gardening, giving

a slight notice of all the principal works which have been written on the subject, and their authors. We have omitted the first of these chapters in the present edition, because, after every endeavour on our own part, and after receiving the assistance of a great many friends and correspondents, we have found it impossible to attain accuracy as to the names of proprietors, or to give satisfaction as to what places ought to be noticed, and what omitted. The chapter on gardening bibliography has not been inserted, because the list of books referred to, which follows our preface, is considered a sufficient substitute for practical men; and because, for book collectors and amateurs, a complete work on the subject of gardening bibliography, which will in short be a complete Biographical History of British Gardening, is expected shortly from the pen of Mr. Forsyth.

CHAP. I.

Different Conditions of Men engaged in the Practice or Pursuit of Gardening.

6925. *Gardeners* may be arranged as operators or serving gardeners; dealers in gardening or garden tradesmen; counsellors, professors, or artists; and patrons.

SECT. I. *Operators, or Serving Gardeners.*

6926. *The garden labourer* is the lowest grade in the scale of serving gardeners. He is occasionally employed to perform the common labours of gardening, as trenching, digging, hoeing, weeding, &c.: men for the more heavy, and women for the lighter employments. Garden labourers are not supposed to have received any professional instruction, farther than what they may have obtained by voluntary or casual observation. In all gardens where three or four professional hands are constantly employed, some labourers are required at extraordinary seasons.

6927. *Apprentice.* Youths intended for serving or tradesmen gardeners are generally articulated or placed under master or tradesmen gardeners, for a given period, on terms of mutual benefit: the master contracting to supply instruction, and generally food and lodging, or a weekly sum as an equivalent; and the parents of the apprentice granting the services of the latter during his apprenticeship as their part of the contract. The term agreed on is generally three years; or more, if the youth is under sixteen years of age; but whatever may be the period, by the laws as to apprentices, it must not extend beyond that at which the youth attains the age of manhood. No one can ever expect to attain to the rank either of master-gardener or tradesman-gardener, who has not served an apprenticeship to the one or the other. In general, it is preferable to apprentice youths to master-gardeners, as there the labour is less than in commercial gardens, and the opportunities of instruction generally much greater.

6928. *Journeyman.* The period of apprenticeship being finished, that of journeyman commences, and continues, or ought to continue, till the man is at least twenty-five years of age. During this period, he ought not to remain above one year in any one situation; thus, supposing he has completed his apprenticeship in a private garden at the age of twenty-one, and that his ultimate object is to become a head-gardener, he ought first to engage himself a year in a public botanic garden; the next year in a public nursery; that following, he should again enter a private garden, and continue making yearly changes in the most eminent of this class of gardens, till he meets with a situation as head-gardener. The course to be followed by an apprentice intended for a tradesman-gardener is obvious: having finished his period in a private garden, let him pass through a botanic and nursery garden, and then continue in the most eminent of the class of public or tradesmen's gardens, to which he is destined.

6929. *Foreman* (before-man, or first man). In extensive gardens, where a number of hands are employed, they are commonly grouped or arranged in divisions, and one of the journeymen of the longest standing is employed as foreman or sub-master to the rest. Whenever three or more journeymen are employed, there is commonly a foreman, who has a certain extent of authority at all times, but especially in the absence of the master. This confers a certain degree of rank for the time being, but none afterwards.

6930. *Master-gardener.* A journeyman has attained the situation of master-gardener, when he is appointed to the management of a garden, even if he has no labourer, apprentice, or journeyman under him; but he has not attained to the rank of master-gardener till having been a year in such situation. Afterwards, should he be obliged to work as journeyman, he still retains the rank and title of master-gardener, but not of head-gardener.

6931. *A head-gardener, or upper gardener,* is a master who has apprentices or journeymen employed under him. Out of place and working as a journeyman, he retains the rank and title of master-gardener, but not of head-gardener.

6932. *Nursery-foreman*. This is an important situation, the foreman being entrusted with the numbered and priced catalogues of the articles dealt in; authorised to make sales; entrusted to keep an account of men's time, &c. (see *Time-Book*, 3171.); and in consequence it entitles the holder to the rank of head-gardener while so engaged, and to that of master-gardener ever afterwards: the same may be said of foremen to public botanic gardens, and royal or national gardens.

6933. *A travelling gardener* is one sent out as a gardener, or collector of plants, along with scientific expeditions; he is generally chosen from a botanic garden; and his business is to collect gardening productions of every kind, and to mark the soil, aspect, climate, &c. to which they have been habituated.

6934. *Botanic curator*. This is the highest situation to which a serving gardener can attain next to that of being the royal or government gardener. He superintends the culture and management of a public botanic garden; maintains an extensive correspondence with other botanic curators; exchanges plants, seeds, and dried specimens, so as to keep up or increase his own collection of living plants, and *herbarium siccum*. Abroad, for want of sufficiently intelligent practical gardeners, they have what are called *directors* and inspectors of botanic or other government gardens; but no such office is requisite in this country.

6935. *Royal gardener, court-gardener, or government-gardener; jardiner de la cour, Fr. hofgartner, Ger.; and giardiniere della corte, Ital.* This is the highest step, the *summum bonum*, of garden servitude. In foreign countries, the court-gardener wears an appropriate livery, as did formerly the head gardeners of the principal nobility, as well as the court gardeners of this country. At present this remnant of feudal slavery is laid aside in every grade of British garden servitude.

SECT. II. Tradesmen-Gardeners.

6936. *Of tradesmen-gardeners*, the first grade is the *jobbing-gardener*, who lays out or alters gardens, and keeps them in repair by the month or year. Generally he uses his own tools, in which he is distinguished from the serving gardener; and sometimes he supplies plants from a small sale-garden of his own.

6937. *Contracting gardeners, or new-ground workmen*, are jobbers on a larger scale. They undertake extensive works, as forming plantations, pieces of water, roads, kitchen-gardens, and even hot-houses, and other garden structures and buildings. Formerly, and especially in Brown's time, this branch of trade was combined with that of the artist-gardener; but now, since the principle of the division of labour has been so much refined on, they are generally separated.

6938. *Seed-growers* are as frequently farmers as gardeners; their gardens or fields are situated in warm districts, and they contract with seed-merchants to supply certain seeds at certain rates, or to raise or grow seeds furnished to them by the seedsmen on stipulated terms. The great test of excellence here is never to grow at the same time such seeds as may hybridise the progeny by impregnation.

6939. *Seed-merchants, or seedsmen*, deal in garden seeds, and other garden productions: in general they combine the business of nurserymen or florists, but sometimes confine themselves entirely to dealing in seeds wholesale, or to a sort of agency between the seed-growers and the nursery-seedsmen.

6940. *Herb-gardeners* grow herbs, either the entire herb, as mint, or particular parts, as the bulb of lillium and the flower of the rose, for medical purposes or for distillation or perfumery.

6941. *Physic-gardeners, herbalists, or simplists*, not only grow herbs for the purposes of medicine or perfumery, but collect wild plants for these purposes. Formerly, when it was the fashion among medical men to use indigenous plants as drugs, this was a more common and important branch of trade. They have commonly shops appended to their gardens, or in towns, in which the herbs are preserved, and sold in a dried state.

6942. *Collectors for gardens*. The first variety of this species are the gipsy-gardeners, who collect haws, acorns, and other berries and nuts, and sell them to the seedsmen; the next are those who collect pine and fir cones, alder catkins, and other tree seeds, which require some time and a process to separate the seeds from their covers, and clean them, before they can be sold; and the highest variety are those gardeners who establish themselves in foreign countries, and there collect seeds and roots, and prepare dried specimens of rare plants for sale.

6943. *Orchardists* of the simplest kind are such as occupy grass orchards, where the produce is chiefly apples, pears, and plums, for cider or kitchen use; the next variety occupy cultivated orchard grounds, where fruit shrubs, as the gooseberry, currant, strawberry, &c., are grown between the fruit trees; and the highest variety occupy orchards with walls and hot-houses, and produce the finer stove fruits and forced articles.

6944. *Market-gardeners* grow culinary vegetables and also fruits: the simplest kind are those who grow only the more common hardy articles for the kitchen, as cabbage, peas, turnips, &c.; a higher variety grow plants for propagation, as cauliflowers, celery, and artichoke plants, and pot-herbs, as mint, thyme, &c.; and the highest variety possess hotbeds and hothouses, and produce mushrooms, melons, pines, and other forced articles and exotic fruits. They have often shops at their gardens, or in towns, for the disposal of their produce; and these, when fruit is chiefly dealt in, are called fruit-shops, but where culinary vegetables are also sold, green-grocery shops. Most commonly, however, the culinary vegetables are carried to market, and are there disposed of to such as retail them in shops or on stalls. Occasionally they are deposited for sale in the hands of agents or brokers, and sometimes shops are supplied regularly on certain conditions.

6945. *Florists* are divided into two kinds: the first is the *market-florist*, who grows and forces flowers for the market; and of this subspecies are two varieties, those who grow only hardy flowers to be cut as nosegays, and those who deal chiefly in exotics or greenhouse plants to be sold in pots. The other subspecies is the *select florist*, who confines himself to the culture of bulbous-rooted and other select or florists' flowers, who has annual flower-shows, and who disposes of the plants, bulbs, tubers, or seeds.

6946. *Botanic gardeners* are such as devote themselves exclusively to the culture of an extensive collection of species for sale; these may be either limited to indigenous kinds, as was the botanic garden of the late Don of Forfar, which embraced all hardy plants, or extending to tender exotics. Botanic gardeners also collect and dry specimens of plants, and also of mosses, Fungi, Algae, &c. for sale; to this they often join the collecting of insects, birds, and other animals.

6947. *Nursery-gardeners, or nurserymen.* This is the highest species of tradesman-gardener. Their business is to originate from seed, or by other modes of propagation, every species of vegetable, hardy or exotic, grown in gardens, to rear and train them for sale, and to pack or encase them, so as they may be sent with safety to distant places. The nurseryman is commonly, also, to a certain extent, a seed-grower, and is generally a seed-merchant, supplying his customers annually with what seeds they require for cropping their gardens, as well as with the trees they use in stocking them. The simplest variety of nursery-gardener is he who confines himself to the rearing of hedge plants and forest trees; the highest, he who, in addition to all the hardy trees and plants, maintains at the same time a collection of tender exotics.

SECT. III. *Garden Counsellors, Artists, or Professors.*

6948. The first species of this genus of gardeners is the *garden surveyor or valuator*. His business is to estimate the value of garden labour and produce, and of garden structures, edifices, and gardens themselves. When a proprietor lets his house and garden to a tenant for a certain number of years, the stock of the garden is valued, and either entirely paid for by the tenant, or it is again valued when the latter quits the premises, and the difference in value paid either by the tenant to the landlord, or by the latter to the former, as the case may be. It is the business of the garden surveyor to estimate the value of the stock, crop, and business of nurserymen, and other tradesmen-gardeners quitting or entering on premises, or purchasing or disposing of their establishments. The garden-surveyor is sometimes also a garden auctioneer; but generally his business is confined to valuing, and it is practised by nurserymen or other tradesmen-gardeners.

6949. *The tree-surveyor, or timber-surveyor*, limits his occupation to arboriculture; he measures and values standing timber or copsewood; estimates the value of young plantations, with the expense of forming them, and of managing them during a certain number of years; of enclosing with live hedges of every kind, and their management till fence high; and not only determines what trees shall be felled, thinned, or pruned, but directs the manner of performing these operations.

6950. *The horticultural architect (planner, Scotch)* gives designs for kitchen-gardens and flower-gardens, with their structures and buildings; he sometimes also lays out shrubberies and pleasure grounds, when on a small scale. In this case he takes the title of ornamental gardener (*planner of policies, Scotch*), or ground-architect.

6951. *The horticultural artist* is employed in designing and painting fruits, flowers, plants, implements, and horticultural structures and gardens; but chiefly in drawing fruits and flowers, the designs for the gardens and structures being more commonly drawn by the horticultural-architect, or landscape-gardener.

6952. *The landscape-gardener, or layer out of grounds; artiste jardinier, ingénieur des jardins pittoresques, or anglais, and jardinier paysagiste, Fr.; garten künstler, Ger.; and artiste giardinere, Ital.* This species of counsellor gives designs for disposing of the plantations, water, buildings, and other scenery in parks or landscape-gardens, and generally for every thing relating to the arrangement of a country-seat, except the architecture of the mansion, offices, and other buildings; but in what respects the site of them,

and the exposure of the principal fronts and apartments of the house, his counsel is required jointly with that of the architect.

6953. *The gardening author* may be considered the most universal kind of garden-counsellor, since his province extends to every branch of the art. The simplest variety of this species is the author of remarks, or an essay, or treatise on one particular plant or subject; the most comprehensive, he who embraces the whole of the science and art of gardening; but the most valuable, he who communicates original information.

SECT. IV. *Patrons of Gardening.*

6954. *Every man* who does not limit the vegetable parts of his dinner to bread and potatoes, is a patron of gardening, by creating a demand for its productions. The more valuable patrons are those who regularly have a dessert on their tables after dinner, and who maintain throughout the year beautiful nosegays and pots of flowers in their lobbies and drawingrooms.

6955. *Amateurs* (lovers of gardening). These promote the art by the applause they bestow on its productions, of which, to a certain extent, they become purchasers.

6956. *Connoisseurs* (critical or skilful lovers of gardening). These promote the art in the same way as the amateur; but much more powerfully, in proportion as approbation, founded on knowledge, is valued before that which arises chiefly from spontaneous affection. By the purchase of books, engravings, and drawings, from which, in great part, these patrons of gardening acquire their knowledge, they may be said to be eminent encouragers of counsellor-gardeners.

6957. *Employers* of gardeners, whether of the serving, tradesman, or counsellor classes, are obvious and undoubted patrons of the art.

6958. *Occupiers of gardens* necessarily employ both serving and tradesmen gardeners; and, when they are amateurs or connoisseurs, are often great encouragers of the art.

6959. *Proprietors of gardens* are the most eminent of all patrons, promoting every department of the art, and employing serving, tradesmen, and artist gardeners. A man whose garden is his own for ever, or for a considerable length of time, whether that garden be surrounded by a fence of a few hundred feet, or a park-wall of ten or twelve miles, will always be effecting some change in arrangement, or in culture, favourable to trade and to artists. "I pity that man," says Pope, "who has completed every thing in his garden." "Après mes enfans et deux ou trois femmes que j'aime, ou crois aimer à la folie, mes jardins sont ce qui me fait le plus de plaisir au monde; il y en a peu d'aussi beaux." (*Mémoires et Lettres du Prince de Ligne*, tom. i. p. 117.)

CHAP. II.

Different Kinds of Gardens in Britain, relatively to the different Classes of Society, and the different Species of Gardeners.

6960. IN order to form an estimate of the importance of gardening to a people, and of the duties of gardeners in filling different situations, it is not only necessary to notice the different species of gardeners to which it has given rise, but also the different kinds of gardens; the classes of society which enjoy them; and the operators and patrons who cultivate and encourage them. In this view, gardens may be arranged as private, commercial, or public establishments.

SECT. I. *Private British Gardens.*

6961. *Of private British gardens*, the most numerous class of gardens, and those the most regularly distributed over the British Isles, are those of the country labourer, or what are usually denominated *cottage-gardens*. Next to his cottage, the labourer finds his garden the most useful and agreeable object, by supplying a part of his food, affording an agreeable source of recreation, and presenting an opportunity of displaying his taste in its cultivation. To the labourer who has no cottage or garden, human life presents no hopes; his future extends only to a few days; he has only fixed wages, which the most fatiguing exertions can in no degree increase, and of which, in the case of illness, he has only the amount of a week to interpose between the absolute want of lodging and food. But the labourer who rents a cottage and garden is secure, at all events, of a roof to cover him; and he knows that he can live for a certain time on the produce of his garden. Besides, he has that most desirable object, something that he can call his own; and is thus enabled to participate in the feelings which belong to the love of property and progeny—feelings often, indeed, mixed with pain, but which nevertheless have been an object of ambition from the earliest ages of the world.

6962. *Cottage-gardens*, in a moral and political point of view, are of obvious importance; attaching the cottager to his home and to his country, by inducing sober, industrious, and domestic habits; and by creating that feeling of independence which is the best security

against pauperism. (See *Denson's Peasant's Voice*, *Lawrence's Practical Directions*, *Poynder's Cottage Gardener*, and our own *Cottage Manual*.)

6963. *The extent of the garden of a labourer ought never to be such as to interfere with his regular employment; unless it is sufficiently so to enable him to dispose of part of the produce in the manner of a market-gardener; or to keep a cow, and dispose of her produce.* But as it will rarely happen that in either case he can compete in the market with the regular market-gardener or farmer, the most useful extent of garden is that which will occupy his own leisure hours in the operations of digging and planting, and those of his wife and children in hoeing, weeding, and watering. This will generally be something under half an acre, including the space on which the cottage stands; unless, indeed, the cottager is compelled to grow his own fuel; in which case, as we have shown in the *Cottage Manual*, p. 10, an additional acre will be found necessary.

6964. *The vegetables which may be most profitably cultivated by the occupants of this description are, cabbages of the early heading sorts, hardy borecoles, as the German or Scotch greens, early potatoes, parsneps, turnips, carrots, onions, leeks, peas, beans, and kidneybeans; a plant or two of celery (not to be blanchéd), thyme, mint, and chives for seasoning; and a few plants of rhubarb for tarts.* The mode of culture suited for a cottage garden will be found in the works above referred to, and in Main's *Catechism of Gardening*; the latter is an excellent and very cheap work.

6965. *The fruit-shrubs, which ought never to be omitted, are the gooseberry, and black and red currant, as standards, in the margins of the plots, or against the walls or pales, if the garden is surrounded by these; the kinds of gooseberry should be those which grow with straight upright shoots, as the Manchester and Warrington Globe, the yellow globe, the rough green, and the crystal. The fruit trees should be of the best bearing among the baking apples and plums; as the hawthornden, and any of the codling varieties, for early use, the grey russet and Yorkshire greening, for winter and spring; and the damson, bullace, and wine-sour plum; the May duke cherries and a winter bergamot pear may be added. If the climate and aspect is favourable, the most southerly sides of the house may be covered with a white muscadine, or black July grape, or otherwise with pears in the best aspects, currants in the worst, and a rose and honeysuckle on the porch.* (See *Haywood's Conversations on Gardening*.)

6966. *In the management of cottage-gardens, no opportunity should be neglected by the cottager of collecting manure from the highways, from the grass, weeds, and mud of ditches and lanes: leaves of trees, soot-ashes, and all household refuse, should be collected, and the whole mixed together in the dunghill, and turned frequently over before using.* In the culture of these gardens, the principles of a change of surface, and of a rotation of crops, should be attended to; and also that of continually stirring the soil among growing plants as deep as possible; of watering in dry weather regularly every evening, and of gathering by hand all worms, snails, slugs, grubs, and other insects, as soon as they appear. Of potatoes only the early sorts should be cultivated in the cottage-garden; because that plant is now so generally a subject of field-culture, that for a main supply the cottager will find it cheaper to purchase from the farmer, or to rent a few square yards of a field devoted to drilled green crops, and to cultivate himself as many as may serve his family and his pigs and poultry. Besides, in either of these ways, he is more certain of obtaining potatoes of good quality, as, even though the sorts be changed, still the quality is much deteriorated by repeated culture on the same spot.

6967. *Improvement of cottage-gardens.* It is a most commendable practice, and one that ought to be universally adopted, for proprietors who keep head gardeners to desire them to attend to the gardens of the cottagers on their estates; to supply them with proper seeds and plants; to propagate for them a few fruit trees, and distribute them in the proper places in their plots; and to teach them modes of culture suitable for their circumstances. In this way, at no additional expense whatever to the proprietor, much happiness is diffused; and constantly recurring objects, too often indicating wretchedness, or at least slovenliness, rendered useful, neat, and even ornamental.

6968. *Domestic improvement of cottagers.* It would also be a very desirable circumstance if some of the female servants, or even some of the charitably disposed female members of the family, would instruct the cottagers' wives on their estates in improved modes of cookery, washing, making, and mending. It is astonishing how ignorant and how extravagant the humblest classes are in these respects: it is rare to find in operation any principle of action, or much regard to economy in domestic management. It appears to be all work at random, from the making of soup to the baking of pastry. Much might be done by taking any one cottager's dlah, and cooking it in different ways before her. For example, soup from vegetables, water, and a little butter only. How different that made by merely boiling the ingredients *as nature*, and that by browning a part of the butter, adding toasted crumbs of bread, a few chives or onions, and a little celery! How few cottagers know how to make the most of their bees, which, besides honey, afford a most refreshing and enlivening drink, little inferior, when properly made, to champagne. Man, in the condition of a day-labourer, is generally so much engaged in procuring the raw materials of subsistence, that he is without leisure to invent the machinery, or resort to the manipulations necessary for manufacturing them into the best fabric. But let him once be properly instructed in this matter; let him once feel the enjoyments of which even *his condition of life* is susceptible, and he will not easily afterwards relinquish them. In a state of labour and servitude, man is generally so dull and stupid, that almost every degree of refinement, or sensation beyond that of mere animal feeling, is lost on him. The rich man is happily willing to put his hand in his pocket to help him; but that merely affords a temporary relief from evil. To supply instruction in plain practicable economy, and patiently to follow it up till it becomes a habit in the instructed, is to effect a radical improvement in this condition of life; which will be felt by the subjects of it during their lives; and, being transferred to their posterity, like other habits and customs, must ultimately ameliorate this most numerous and efficient order of society. (See *Simpson's Necessity of Education*, &c.)

6969. *Supplying economical knowledge to cottagers.* Something in furtherance of the above ideas might be effected by distributing tracts on cottage-gardening and house-economy; but man, grown up in ignorance, without the habit of reading, does not readily receive instruction from books. His want of experience in book-knowledge prevents him from discerning what is practicable from what is speculative; and consequently he cannot, like the man who is conversant both with books and practice, seize on what is valuable and appropriate to his use. The mind requires a certain preparation before it will receive new ideas; and its faculties must have been exercised on ordinary matters, before reason can be properly employed on any subject not common. Tracts, therefore, among the labouring classes are chiefly useful to their children; and if children were taught the common labours and operations of husbandry and

domestic economy at school, which they might easily be by the Lancasterian method of instruction, it would fit them for entering on a life of labour with superior advantages, both in point of performing their labour, and in making the most of its reward.

6970. *The cottage-gardens of artificers*, that is, of operative mechanics and manufacturers, small tradesmen, and other country artisans, differ from those of the common labourer in being somewhat larger, and in having a larger portion of the space devoted to the culture of fruit trees and flowers. They are cultivated by the occupier and his family, and very frequently sufficient ground is connected with these gardens to enable the occupier to keep a cow or horse. These, indeed, are often half-starved animals, producing little benefit to their owners beyond the feelings of satisfaction which the idea of possessing them confers. In several parts, and especially the north of England, and generally in Scotland, the gardens of artisans differ from those of the cottager in being held on a long building-lease, and in being situated in or around large towns. The most remarkable gardens of this description, for riches, order, and beauty, are at Norwich, where they first originated; at Spitalfields, London, among the residences of the silk-weavers; at Manchester, and other Lancashire and Cheshire towns; and at Paisley and Glasgow. The occupiers are generally their own masters, having their looms or other implements of trade within their dwellings, and being employed by merchant-manufacturers, or taking their goods to a common market. They are generally an intelligent, industrious class of men, who take great delight in their gardens, and the point of practice in which they excel is in the production of florists' flowers. Norwich is, or used to be, noted for carnations. Spitalfields is still noted for all the competition flowers, but especially for auriculas and tulips. Manchester for auriculas and polyantheses, and also for the production of new varieties, and large specimens of gooseberries; and Paisley and Glasgow for pinks. The florists in Lancashire, indeed, excel in every branch of their profession, and are also famous for their success in cultivating the potato, which was in general use in that county long before it was known in many others.

6971. *The farmer's garden* (6842.) varies in extent from an eighth part to a whole acre or upwards, according to the kind of farm. Lord Kaimes (*Cent. Farm.*, p. 297.) considers a fruitful kitchen-garden as the chief accommodation of a farm; yet farmers in general pay very little attention to their gardens, even where the best systems of agriculture are preserved. They are managed in the smallest farms by the farmer himself, with the occasional assistance of his men, and of the female part of his family; in those of a higher kind, where the farmer is not personally an operator, they are managed by a labourer, who is generally kept on the farm for cleaning hedges, clearing out furrows, and doing such extra field-work as cannot be performed by the regular hands of the farm.

6972. *In tradesmen's farms*, large, or what are called gentlemen's farms, villa farms, and *fermes ornées*, the gardens are commonly managed by a gardener, who is expected to assist in the field during the hay and corn harvests; and who, therefore, seldom ranks high in his profession.

6973. *The products of common farmers' gardens* are of the most useful and hardy kinds; but the gardens of villa and ornamental farms contain hot-houses, and often produce many of the luxuries or regular villa or mansion gardens. Indeed, where farmers disposed to excel in gardening, no class of country residents, except landed proprietors, have an opportunity of indulging their taste so variously and extensively, and at so little expense. In the first place, supposing a farmer to have a lease for twenty-one years, at a fair rent; whatever state he finds the farm in, if it be enclosed and subdivided, he may render it a *ferme ornée*, by leaving strips of pasture round all the arable fields, and connecting these by gates in such a way as to form a *drive* or *riding* (6801.) round and through the whole. Secondly, he may form, or enlarge and arrange, the kitchen garden, flower garden, orchard, and the portion of lawn and pleasure ground round or beside the farm-house, at pleasure. Thirdly, he may heat hot-houses, pits, and hotbeds, at the expense of labour only, by fermenting his farmyard dung in such pits, or in other vaults for pines, or behind walls or pales, to force fruit trees.

6974. *Street-gardens, and the smaller suburban gardens* (6835. to 6841.), are the next classes in point of number. They differ from the former in being almost always gardens of pleasure, consisting of a grass-plot (*complot*, Fr. a design or device), with a border, or a few patches of flowers in front of the house, and a grass-plot or gravel walks behind, with beds for culinary vegetables and small fruits. Their extent may be from an eighth to half an acre, and they are managed by jobbing-gardeners by the day or year. As the plants and turf are soon injured by the smoky and confined atmosphere incident to their situation, the finer plants and trees do not thrive in them, and the sorts which do succeed, and even the turf, require frequent renewal. Evergreens and early spring flowers, both of the tree and herbaceous kinds, are most to be desired as permanent plants for these gardens; and in summer, a display of annuals is made from transplanted plants furnished by the jobber, whose great object ought to be to keep up a succession of flowers, to have the grass and gravel in order, and to keep the whole perfectly neat.

6975. *Tradesmen's villas* (6832.), of the smaller kind, may contain from a fourth part to a whole acre; and are commonly managed by a sort of hybrid gardener, who acts also in the capacity of groom, or of house-servant. On a larger scale they are managed by master-gardeners of the lowest kind, as from such situations they can seldom rise to be head gardeners. Besides attending to the duties of the jobber mentioned under suburban gardens, the citizen's gardener ought to study to procure early and late crops

of the vegetables most in use; as peas, kidneybeans, potatoes, turnips, &c., because at these seasons they are dear to purchase. Main summer crops are of less consequence, as they may be procured cheap at market. For similar reasons, he ought never to be deficient of salads, pot and sweet herbs, tart plants, &c., as these are dearer to purchase in proportion to other vegetables, because less in demand. If there are frames, hot-beds, and hot-houses, the same general principles are to be observed, viz., when the whole of what is necessary for the consumption of the family cannot be raised, to raise such crops as, either from their kind, or the seasons at which they are grown, are most dear to purchase.

6976. *Where amateurs of gardening have gardens, they are generally cabinets of rural beauty, however small.* Some of the finest gardens of this kind, in 1822, were those of R. A. Salisbury, Esq., Queen Street, Edgeware Road; and Topham, Elkin's Row, Bayswater; both since destroyed. In 1834, the finest of these gardens were those of Mrs. Lawrence at Drayton Green, and W. Harrison, Esq. at Cheshunt.

6977. *The gardens of connoisseurs vary in extent; perhaps the largest and best furnished is that of Knight, the first of all horticultural connoisseurs, at Downton Castle, which, with the experimental ground, contains several acres, and various hot-houses, pits, and frames.* In general these gardens are to be considered as horticultural work-shops, and beauty and order is not to be looked for.

6978. *Suburban or citizens' villas (6834.) may be considered as occupied by the more wealthy class of citizens; or, if not the more wealthy, at least those possessing most of the taste and tone of good society.* These gardens or residences contain always a portion of lawn or field, as well as a kitchen-garden and shrubbery, and may extend from one to ten acres. They generally contain hot-houses of some kind, and are managed by a regularly bred master-gardener. Besides attending to the duties of a tradesman's gardener, he must bear in mind two things; first, as the families who occupy such places are generally constant residents, he must provide enjoyment both of the agreeable kind from the flower-garden and plant hot-houses, and of the useful kind from the culinary and fruit-garden, for every month in the year; and, secondly, he must attend to the habits of the family as to the kinds of productions and enjoyments preferred. The great art of deriving enjoyment from a country residence of this description, is to provide an interest, a hope, and a fear, for every season, or even for every month in the year. By observing the chapter of monthly productions of horticulture (§484.), and the table of monthly floricultural productions (6238.), the resources which these branches afford are readily discovered. There are also other resources in the nature of culture; such, for example, as raising flowers or fruits from seed. In this view it is good to have some seedlings of early and late flowers, as of the polyanthus and georgina; of early and late fruits, as of the currant or strawberry, and apple, to come into flower and bearing every season. Other devices for exciting and keeping alive interest will readily occur to the reflecting gardener.

6979. *With respect to the habits of a family, it is not only the duty of a gardener to grow those vegetables, fruits, and flowers, of which the members consume the most, or of which they are fondest, but he must also look for other habits of enjoyment; as whether they are fond of walking in the garden, and at what times and places, so as to have every thing in the condition and order best adapted for affording them gratification.* Some delight in smells, and for such the most odoriferous plants should be distributed along the walks; others in sounds, and for these, the trees and plants which produce the fruits preferred by singing-birds should be planted; or birds, in portable aviaries, distributed through the grounds. Some, in walking, may prefer not being seen by workmen, or at least not meeting them in the paths on which they enjoy this mode of recreation; others may take delight in seeing work going forward, and even in asking questions of the operatives.

6980. *In all families there are invalids at some time or other, and a great object is to render the garden an alleviation to their sufferings.* Some afflicted in the lower extremities can only walk on grass-walks; others, from asthma, may not be able to stoop to smell to or gather a rose or a gooseberry; others may require to be carried round the hot-houses in a chair, or wheeled along the walks reclining on a couch. Grass-walks, standard roses, and gooseberries, elevated pots of plants, hot-house paths uninterrupted by pots, and gravel-walks smoothly rolled, are obvious luxuries for such persons. A sick horticulturist, confined to his chamber, may derive some enjoyment from having pots of plants brought before him for a few minutes, to show him their progress; and also by a relation of what work is going on, and what articles are vegetating in the garden. When life is under the pressure of disease, any object or measure which can divert the attention for a moment affords relief; for though night cannot be turned into day without the presence of the sun, its darkness may be lessened by a speck of the dimmest day-cloud. It does not often happen that residences are laid out purposely for invalids; but where this is the case, the designer ought to contrive gently inclined planes instead of

steps or stairs, and to avoid all corners in walks and paths. Easy turnings in walks are also a great luxury to studious persons, who think as they walk. For this reason, an author, if he can afford any other garden than a pot of mint, should surround his plat with an oval path, that he may walk on without end, and without any sensible change in the position of his body.

6981. *Whether a family is of retired or public habits* ought to be noticed by the gardener. A retired family will derive most satisfaction from the useful products, and the personal recreation they can take in their garden; a public or fashionable family, on the contrary, from its beauty, high order, and keeping. Beautiful objects are formed to be admired, that is their use, and what renders them so desirable, and their possessors so much envied; therefore those who possess beautiful objects, in order to derive the enjoyment they are calculated to confer, must court applause by inviting such friends as are likely to become admirers. Let no man shut himself up in the midst of beautiful rural nature and think he will be perfectly happy, lest he should be forced with the satirist to ask—

—“What is nature? ring her changes round,
Her three flat notes are water, plants, and ground.”

6982. To be condemned to *pass a whole life in a pleasure-ground*, would be perhaps as dull as to pass it in a conventicle. Man is a social being, and never can reject the habits to which this part of his nature gives rise with impunity. To be happy, he must see and be seen: it is the operation of this principle that has rendered the most beautiful seats of the country *show-places*, or places which all the world are permitted to come and admire, as Blenheim, Mount Edgcombe, High Clere, &c.; which induces others to publish accounts of their seats, as Dr. Letsom, of Grove Hill; T. Johnes, Esq., of Hafod; the Duke of Marlborough, of White Knights, &c.; which leads the citizen to place his box or lodge, and the artisan or labourer his cottage or cabin, by the roadside; and which, in short, impels the humblest individual to court applause by making his powers, either of purse or mind, known to those around him. A gardener, therefore, must attend to these general principles of our nature, and apply them in his department as well as he can; for much, it is evident, depends on his studying the effect of the scenes under his charge, and keeping them in the most perfect order and neatness for inspection.

6983. *Villas.* (6808.) The grounds and gardens of this class of residences may occupy from ten to a hundred acres, or upwards; they are generally managed by a head gardener, with one or more journeymen, and probably an apprentice, and with the occasional assistance of men and women labourers. The kitchen and flower gardens of places of this sort are generally good, and well furnished with hot-houses; the shrubbery also is carefully laid out, and planted with choice shrubs and trees; and, as the proprietor is generally an opulent commercial man, he is liberal in his annual expenditure. The gardeners at such places are generally well paid, no limits put to the dung, implements, structures, or assistance they may want, and left more entirely to their own discretion than those in the service of country gentlemen. Their responsibility is, therefore, so much the greater, and they are quite unpardonable if they do not excel in their art, and, above all things, in keeping the whole scene under their charge in the utmost order and neatness. It frequently happens, however, that soon after a gardener has got into such a situation, and become familiarised with his garden, and the habits of his family, he begins to consider his place as a sinecure (*sine, adv. and cura*; i. e. without care), and, instead of arduously endeavouring that the productions of the current year shall surpass those of the year past, instead of adding more and more to the enjoyments of his employers, he begins to the with how little they may be put off; and the object of his ambition, which ought to be to delight and astonish his family, is ultimately lowered to that of contenting them. This sort of lethargic indifference, brought on by plenty and ease, is not peculiar to gardeners; it is a condition of our nature, which also furnishes checks to its increase after a certain period; but it is the business of cultivated man to apply these checks at an early stage, and thus to lessen the evils to all parties.

6984. *The simplest check to indolent gardeners* is the demands of their masters, who, seeing at other tables, and in other gardens, productions superior to their own, and knowing that they spare no expense, &c., naturally enquire into the cause of the default. This sort of observation when abroad, and comparison with home, ought never to be neglected by those who wish to keep servants of any description to their duty. The deficiencies and bad points of other gardens and gardeners may be let alone; but their excellencies should always be particularised, and dwelt on to our own; and where a failure happens in the one case, the reasons should be required for the other's superiority in that particular, and our inferiority. If the master ultimately becomes dissatisfied with the condition and produce of his garden, let him first call in the nurseryman who recommended the gardener, as counsel for both sides; and let him consign him to this nurseryman, with such a character as he may be considered to merit.

6985. *On the order and neatness with which a garden is kept*, so much of its beauty and effect depends, that, often as we have mentioned the subject in the course of this work, we must again advert to it. Many excellent gardeners are deficient in these particulars, from causes which, at first sight, would seem calculated to have a contrary effect; such as staying constantly at home in their own gardens, and daily inspecting every part of them. The consequence of this is, that the changes which take place in the growth, decay, or deterioration of objects is so gradual as not to be observed, and that an object seen twice every day for ten days, seems the same thing the twentieth time which it did the first, when, in fact, and to the person who has only seen it two or three times, it is something different. To illustrate this, let us suppose a collection of green-house plants, newly shifted, surfaced, pruned, trimmed, tied, washed, and replaced on the stage, and that one man attends to the watering of them regularly every day for a month. They are newly shifted plants the first day, and consequently require nothing done to them; so they are the second, third, fourth, and so on: even after a week or ten days, they are so considered; and this notion now becomes habitual to the attendant. Every day, as he enters the green-house to water, he sees, without even opening his eyes (that is, the idea recurs), a stage of newly shifted plants, all fresh, and free from weeds and decayed leaves, and wanting nothing; therefore weeds and decayed leaves he never thinks of looking for, but waters on: while a stranger, or one who has not seen them for a few days, is struck with the slovenliness displayed; and though, perhaps, the same thing may take place in his own garden, or his own department in the same residence, he goes away, not willing to benefit the other by corrective advice, but "thanking God that he is not like this man."

6986. *This cause of slovenliness* we think there are few gardeners who will deny to be correctly stated; and we think, the cause being discovered, the remedy very easily presents itself. Let master-gardeners not inspect every part of what is under their care every day at the same time, and in the same order, but let them omit some parts on some days, occasionally omit the whole, and often vary the time and order of their visits. Let them, also, instead of going round to look if such and such scenes are in order, go impressed with the idea of finding them in bad order, in search of particular sorts of weeds, of decayed, damaged, or straggling parts of plants, of insects, &c. It may seem ludicrous to add, let him go round sometimes in the night instead of during day; but we are persuaded that viewing particular scenes by the light of a lantern or the moon, would present them in such a new aspect, as would probably show deformities or deficiencies. It is a common observation of servants, that after their master has been a day or two confined with illness, or on the morning after an evening of dissipation, he is generally very apt to find fault and be cross, and difficult to please. This is actually the case, and is satisfactorily accounted for without reference to humour or temper: the master sees faults which before escaped him, because the machinery of his faculties has been deranged, and he sees differently. But why does he see faults rather than beauties? Because it is his business to seek for them; and this impression being habitual on his mind, the strongest images reflected by the eye are of that nature.

6987. *Visiting neighbouring gardens* is another important part of a head gardener's duty. This should be done with a view not only to order and neatness, but also to good culture, intelligence as to the state of gardening, &c.: he should not limit his visits to those near him, but include all the principal gardens for forty or fifty miles round; and he should, at least once a year, visit the capital or the metropolis, to inform himself, by means of the nurserymen, and among the numerous first-rate gardens that are always found round capital cities, the horticultural societies, and agricultural libraries, of what is going on in the gardening world.

6988. *The mansion and demesne* (6805.) is less common than the villa near large towns, but is more so in the country. The proprietors are sometimes commercial men, but more generally country gentlemen. The extent of these residences varies from a hundred to a thousand acres, or upwards, and, in addition to the park and gardens, they contain a home or family farm managed by a bailiff. The garden-scenery, as in the case of a villa, is managed by a head gardener, sometimes more circumscribed in his operations, but always respectably provided for, both as to his person and garden. The worst point attending residences of this description is, that the business of gardener and bailiff is, sometimes in England, and often in the other districts of the empire, united; and the consequence almost universally is, that the business of both situations is very imperfectly performed. The master's object in attempting this union is obviously the saving of a bailiff's wages, which, though an apparent saving, is not always so ultimately. The gardener and bailiff cannot be present at one time, both in the garden and on the farm; he must pass alternately from the one to the other, and it may be questioned whether the time lost in his absence from both, while going between them or to market, and from the one while on the other, does not more than counterbalance the wages of a bailiff, independently of any other consideration. But the loss both to the farm and the garden, in

cases of this sort, though not very obvious at first sight, is very considerable when details are entered on. No man brought up as a gardener can at once become a good bailiff; and admitting that he may become one in time, yet he acquires his experience at his master's expense. It is generally imagined that a gardener makes a good arable farmer; but this he does not become without experience; for though he may know what good culture is, and may bring the fields of corn or green crops under his charge into a state of good cultivation, yet he may do this at much too great an expense to afford any profit. The management of arable land, however, is but a small part of a bailiff's duty; the grand object is the breeding, rearing, fattening, buying, and selling of live stock; and a knowledge of these parts of farming cannot be acquired without several years' experience. In the mean time, the losses to the master by bad marketing must be most considerable. Suppose the gardener and bailiff goes to purchase a few scores of sheep, and a dozen of oxen for feeding, every grazier knows that on the nature of the *feel* alone, which no man can communicate to another by description, much of the value of the animal depends. But a gardener knows nothing of this *feel*, and the tact of discovering it is not to be acquired but after such a course of experience as no prudent master, who knows any thing of the subject, would wish a bailiff to acquire in his service. As much might be said on the correctness of judgment required in selecting animals to breed together, and in the shrewdness essential for advantageous marketing; the latter, a duty totally inconsistent with the retired habits of a gardener.

6989. *That some gardeners may become good bailiffs* we readily allow, because a man of moderately good natural faculties and persevering application, will acquire any thing; but, from the nature of the duties which a bailiff has to perform, and the time he must occupy on the farm and at market, it is impossible he can attend sufficiently to the garden. We have never yet known an instance where the duties of both the offices were well performed by the same person, but in such cases we have almost universally found both the garden and farm deficient in the products expected from them. That the master is content is no proof to the contrary, for knowing no better, he naturally considers what he has as the best.

6990. *From the country-gentleman's gardener, who does not unite to his duties those of bailiff*, a good deal is expected; he must know his profession well; he cannot probably from limited extent and means produce all he could wish, or that a garden should afford, but what he undertakes to raise, he must raise in perfection, according to the kind and season, and the main crops in sufficient quantity, because he cannot, like the citizen's gardener, have recourse to Covent Garden, or, like the villa-gardener, surrounded by neighbours, borrow from them melons, mushrooms, or asparagus, in cases of emergency. He has one duty also which does not belong to either of these classes of gardeners, that of packing and sending fruits and other garden products to town when the family reside there.

6991. *The mansion-residence* may be considered as including all those between the villa and the royal palace. The dwelling-houses are called houses, halls, courts, or palaces, according to the custom of the country, where they are situated; or castles, abbeys, or Grecian buildings, according to their style of architecture; and mancions or palaces, according to their extent and magnificence. The mansion residence consists of the same parts as in the mansion and demesne (6805.); it may contain from 500 to 10,000 acres, or upwards, and the whole is managed, in first-rate establishments, by the following officers:—*A secretary*, who receives the commands of the master, and conveys them to the *house-steward*, who manages the expenditure of the house and offices, and gamekeeper; to the *land-steward*, who manages the tenanted lands, receiving rents, and seeing to the fulfilments of covenants in leases, repairs, &c.; to the *bailiff*, who manages the family farm; and to the *gardener*, who manages the garden-scenery, including the park, as far as respects the trees and grass, and the internal plantations or forests.

6992. *The gardener who occupies a first-rate situation* has under him a forester, for the demesne woods and park trees; a pleasure-ground foreman for the lawns and shrubbery; a flower-garden foreman, a forcing-department foreman, and a kitchen-garden foreman. A horse and a two-wheeled chaise is kept for his use, and a boy, who not only takes care of his horse, but acts as his messenger and house servant. He lives in a respectable house, near the kitchen-garden, with a stable and cowhouse not far distant. His wages are from 150*l.* to 300*l.* a year, independently of a free house, fuel, and other advantages. He should be at the head of his profession when he enters on it; and keep himself at the head of it, by taking care to be informed of every improvement and invention in his line, as they are discovered and made public. He must not only know all that is in books, but must be in advance in knowledge; not only ready to apply all the best practices, but fertile in expedients on extraordinary occasions, and in cases of novelty, difficulty, or emergency. Necessities and difficulties, as they occur, excite the inventive faculty far beyond reflection or study; therefore we can afford little assistance here, except recommending the gardener who is ambitious to excel in his profession, first to store his mind with all the resources of gardening, and next to lay up in his memory as many ideas as he can on all other subjects, but especially on art and science. Next to books on gardening and agriculture, and topographical surveys of every kind, he should have frequent recourse to the best encyclopædias of general knowledge, and observe the operations, and converse much on professional subjects with mechanics and artificers of every description. Much useful information is to be obtained from carpenters, mill-

wrights, and smiths, and all kinds of information may occasionally be applied to use in so varied and extensive an art as gardening.

6993. *Gardens of royal palaces.* The government-gardens of this country are those of Windsor, Hampton Court, and Kensington; that of Kew being a private royal garden. None of them are in any respect worthy of their rank: the garden at Windsor is without hot-houses; that at Hampton Court consists chiefly of some pine-pits and a vinery; at Kensington, great part of the kitchen-garden is cultivated by the plough, and the only two things which render it worth notice are its pine-stoves, and the public gardens or pleasure-ground. The garden-structures at Kew are in a state of decay, and the gardens are never in first-rate order, often slovenly, and always confined as to arrangements. It

said these things arise from want of funds; and from the low rate at which the operators are paid in these gardens. This seems to be the case, and it is much to be regretted, as it prevents the royal gardeners from displaying their skill and taste. Judging from the pine-apples grown in the forcing departments at Kensington and Hampton Court, there is reason to believe this would be highly creditable to themselves, and exemplary to the nation.

6994. *The royal gardeners* were formerly much consulted by private gentlemen on the subject of their profession; this is still the case, though in a much less degree, and more now as to garden structures or culture, than as to matters of design and taste. With reference to this circumstance, the professional skill of royal gardeners ought to be of the first order, as their opinion will always be law to a certain number of the court, but for the culture and produce of the gardens (situated as these now are), less professional skill is wanting in a royal gardener than in a private head gardener, as deficiencies in products can always be made up from the commercial gardeners, or from Covent Garden.

SECT. II. Commercial Gardens.

6995. *Of commercial gardens,* the lowest species are what are called *ploughed or farmers' gardens.* One or two are to be found near all large towns, and a number round London. They extend from fifty to a hundred and fifty acres or upwards, and are almost entirely cultivated by the plough and other agricultural implements. Their possessors are small farmers, and the chief difference between this *farm-gardening*, and common farming, is, that the green crops that intervene between the corn crops are more highly cultivated, and, instead of being consumed on the farm, are sent to market as culinary vegetables, or food for stall-fed cows. The crops of every kind, but especially the green crops, are cultivated in drills, two close together, with a wide interval, by which means abundance of room is left to plough and horse-hoe this broad interval, and sow a succeeding crop there before the other is removed. In this way two crops are obtained most years; as a specimen of which, we shall mention one of the common rotations, viz., 1. Peas with dung, two rows near each other, and a wide interval; 2. Turnips in the intervals; 3. Drilled wheat between the turnips; 4. Turnips, with dung, in drills after the wheat. These four crops are put in, and removed within two years, the ground being in good heart.

6996. *The seed-garden* is the next species, and forms one of the points of union between horticulture and agriculture. These gardens or small farms are not numerous, and are confined chiefly to two or three counties near the metropolis. They consist of from five to twenty acres or upwards, in part cultivated by the plough; the occupier is not generally a bred gardener, but sometimes is so, and unites with the business of seed-grower that of market or nursery gardener. The seeds he cultivates are generally limited to a few kinds; thus chervil, radish, and cress seeds are grown chiefly in the neighbourhood of Saffron-Walden in Essex; cabbage seeds at Battersea; onions at Deptford; peas in Kent, turnips in Norfolk; rape in Lincolnshire; mustard in the county of Durham, &c. The great art is to grow the seeds true to their kind, for which purpose one grower must not attempt too many varieties of the same species, but he may grow a number of different species, and of varieties of the same species, provided they do not come into flower at the same time. Such seeds as are raised in large quantities, as turnip, mustard, cress, maw or poppy-seeds, peas, &c., are either sold privately by samples, to the London or other seedsmen, or exposed publicly in the seed-market in Mark Lane, London, or in local country markets. But for the greater number of seeds, the practice is for the nurserymen about London to grow a sample of it in their own grounds as pure and perfect as possible, and then to send it to the seed farmer to be sown and cultivated by him, and the seed ripened, cleaned, and sent to the nurserymen, at a fixed rate, by the cwt. or bushel. Flower-seeds are generally grown by nurserymen themselves: many of the other sorts by market-gardeners, and many kinds are received from the head gardeners of private gentlemen.

6997. *Grass-orchards* (*Vergers agrestes*, Fr.) form the next point of union between farming and gardening. There are a number of them in the cider counties, and in the Vale of Clyde and the Carse of Gowrie. A suitable soil and site are chosen, the surface, if not in pasture, is sown with grass-seed, and standard fruit trees, chiefly apples and pears, and sometimes, as in Shropshire, umns and walnuts, are planted in rows, and properly

fenced. They have little pruning, and generally receive no other care than that of gathering the fruit; which is either made into cider, stored in cellars, or sent immediately to market. As the trees get old and covered with moss or mistletoe, or infected with canker, shakes, or rottenness, they are scarified, headed down, and sometimes regrafted or rooted out and renewed, according to circumstances. (See *The Orchardist*, by Bucknal; and *Hints to Proprietors of Orchards*, by W. Salisbury.)

6998. *Ploughed orchards* differ in nothing from the grass-orchards but in being constantly or occasionally under aration. The trees stand in quincunx, and every year the direction of the furrows is changed: thus, the first year it may be ploughed east and west; the second south-east and north-west; the third, south and north; and the fourth, south-west and north-east. The stem of each tree is thus left in the centre of a square or rhomboid of turf of four feet on the side. The ground is cropped as in common farming, or farm-gardening.

6999. *Market-gardens.* (6906.) The number of these is considerable; their situation is near large towns or seaports, and their extent from one to fifty acres or upwards; some near London extend to upwards of a hundred acres. The object of all is to produce culinary vegetables and fruit for public sale, either as called for at the garden or garden-shop; as wanted by the green-grocer; or exposed in the public market. Some of these gardens are general, producing every description of culinary fruit and vegetables, hardy, exotic, and forced, in demand; of which, as examples, may be mentioned the Earls-court garden, of upwards of sixty acres and with extensive hot-houses; and the Isleworth gardens. Other gardens near the metropolis are devoted chiefly to particular crops; as those at Mortlake, to asparagus; some at Battersea, to cabbage and cauliflower; at the Neats-houses, to celery; at Deptford to asparagus and onions; at Charlton and Plumstead to peas, &c. In some gardens attention is chiefly paid to forcing early and growing late crops; in others, as at Lambeth, exotic fruits, as pines and grapes, are chiefly grown. At a greater distance from town, articles of easy carriage, as gooseberries, strawberries, asparagus, tart-rhubarb, sea kale, &c., are leading articles; and in small gardens in the immediate vicinity of the metropolis nothing is sent to market: as water-cress, radishes, lettuce, parsley, herbs, and flowers are the chief articles grown, and they are sold in small quantities on the spot. The market-gardeners near sea-ports direct their attention chiefly to the produce of cabbage, onions, turnips, and such vegetables as are in demand as ships' stores. In most parts of the country it happens that, from bankruptcies, absence of families, and such like causes, the produce of a number of private gardens is sent to market. This is a good deal the case near London; but so much so round Liverpool and Manchester, that scarcely a market-gardener is to be found near those towns. Indeed, many of the citizens there, who possess villas and gardens, cultivate them as much for the sake of the disposal of the produce as for their own enjoyment.

7000. *Market-gardeners on a small scale* have generally been master or head gardeners, who have acquired a capital from a number of years' servitude; those occupying more extensive concerns are generally the sons or successors of other market-gardeners, and possess considerable capital. An important point in the culture of these gardens is to supply abundance of manure and water in dry weather; these always produce luxuriant and succulent crops of leaves, though obviously injurious in respect to flavour. A proper rotation and change of surface are also important; and in smaller crops it is a material point to have the rudiments of one crop always ready to succeed another. Thus radishes, lettuces, and onions are sown on asparagus-beds; the radishes are soon drawn, and succeeded by the lettuces and onions, which are left only in places where they will not injure the asparagus; the lettuces come into use soon after the asparagus is cut, part of the onions are drawn young, and the rest left to bulb. In the alleys between the beds, cauliflowers are planted early in the season; and between these, at a later period, cucumbers, which, with their runners, cover the vacant parts both of the alleys and beds. Thus six crops are obtained in succession, and the ground is clear by October for landing up the beds. Early cauliflowers are generally a profitable crop. The seeds are sown in August, pricked out, and planted under hand-glasses, six under each, in October. The glasses are placed in rows, ten feet apart, and at four feet distance from centre to centre in the row: thus an acre will contain 1092 glasses. After the cauliflowers are planted, the ground is sown with lettuces and spinach; if the lettuce stands the winter, it is valuable, and grows fast when the soil is stirred round it in March. About this time, four of the six plants under each glass are removed, and planted in a warm situation, or in the sheltered alleys of the asparagus-beds. About the beginning of May the cauliflowers are too large for the glasses, and are just coming into flower. As they are gathered and their roots removed, they are replaced by cucumber-plants, previously raised in hotbeds, and now containing two or more proper leaves. In July the middle of the intervals between the rows of glasses is planted with endive, and between each glass two cauliflower-plants are planted to come in late. Thus five crops are raised, all valuable ones, if the ground was previously in good heart and was kept frequently well stirred, and

quite free from weeds. The following is a common rotation: 1. — Radishes, carrots, savoys or cabbages, and coleworts; 2. Early turnips, autumn cabbage; 3. Spring turnips, French beans, savoys, or peas and spinach, and leeks or broccoli.

7001. *In sowing broad-cast crops* it is found of advantage to sow several sorts of seeds together, because some of them may fall or be destroyed by insects after they come up: if all come up and thrive, then such sorts as are least valuable may be treated as weeds. Thus onions, radishes, lettuce, and carrots, are often sown together; sometimes the carrots are weeded out, and the best crop is the onions; at other times the onions partially fail, and are drawn for salading or transplanting, and the lettuce is the main crop. Radishes are often sown with turnips, as a sacrifice to the fly, while the turnips escape.

7002. *In general all transplanted crops*, and as many sown ones as possible, are drilled; and for bulky crops, as cabbages, peas, beans, &c., it is an approved practice to sow or plant two rows near to each other, and then leave a wide interval, in which a dwarf early crop, or crops of short duration, as spinach, lettuce, &c., may be sown. By the time the main crop is at its full size, the inter-crop is removed; the ground is then dry, and another crop, as cabbages or turnips, introduced, which is ready in its turn to succeed as the main crop. In this way, no part of a market-garden is ever left naked or cropless, at least during summer, and though these intervening crops are often injured when young by the shade of the main crops, yet, if the ground be in high order, they soon recover when freely exposed to the air, and the ground is stirred. If the land, however, is not in good heart, it is a better system to adopt a rotation, and stir the whole ground well between each crop; because, the soil being poorer, a greater volume is required to supply the same nourishment: quantity is substituted for quality.

7003. *With respect to the comparative market value of crops*, they must, on the general average, be nearly on a par; if one crop is at any time dearer than another, it is in consequence of being more precarious or expensive to raise; if one article is very dear at one time, it is immediately overgrown, and becomes proportionally cheap. To grow something of every thing is safe for those who have extensive concerns; select things for those who devote their whole attention to small spots; and things long of coming to perfection, as tart-rhubarb, sea kale, asparagus, &c., to those who have capital. It is never advisable to propagate a dear article very extensively, as everybody is likely to be doing the same thing; it is better even to adopt a contrary practice.

7004. *A good deal of the profit of market-gardening* depends on studying the state of the market; in gathering crops sparingly when things are low, and in sending liberal supplies at times when, from weather or other causes, they are, or are likely to be, high. This requires both judgment and capital, for the needy grower must sell at any price.

7005. *Orchard-gardens.* These are distinguished from the parterre or field orchards in being cultivated with the spade, and cropped like a market-garden; indeed, they are so much allied to market-gardens, as hardly to require any separate discussion. In general, several kinds of fruit trees are cultivated together, as tree-fruits, shrub-fruits, and herbaceous fruits; but some spots, from the soil, and probably superior culture, are noted for particular kinds of fruit, as Twickenham and Roslin, for strawberries; Maidstone, for filberts and cherries; Pershore for currants, &c. An account of the Isleworth mode of growing strawberries has been given in the *Horticultural Transactions* by Keens, an eminent grower of fruits and culinary vegetables. The filberts are planted in rows alternately with rows of cherry trees; and, as temporary crops, a row of gooseberries, currants, or raspberries, are planted in each interval. Currants are grown extensively round Pershore, and the fruit sold to the manufacturers of British wines. They are also grown in Kent and Essex in rows eight feet asunder, and four feet from tree to tree. Early in spring the ground is dug, and sown with spinach; to that succeed potatoes, and to these cabbages, which last are gathered as coleworts before winter: four crops, including the fruit, are obtained in one season.

7006. *Herb and physic gardens.* These are of limited number and extent, and generally occupied along with market or seed gardens. There are one or two for peppermint and a few other herbs, near Edinburgh, and the rest are in the vicinity of the metropolis, and chiefly at Mitcham in Surrey. Peppermint is a principal crop, which requires a moist soft soil, and to be taken up and replanted every three or four years. Lavender is grown to a considerable extent on lean soils, as is chamomile, wormwood, rosemary, thyme, &c. Liquorice and rhubarb require a deep free soil; roses, which are grown in large quantities for their flowers, require a rich soil; white lilies and colchicum, grown for their bulbs, require a new soil. In one or two gardens near the metropolis, many species of herbs are grown to gratify the demand of certain classes of medical men, of self-doctors, and of quacks and irregular practitioners. Formerly there were many gardens of this sort; apothecaries generally grew a great part of their own herbs, and collected the rest in the fields; and hence the reason why so many of them formerly were eminent as botanists. There are still one or two herb-shops which collect their simples in a wild state; but land is now so generally cultivated, that, even if there were a demand for native herbs, this mode would not be very successful. It may be mentioned as a curious fact, that, in Weston's time (say about 1750), winter savory, chamomile, pennyroyal, peppermint, &c., were grown in the common fields near London, where cattle were turned out all the winter; the scent of these herbs being so disagreeable to these animals as to cause them to avoid them. (*Weston's Tracts*, &c., p. 71.) All herbs should be gathered dry, and in sunshine after dry weather; they should be dried in the shade, and, when perfectly dried, pressed close by a press or weights, and enclosed in paper. The packets should then be deposited in a dry place, and when opened for use always carefully shut afterwards. The practice of hanging up herbs in loose bundles tends to dry them too much and dissipate their flavour.

7007. *Market flower-gardens.* These are devoted to the culture of flowers for sale when in blossom; either cut as nosegays, or in pots. They are chiefly to be found in

the neighbourhood of the metropolis, where a sort of division of objects exists among them. Some gardens are noted for their roses; others for growing the narcissus tribe; for geraniums; for cheap heaths; for mignonette; and for forced flowers of all sorts. These gardens are not large; generally from one to a dozen of acres, and they are occupied by gardeners who have been brought up to this department of their profession. The standard articles of cultivation are roses, especially the moss-rose for nosegays; the monthly rose is also much grown in pots for spring and autumn sale. The sweetbriar is in demand for its odour; honeysuckles, lilacs, mezereons, rhododendrons, azaleas, spiræas, double and scarlet-blossomed jasmynes, laburnums, rose acacias, are in great repute, especially when forced. All sorts of evergreens, as pines, firs, laurels, cypresses, arbovitæ, hollies, yews, and, above all, laurustinus and box, are much in demand for decorating balconies, flat roofs, areas, courts, lobbies, &c. Potted fruit trees in bearing have generally a ready sale, and especially the grape and peach.

The common flowers for nosegays are snowdrops, anemones, narcissi, hyacinths, ranunculus, tulips, lilliums, auriculas, polyanthus, carnations, pinks, sweetwilliams, sweetpeas, wallflowers, many other border-flowers, and most of the biennial and annual kinds.

The flowers prolonged in duration by being placed under glass before frost approaches, being in pots are mignonette, stocks of all the sorts, nasturtiums, veronicas, violets, gentians, monthly roses, laurustinus, clematis, georgines, and chrysanthemums.

The forced flowers are chiefly the pink tribe, violets, wallflowers, ten-week stocks, common stocks, hyacinths, cro-

cuses, narcissi, tulips, tuberose, lilies, rose-campions, sweetpeas, lupines, roses, lilacs, sweetbriars, mezereons, &c. The exotics in most common demand are myrtles, geraniums, hydrangeas, bonitas, camellias, Chinese roses, bellotropes, fuchsias, &c.

The flowering plants generally kept in pots are auriculas, polyanthus, carnations, pinks, georgines, violets, foxgloves, veronicas, georgines, chrysanthemums, phloxes, scabifraga, &c. most of the bulbs and many of the annuals and biennials.

The flowers blown in water-glasses are the hyacinth and narcissus chiefly, and also the crocus, tulip, amaryllis, colchicum, iris, &c.

7008. *Of mignonette*, perhaps more pots are sold in and near the metropolis than of any other potted plant whatever; fifty years ago it was hardly known. Next to mignonette may be named stocks, pinks, sweetpeas, and wallflowers, among the hardy plants; hyacinths, among the bulbs; and geraniums and myrtles, among the exotics. Some years ago heaths were chiefly in repute; these being found difficult to keep in living-rooms, the public taste has changed, and the flower-grower varies his products accordingly. All these, and other sorts of plants in pots, are also lent out by the market-florist, to decorate private or public rooms on extraordinary occasions, but especially for those midnight assemblages called routs. This is the most lucrative part of the grower's business, who generally receives half the value of the plants lent out, as many of them, and generally those of most value, are so injured by the heat as never to recover.

7009. *Florists' gardens* are devoted to the culture of florists' or select flowers for the sale of the plants and roots. There are not many exclusively devoted to this branch, except near Manchester and the metropolis. Those near Manchester, Paisley, and most other provincial towns, are generally on a small scale, and cultivated by men who have auxiliary resources of livelihood; but near London there are some extensive concerns of this sort. This is one of the most delicate and difficult branches of gardening, and is only successfully pursued by such as devote their exclusive attention to it. The great difficulty is to preserve fine varieties, and keep them from degenerating or sporting; many gardeners, excellent propagators and cultivators of hot-house and green-house plants, find it a very difficult task to grow a fine auricula or carnation; and their flowers would cut but a poor figure at the florists' shows, either near London, or in the country. Much depends on the soil, which requires to be rich and well mellowed by time. It is also the most precarious branch of commercial gardening as a means of subsistence, since the purchasers are not so much the wealthy mercantile class who possess villas, or the independent country gentlemen, in whose gardens fine florists' flowers are seldom seen, as the tradesman and middling class. The income of these being temporary, that is, depending in a great measure on personal exertion, and the current demand for their produce, is, of course, easily affected by political changes, which make little difference to the man whose income arises from a fixed capital.

7010. *Nursery-gardens.* (6883.) In these are propagated and reared all sorts of trees and shrubs, and all other herbaceous plants in general demand: the culture of florists' flowers is often combined to a certain extent, and the dealing in seeds imported, bulbous roots, and garden-implements and machines, is generally considered a part of the business. Hence the designation of nurseryman, seedsman, and florist, formerly, and still, to a certain degree, common on their sign-boards. Of this class of commercial gardens, there is one or more in most counties of Britain, and a few in Ireland; but the greater number, and by far the most important, are in the vicinity of the metropolis. Their extent near town is limited; some contain only an acre or two, but others occupy forty or fifty acres; in the country, where land is cheap, some are of double or triple that extent. In general they have been commenced by head gardeners, who had acquired a little capital, and continued by their sons or successors. In country nurseries, the commoner hardy fruit trees, and tree and hedge plants, are the chief products: near Edinburgh and the metropolis some embrace every article of nursery produce: others deal chiefly in fruit trees, green-house plants, or American plants; and some almost limit themselves to particular species, as the camellia, erica, geranium, &c. The Scotch nurseries, and

especially those of the northern districts, are famous for the raising of forest-tree seedlings, which they send in large quantities to all parts of the three kingdoms.

7011. *The subject of nursery-culture embraces almost every part of gardening ; since no department requires a more general knowledge, or so much attention and practical adroitness. The essential part of the business is the art of propagation ; which, in some cases, as in multiplying beaths, and other Cape and Botany Bay plants, by cuttings, and in raising even the pine and fir tribes from seed, requires very delicate and accurate manipulation, and constant subsequent care and attention. Even grafting, budding, and layering, require to be carefully, skillfully, and expeditiously performed, and the future progress of the scion, bud, or shoot, carefully watched. Next to propagating, rearing requires attention, and especially transplanting and pruning ; on the former depends the state of the roots, and of course the fitness of the plant for removal ; and on the latter, very often, the future figure of the tree. The Dutch and French nurserymen are in some respects superior tradesmen to those of Britain ; they generally remove all plants for sale, especially the ligneous sorts, every second or third year, and continue doing this with fruit trees for seven or ten years, training their heads at the same time in particular forms. The purchaser finds their heads already formed and bearing fruit, and with such tufts of fibrous roots that they suffer very little from removal. Even thorn, privet, yew, and other hedge plants are trained in this way, and ready-made hedges may be purchased by the foot or yard.*

7012. *The most skilful and vigilant nurseryman can seldom make his practice conform to his knowledge. Thus, many customers, from ignorance, indolence, or unforeseen circumstances, defer ordering what they want from their nurserymen till the last moment, which consequently prevents him from applying the requisite details of culture to his stock of plants and trees in the proper season. Thus the heading down of fruit trees is often delayed, in deference to late purchasers, till the buds begin to push ; and to cut them at that time, particularly vines, apricots, and cherries, would endanger their existence, and, at all events, enfeeble their shoots. In this case it is necessary to wait till they have made shoots of a few inches, when they may be headed down not with much regard to shoots which have appeared, but more as they would have been cut in the proper season when nothing appeared but buds. The plant in a healthy, vigorous state, when so headed down to apparently dead or dormant eyes, will soon push, and regain, in a great degree, the lost time ; and, indeed, it may always be considered safe to rub off all shoots, not in desirable situations, from healthy trees, provided it be done early in the season. Trees which are not in full health, whether recently transplanted or not, should, in general, be left with their tops on ; the leaves on which will prepare nourishment to strengthen their roots, and they can be headed down the following season. Some persons, after the drawing season, fill up the blanks in the lines of fruit trees, with stocks to be budded the same season. This may do in new and excellent soils, and where there is little demand for fruit trees ; but, in general, the best way is to fill up all blanks that cannot be filled up with the tree kind in the proper season, with culinary vegetables, either for the kitchen or for seed, or with flowers to produce seed.*

7013. *The following are leading objects of nursery-management : —*

7014. *Correctness in the names given to plants and seeds of every description, and particularly to fruit trees. To facilitate this, as to seeds and roots, their names should be painted on the various boxes, sacks, and chests in which they are kept ; and as to fruit trees, they should be designated by numbers painted on wooden, or, better, on cast-iron, tallies. Stools and stock plants of every description, not very generally known, and, if possible, the whole of those planted along the borders, whether known or not, should have their systematic and English names painted on similar tallies ; and smaller herbaceous plants in pots, and all exotics in pots, except such as come under the head of fruit trees or plants, as vines, pines, &c., should be named on small wooden tallies, written with a black-lead pencil on white lead newly rubbed on. Some employ leaden, iron, or copper tallies, painted, but these are too conspicuous, and require too much labour in the preparation for a nursery. It appears to us, that, to prevent the chance of substituting one sort of fruit-tree for another, either by accident or design, the following mode might be adopted : let a catalogue of fruit trees be printed by the nurseryman, and let it contain against each name the number placed against the plant in the nursery ; then every autumn before the drawing season commences, let a person with steel types of the numeral, and a marking-iron with the initials of the nurseryman, go through the rows of fruit trees, and, beginning at No. 1., say of apples, put type 1. in a proper socket prepared in the marking-iron, and mark each tree fit to move, a few inches above the graft ; let him next do the same with No. 2., having changed the type ; and so on with the apples and all other fruit trees, not excepting the peach. This would not supersede the use of parchment labels to plants sold, but it would afford both to the nurseryman and the public who purchased his catalogue and his trees, a certain means of detecting error ; as, should the label drop off in the hurry of carrying the trees to the packing-court, or in unpacking when arrived at their final destination, the number on the bark and the published catalogue could readily be referred to. If performed with a small sharp instrument, this practice could do no harm to the tree.*

7015. *Punctuality, accuracy, and despatch, in executing all orders.*

7016. *Rather procuring or omitting an article than sending off a bad one, unless under peculiar circumstances, to be explained to the party.*

7017. *Careful packing, and such as suits the sort of articles, the season, the distance, or the climate to which they are to be sent, mode of carriage, &c.*

7018. *Keeping an exact account of men's time, and being particular in mustering them every morning before the hours of commencing work, and again at the hours of rest and refreshment. This may be greatly facilitated by causing them all to enter and go out at the same gate, which ought to be that at the counting-house ; and a bell or horn should call them to or from work.*

7019. *Keeping a vigilant eye to the men while at work, especially with strangers, till you have proved to them that you know what they can do by day or hour, by fair labour.*

7020. *Having one principal foreman or partner for the whole, and sub-foreman for the exotic, American, herbaceous, general nursery, and seed departments.*

7021. *Having a proper person employed as a traveller ; or yourself or partner taking that department.*

7022. *Acting on all occasions with the utmost impartiality between gentlemen and their gardeners, leaning rather to the latter, in all doubtful cases, as the weaker party, according to the common consent and practice of all mankind.*

7023. *Paying all workmen, and, at all events your foremen, such wages for their labour as may not tempt them either to idleness or pilfering themselves, or to countenance these practices in others.*

7024. *Publishing a printed catalogue, on a scientific principle, of every article you have, or intend to have, for sale, with the names, synonyms, some description of the fruits, and reference to a figure of the plant or fruit in some generally known work ; and placing, as above observed (7014.), the same number opposite the names of your fruit trees in the catalogue, as is actually placed against them on cast-iron tallies in the nursery, and annually in autumn, before the drawing season, impressed on all of them fit for sale, with a marking-iron and types.*

7025. *Attending at all times and seasons ; and in every part of the nursery, to frugality (avoiding messes) and neatness, keeping everywhere a vigilant eye, and always being beforehand, rather than behind, with the different operations of cultivation. Much of neatness depends on the master's insisting that every workman shall clean up and finish, as completely as practicable, every operation as he goes along. Having taken up a tree or a plant, he ought never to forget to level up the hole ; having pruned one, he ought at the same time to pick up the shoots, or, if in a course of pruning, he should have a boy or woman going*

after him to do so, or, at all events, they ought to be picked up the same day. A corresponding attention to order and neatness is requisite in every other operation; and this attention, once become a habit, will be found a saving of labour, and a source of profit as well as of pleasure.

7026. *The management of the seed department* is comparatively simple. The chief difficulty for seedsmen who are beginners, and at a distance from the metropolis, is the ordering the proper quantities of each seed from the growers or wholesale dealers. The guides to this are the proportions of the different crops usually grown in private gardens, and the wants of the class who are likely to become purchasers. The same difficulty occurs in beginning almost every business, and is only to be overcome by experience. The different periods to which different seeds retain their vegetative powers require to be known by seedsmen, as well that they may not furnish lifeless seeds to their customers, as that they may not throw away as useless such as are possessed of the vital principle. Though few seeds are kept by respectable seedsmen above a year, yet, in cases where a partial failure has taken place in the seed crop, most sorts will grow the second year after that in which they have ripened. Some, however, will keep from two to five or ten or more years; and others for an unknown length of time.

7027. *The latest periods at which the seeds most generally in demand may be expected to grow freely* are the following:—

Cabbage tribe. Four years.
Leguminous culcary vegetables. One year.
Esculent roots. Beet, ten years; Turnip, four years; Carrot, one year; Parsnep, one year; Radish, two years; Salefy, two years; Skirret, four years; Scorzenera, two years.
Spiceous plants. Spanish, four years; White leet, ten years; Orache, one year; Parslane, two years; Herb-petience, one year.
Ailaceous plants. Two years.
Asparagus plants. Asparagus, four years; Sea-kale, three years; Artichoke, three years; Cardoon, two years; Ram-pion, two years; Allenders, and the Thistles, two years.
Asteraceous plants. In general two years: Lettuce, three years; Radish, four years; Burnet, six years; Mustard, four years; Taragon, four years; Sorrel, seven years; Celery, ten years.
Pea-herbs and germinating-plants. In general two years; but

Parsley will grow at six years; Dill and Fennel, five years; Chervil, six years; Marigold, three years; Borage four years; Sweet herbs, generally two years; but Rasc and Rosemary three years; and Hyssop, six years.
Plants used in herbs, &c. generally two years; but the Rhubarb only one year; and Gourd, Poxopion, &c., ten years.
Herbaceous fruits. The Cucumber and Melon, two or more years; Love-apple, Capecaun tribe, and Egg-plant, two years.
Annual and biennial flower-seeds, generally two years; but some grow with difficulty the second year: they are seldom kept by seedsmen longer than one year.
Perennial flower seeds, the same.
Tree-seeds. Stones, two years; and some, as the Haw, three but they are in general of very doubtful success the second year; Acorns will scarcely grow the second year; Elm, Poplar, and Willow seeds, not at all.

7028. *All seeds ought to be kept dry, and the air excluded as much as possible*; but those liable to be attacked by insects, as the pea, bean, turnip, radish, &c. should be occasionally exposed to air and friction, by being passed through a winnowing machine. The more rare seeds should be kept in their pods till the season for using. Seeds received from foreign countries should, in general, be sown as soon as possible after their arrival. In packing seeds for the home demand, no particular process is requisite; but in sending seeds to America or the East Indies, the sorts which soon lose their vitality should be enveloped in clay, tallow, or wax, or put up in bottles rendered air and water tight. (3150., *Busby's Journal*, and *Gard. Mag.*, vol. x.)

7029. *Bulbous roots*, with the exception of the anemone and ranunculus, can only be kept out of ground a few months with propriety, though some are often found in the seed shops as late as May. When thoroughly dry they may be kept in bags or boxes, and the more delicate sorts wrapped up in papers separately. Ranunculus and anemone roots retain their vegetative powers two, and sometimes three years.

7030. *The English seed-growers and seed-collectors* furnish the greater part of culinary flower and indigenous tree seeds sold in the shops, but a part also are obtained from other countries; as of onion-seed from Genoa; anise, basil, &c., from the south of France; carrot, onion, and a variety of seeds, when the English crop fails, from Holland. The hardier bulbs, as crocus, daffodil, &c., are for the most part grown in England: the other hardy sorts are obtained from Guernsey, as the Guernsey lily; the Cape of Good Hope, as ixia, gladiolus, &c.; from South America, as the tuberose; or China, as the Japan lily, &c. The seeds of tender exotic trees and shrubs are obtained from the seed-collectors at the Cape, New Holland, and other foreign settlements; and of others from North America.

7031. *The recommendation of head gardeners* forms an important part of a nurseryman's duty and care, and one in which he may render essential services to horticulture. He ought to select such as are well qualified for what they undertake, and consider himself as in some degree responsible for the conduct of the person recommended. In addition to this, the nurseryman, in the yearly tour he generally makes among his country customers to receive payments and take orders, should observe whether the person recommended has acted according to his expectations, and should exhort, reprove, or approve accordingly. The nurseryman, while on this tour, by seeing a number of gardens and gardeners, must, by comparison, be well able to judge of their merits; and, by judiciously dealing out approbation or blame, might do much good. The good gardener, who had become slovenly, from not seeing other gardens, or from the indifference of his employer, might thus be recalled to his duty, and the art not suffered to be disgraced by his practice. This is also the time for gentlemen to state to nurserymen the faults they have to find with their gardeners, so that they, by their advice, may endeavour to correct them. The nurseryman who has recommended a gardener, is the only person who can act as a

mediator between this gardener and his employer; and we repeat that, by the judicious interference of well-informed and experienced nurserymen, much good might be done; gardens kept in better order, and gardeners improved and retained, instead of being removed from their situations without being properly informed of their errors, and a proper opportunity afforded them of amendment.

SECT. III. *Public Gardens.*

7032. There are very few *public gardens* in Britain; and we can only refer to the enclosed areas of the public squares and parks of the metropolis and principal cities, to the botanic gardens of the universities and other public bodies, and to the gardens of the numerous horticultural societies.

7033. *The public squares* are generally kept in order by jobbing gardeners at a certain rate by the year. The principal part of their business consists in keeping the grass short, by mowing once a fortnight in summer, and rather seldomer in spring and autumn; in keeping the gravel clean, and keeping up a display of flowers in the dug groups.

7034. *The public parks*, and other equestrian promenades, are mostly managed by officers appointed by government: being once formed, and the trees grown up, they require little annual expense. The Regent's Park is in part let as a nursery-ground, and, instead of a rent, the occupier is bound to plant a certain number of trees the first year of his lease, to nurse up these, and leave a certain number of them on each acre at the end of his lease. A considerable part of this park has also been let to private persons for the purpose of erecting villas, which, though it controls the rambles of the pedestrian, gives and will maintain a woody appearance, without any expense to the public.

7035. *The botanic gardens* of the universities are under the general direction of the professor of botany, and managed by a head gardener or curator: those founded by subscribers, or a society, are under the direction of a committee, and similarly managed. The duties common to curators are the keeping up and increasing the collection of plants; those who manage university-gardens, have, in addition, to furnish specimens of certain plants in sufficient numbers for the use of the professor and students. In some cases, the curator is required to instruct students, and in others, he is permitted to do this and to take pupils or apprentices for his own emolument. Most gardens exchange, and some, as that of Liverpool, sell plants and seeds.

7036. *On the cultivation of botanic gardens* we shall offer only a few general hints. Instead of the principle of *rotation*, is here substituted that of *renewal*, partial or wholly, of the soil. On shallow soils it is to be effected by removal of the whole or a proportion of the old soil, and the introduction and thorough mixture of a proportionate quantity of good virgin loam, or of virgin peat, bog, or sand, according to the plot or border to be renewed. In rockworks, and bogs, American grounds, and in most of what may be called *particular habitats*, there is no other way; but in the plots which contain the general arrangements, deep trenching may partially or wholly supply its place.

7037. *Manure* cannot altogether be dispensed with in botanic gardens, particularly for some or most of the vegetables which will be included under the culinary, agricultural, and flower-garden departments; but, in general, decayed leaves is the best manure for all other plants and trees, not in a state of monstrosity or otherwise changed by cultivation.

7038. *Sheltering and shading* are parts of culture which demand very considerable attention in botanic gardens, especially in warm climates. Delicate plants which require a moist atmosphere, as some alpenes and Americans, require to be closely covered with a hot glass, and this again partially with a wicker case during the whole summer, even if under the shade of a wall or hedge.

7039. *In sowing and causing to vegetate, seeds which have been brought from a distance*, a good deal of skill is often requisite. Sowing in very fine earth in pots, covering them with a bell, and placing them in the shade and in moist heat, is the most likely mode to succeed, whatever climate the seeds may have been sent from. To this, some add previous steeping of the seed in pure water, and in water impregnated with oxygenated muriatic acid. Others water with water impregnated with this acid or with its gas; some charge the earth of the pot with the gas, and others invert a bell-glass over it, containing an atmosphere partly or wholly composed of the gas. (See *Hill, in Hort. Tysar.*, vol. i. p. 233.) All these modes and others suggested by vegetable chemistry, may be tried; but where the vital principle is not extinct, the first mode will generally be found sufficient. Numerous annual and biennial seeds require to be sown every year, independently of seeds of new sorts from foreign countries. For collections of these in beds or in a general arrangement, the mode of sowing in rows across the bed is obviously the best; and several rows radiating from a polygonal tally in the centre is the most economical, as admitting of the greatest number of sorts in the least space.

7040. With respect to *management*, there are various duties belonging to the office of curator of a public botanic garden which are peculiar to the situation; some of which we shall briefly enumerate.

7041. *Gathering and drying specimens* to maintain the herbarium and to exchange or give away; frequently inspecting the herbarium to guard against damp and moths; collecting and *preserving seeds* of every kind for the purposes of exchange.

7042. *Collecting wild plants*, and seeking for new species in proper situations; in unfrequented haunts for herbaceous plants; in haunts much frequented by birds, for trees; in bays and sheltered creeks and shores for aquatics; in rocky shores for marine plants; among the tops of snow-clad mountains in winter, for mosses; in old forests in winter for lichens, and in spring for fungi, and so on.

7043. *Acclimatizing plants*, by raising them from seeds, one generation after another, or proving their hardiness by inuring them to the open air, appears to us one of the most important of the services a botanic curator can render the horticulture and agriculture of his country.

7044. *Distributing seeds, cuttings, and plants of all sorts*, among all who are likely to keep them, and as a due value on them, but to none else. The illiberality of the administrators of some gardens, in this

respect has been much and deservedly blamed. The surest mode of preserving a plant in the country is to render it as common as possible; and the easiest mode of effecting this is, to distribute a few specimens among the nurserymen. From an opposite conduct, many of the plants introduced at Kew, and described in the *Hortus Kewensis*, are not to be found in the Kew garden; and, thus, never having been distributed, are lost to the country. The policy of this garden, for a number of years past, is considered as highly reprehensible: being supported by the public, it ought to have been devoted to its service.

7045. *Giving the name and history of plants* to all eager enquirers, in order to encourage a desire of botanical knowledge; to induce a taste for botany and the vegetable kingdom, by pointing out striking peculiarities of plants to superficial observers, in order to attract their attention; trying to point out things which may assimilate with the taste or folly of the person addressed; recollecting that sexual matters, and matters bordering on the marvellous, are the most generally attractive to volatile or vacant minds: in this way "becoming all things to all men, in order, by all means, to gain some."

7046. *Disseminating and dispersing seeds and plants of scarce natives, or of foreign sorts not yet naturalised*, by placing them in their proper soils and habitats. Thus, when the aquatic plants are reduced, throw the parts taken from rare ones, into an adjoining ditch, lake, canal, or river; scatter the seeds, and plant the roots of wood plants in plantations; arenarious plants on sandy soils or shores, and so on. Curator Anderson of the Chelsea Garden scatters all his spare seeds on Battersea, Clapham, and Wandsworth commons, and throws his spare aquatics into the Thames. The consequence is, that, though only a few years practised, some rather scarce plants seem already naturalised in these places. Dickson, an enthusiastic botanist, naturalised that beautiful plant, the fresh water soldier, in the ponds about Croydon; as we have done the same plant, and several others, in the Serpentine Canal in Hyde Park. Salisbury, one of the first botanists of the age, and equally eminent as a horticulturist, thinking he could naturalise on our sandy shores the *Pancratium maritimum*, planted a bulb in the Isle of Wight, among *Chelidonium corniculatum*, and *Eryngium maritimum*, with which he saw it growing wild below Montpelier (*Hort. Tross.*, vol. i. p. 341.); "and when at school, in the neighbourhood of Halifax, in 1769, he was fogged, in the Whitsuntide holidays, for helping to propagate the *Narcissus triandrus*, and for running out of bounds to know the name of it at North Bierly."

7047. *A catalogue of every botanic garden* should be printed for exchange, distribution, or sale. Very complete gardens, such as those of Kew, Cambridge, and Liverpool, find it answer to publish printed catalogues, with a view to remuneration by sale; but the legitimate object of a botanic-garden catalogue is, to exchange it with that of other botanic gardens, foreign and domestic; in order that, by comparison of riches, exchange may be made for mutual advantage. For this purpose, it seems desirable, that every thriving establishment should print or prepare a catalogue once a year, or once every two or three years. By printing only the botanic names, each sheet would contain nearly four thousand names, and consequently three sheets, all the plants, native or introduced into Britain. This might be produced stitched together, all expenses included, for a trifle; and, as the present law respecting letters stands, might be franked in separate sheets. Thus a cheap communication between British botanic gardens might be formed, and, through our foreign ambassadors, these catalogues might be distributed all over the world.

7048. *A catalogue may be formed of figures*, where it is not convenient to form one of printed names. Thus the possessed or desired plants might be indicated by putting down the numbers placed against the names of the plants in some generally circulated botanical catalogue. Our *Hortus Britannicus* is numbered in such a way as to render communication between botanists, however remotely situated, perfectly facile.

7049. *The gardens of the horticultural societies.* The original plan of the garden of the London Horticultural Society will be found in *Gard. Mag.*, vol. vi. p. 250. It appears to us most defective in general arrangement. There is a want of grandeur and unity of effect as a whole, and of connection and convenience in the parts. One obvious error, that must strike every one, is, the forming the arboretum in a large rectilinear clump; and, another is scattering the hot-houses and other buildings here and there over the garden. There should, in our opinion, have been three grand parts: a centre for all the buildings of every description, with the exception of entrance-lobges and resting-seats, or shelters, &c.; a circumference, displaying the arboretum, fruticetum, and ornamental flowers; and the intermediate space laid out as culinary, dessert, or pomological, floricultural, experimental, naturalisation, and nursery gardens. The hot-houses requisite for these different departments might easily have been arranged so as to be included in each of them, and yet forming with the other buildings a whole or connected chain round the central area, and these might have been all heated from the same steam or hot-water apparatus, and the sheds and other parts and buildings lighted, if desired, by gas. A plan for laying out the area of this garden agreeably to the above principles, is given in the *Gard. Mag.*, vol. vi. p. 249. The garden of the Caledonian Horticultural Society will be found figured and described, *Ibid.*, vol. i. p. 90.; and that of the Botanical and Horticultural Society of Birmingham, *Ibid.*, vol. viii. p. 410.

CHAP. III.

Professional Police and Public Laws relative to Gardeners and Gardening.

7050. *By professional police*, we mean those associations which gardeners have formed, at different times, for mutual benefit or instruction, or the improvement of their art; by public laws, those of the legislature.

7051. *A fraternity of gardeners*, we have already remarked, has long existed in Germany as regularly organised as that of freemasonry. A fraternity also exists in France, but less extensive and systematic. Their principal lodge is at Versailles; the *compagnons de St. Fiacre* being there, as Neill observes, in France, what "Adam's lodge of Aberdeen is to Scotland." There are also a few similar fraternities in this country, who hold meetings, and have secret signs and other rites nearly similar to those of masonry; but these societies have no systematic connection like those of Germany. In masonry they have undoubtedly originated; but how, when, and where, and for what object, in the first instance, though we have corresponded with competent persons in all parts of the kingdom, we have been unable to ascertain.

7052. *The oldest gardeners' lodges* seem to be those of Aberdeenshire, and *Adam's lodge*, held in the city of Aberdeen, is considered the oldest in Britain: though there is another, of nearly equal antiquity, called *Solomon's lodge*, held in Banff. These lodges profess to be for the mutual instruction of the members in their art; for the assistance of brethren in distress; and for the benefit of travelling members. The first object is attained both by secret instructions, and also by compulsory exhibitions of garden productions, as flowers and fruits; the second, by annual subscriptions, from which a fund is formed, managed by a committee of the society; and the third, by signs and pass-words, as in masonry. They have a general meeting, a formal procession with symbols and flowers, and a feast, once a year. There were formerly a number of gardeners' lodges in Scotland, and there are still a few besides those of Aberdeen and Banff, but chiefly confined to the counties of Aberdeen, Forfar, and part of those adjoining.

7053. *The principal Scotch gardeners' lodge*, though it has no connection with the others, like the metropolitan masons' lodge, is the Caledonian lodge of Edinburgh, founded about the end of the last century: its object is the same as that of the Aberdeen lodge; but it has no shows of flowers or other garden productions. Their meetings are respectable, their processions pompous, and their funds considerable.

7054. *There are very few gardeners' lodges in England*; the only one of which we have been able to obtain any distinct account is "Adam's Lodge, of London," founded June 4, 1731, of which the rules and orders have been published. This lodge is described in the *Rules*, &c. as a "fraternity or community for improving the art of gardening; to establish a fund for the mutual support and relief of each other in the time of sickness, lameness, or distress; and also to ascertain the characters and abilities of such gardeners who shall belong to, or may be recommended by, this society, to obviate the difficulty, so commonly complained of by the nobility, gentry, and others, of obtaining skilful and experienced persons to undertake the employment." In 1823, when the second edition of this Encyclopedia was prepared, it consisted of about one hundred and fifty members, and it is now (in 1834) extinct.

7055. *Gardeners' charter*. About the middle of the last century, Lee, Gordon, Russel, and Malcolm, all Scotch gardeners, commenced their nurseries at Hammersmith, Mile-end, Lewisham, and Kennington. Their success excited the jealousy of the established commercial gardeners, who, between 1760 and 1770, held several meetings, and entered into resolutions not to employ young men from the north. These resolutions were not long adhered to; but a tract, entitled *Adam's tract*, published by his association at the time, shows the extent of what they intended. From this tract it appears that James I. had granted a charter to certain persons inhabiting within London and six miles of it, who were capable to educate and instruct young men in the art of gardening. This charter was granted in the third year of this king's reign, and renewed in the fourteenth; but, in the tract alluded to, it is stated never to have been put in force, and not to be sufficiently extensive; and therefore it is proposed that a charter be granted, to extend over the whole kingdom, to prevent mere labourers and other unqualified persons from assuming the profession of gardeners, and thereby doing "great injury to the nobility's and gentry's gardens and plantations," as well as to proprietors who let ground to such as "undertake to furnish the market with estates." Only a certain number of gardeners were to be licensed to take apprentices, and of these the number was to be limited, &c. This attempt at monopoly of skill does not appear to have met with serious attention, and all that resulted from the association, as far as we have been able to learn (from a gardener, Duncan, in 1824, upwards of 90 years of age), was the partial exclusion, for a year or two, of young Scotsmen, from a few of the nurseries and gentlemen's gardens near town.

7056. *The origin of florists' societies* we have not been able to discover. It is more than probable that meetings for the display of fine flowers and the estimation of their merits were first held at Norwich, where, as Sir J. E. Smith informs us (*Suppl. Encyc. Brit.*, art. *Bot.* 336), a love of flowers, and a great degree of skill in their culture, had been introduced into that city, with its worsted manufactures, about the middle of the sixteenth century. At all events, there were florists' feasts held there so early as 1637; a play, called *Rhodon and Iris*, being extant, which was acted before the company in that year. (*Linn. Trans.*, vol. ii. p. 296.) The next florists' meetings, it is probable, sprang up about London; and Nathaniel Rench, of Fulham, is said (*Faulkner's Historical Account of Fulham*) to have been the first who established them, probably about the end of the seventeenth century. According to the late Mr. Derry, florist, King's Road, whose father was also an eminent florist, and lived to be upwards of 90 years of age, the florists' feasts and meetings were at their greatest height about London between 1740 and 1770. They were then attended by many noblemen and gentlemen, as the horticultural societies are at present. They declined towards the end of the last century, but have since revived, and are at present rapidly on the increase. The florists' meetings, and those of the gooseberry-growers in Lancashire and the adjoining counties, are also very numerous. When they were first adopted in that part of England is not exactly known. From the best accounts we have been able to collect, they were in vogue there in 1769, and are recollected so far back as 1740. Some florists' societies existed in Edinburgh during the latter end of the last century; and on one of these the Caledonian Horticultural Society was founded. The principal florists' societies in Scotland are at Paisley.

7057. *The principal modern societies for the encouragement of gardening* are the London and Caledonian Horticultural Societies; but there is one, if not more, in almost every county. A summary of their proceedings, during each year, will be found in the *Gardener's Magazine*. The tendency of these societies is to diffuse generally a taste for gardening, which may truly be called one of the most agreeable and humanising of pursuits. They also assist in spreading improved varieties of culinary vegetables and fruits, and in bringing into general cultivation many of the beautiful new hardy trees, shrubs, and herbaceous plants, which have been lately introduced from North and South America, Nepal, and other parts of the world. There is yet another good which results from the meetings of these societies; and that is, the bringing into personal communication many individuals, gardeners and others, who, but for assemblages of this sort, might have remained for ever unknown to one another. In general, whatever has a tendency to bring men together, so as to enable them to think and act in masses, is favourable to human improvement. The farmer confined to his farm, and the gardener within the walls of his garden, could never have any influence on society, either in the way of disseminating agricultural or horticultural knowledge, or improvements; or in ameliorating the condition or manners of the two classes; but let them meet together two or three times a year, and communicate their respective experience, and decided improvement must be the result. Prejudice and self-conceit, two of the most inveterate foes to human advancement, are thus swept away; and every man being enabled to profit by the experiments of others, a great step is made not only in particular branches of science, but in the general progress of civilisation. (*See Gard. Mag.*, vol. ix. p. 782, and vol. x. 298.)

7058. *There are few public laws* specially formed for the first two branches of gardening, horticulture and floriculture; the general laws being quite sufficient for their protection. Robbing of orchards or gardens of fruit growing therein is punishable criminally by whipping, small fines, imprisonment, and satisfaction to the parties wronged, according to the nature of the offence. (43 Eliz. c. 7.)

7059. *There are a number of acts relative to arboriculture, and especially against the cutting down of young trees*. (*See Tomlin's Law Dict.*, vol. ii. art. *Timber*.)

BOOK II.

FUTURE PROGRESS OF GARDENING IN BRITAIN.

7060. *The improvement of gardening*, like that of every art or commodity, necessarily depends on demand and production. These causes operate reciprocally on each other: a nicety of taste, in the purchase of vegetables and fruits exposed in public markets, will occasion articles of better quality to be brought to such markets; and the facility of purchasing articles of a superior quality in them, by improving and rendering more fastidious the taste of the purchaser, will insure the continuance of the production of such articles. In like manner, if those who have private gardens were a little more difficult to please in selecting a gardener, and in the quality of the produce sent to table, the consequence would be, an improvement in that produce, and in the degree of knowledge thought necessary for gardeners. More scientific gardeners would surprise and delight, by their superior fruits and flowers, and by the greater order, beauty, and high keeping of their gardens; and the habits of both parties accommodating themselves to this improved state of things would be the ground on which to rely for its continuance. In this view of the subject, the future progress of gardening depends on two causes; the improvement of the taste of the patrons of gardening, and the improvement of the science and art of practical gardeners.

CHAP. I.

Improvement of the Taste of the Patrons of Gardening.

7061. *Improvement* is the characteristic of civilised man, and implies progressive advances. Men rest satisfied with what they have, when they know of nothing better; and therefore, one of the first sources of improvement in the taste of the patrons of gardening, whether of the tradesman who has recourse to the public market, or the private gentleman who is in possession of a garden, is the increase of knowledge. The wealthy tradesmen of Dublin and Edinburgh should look into Covent Garden market in London; and, not to mention fruits, and forced or exotic productions, let them compare the cauliflowers and salading of the three markets. Those who have once acquired a taste for such salads of endive and lettuce as are afforded in the London markets, and still more in those of Brussels, throughout the winter, would not very readily reconcile themselves to the acetarious productions of Dublin and Glasgow during that season.

7062. *The ignorance of the proper mode of cooking vegetables*, and especially of dressing salads, which exists among the middling classes, is another retarding cause. A French labourer, out of a few leaves of dandelion and wild sorrel, which may be gathered by the hedge sides anywhere, and almost at any time, will produce, merely by the aid of the common condiments, what the wives of the greater number of respectable British tradesmen have no idea of. There can be no great demand for a thing, of which the use is not thoroughly understood; and, therefore, an improvement in the knowledge and practice of cooking must take place among a certain class before much can be expected in the quantity, kind, or quality of the gardening articles which they commonly consume. (See *Vegetable Cookery*, &c.)

7063. *The more general use of dessert fruit among the middling classes* is another requisite wanting for the improvement of horticulture in Scotland and Ireland. If fruit, physiologically considered, is less wholesome after dinner than before it (which is questionable), it is at least more so than where drinking is substituted in its place. To prolong the period of eating, and the conversation of female society, are not only objects which afford immediate satisfaction; but, by moderating the use of stimulating liquors, tend to insure future health. Even in England, where a dessert is universal among the independent classes, there is a great want of nicety of taste; fruit is valued by many only as a symptom of the presence of wine; others contentedly use pears and plums that would be rejected at the most common French *déjeûné*; and many rest satisfied with melons and grapes, who, at scarcely any additional expense, might have pine-apples. Wherever the litter of four horses is at command, pine-apples may be grown in pits with very little trouble to the gardener, and, indeed, at much less trouble than very early cucumbers or melons. But why speak of pines, when not one family in a hundred is properly supplied with mushrooms, which ought to be on the table, in some form, every day in the year? On a small scale, the grand secret is to employ a gardener who knows his business; and to direct his attention less to raising ordinary productions at extraordinary seasons, than to raising first-rate crops of everything in due season. On a larger scale, all ordinary and extraordinary things should be attempted that art and wealth can accomplish.

7064. *A taste for fine flowers and rare exotics* must be preceded by some knowledge of plants, or a taste for scientific botany, and the history, geography, and uses of plants. These branches of knowledge may be considered as gaining ground. A good deal also depends on the fashion of using flowers as chamber ornaments, and on having green-houses attached to dwellings; both are most agreeable and rational luxuries; and it is much to be desired that a taste for them was more general, especially in provincial towns, and in the cities of Scotland and Ireland.

7065. *The taste for planting* has attained a greater height, during the last twenty years, than any other department of gardening; the beneficial consequences of which are already powerfully felt in Scotland and the exposed parts of England. An essential requisite in this department is attention to the future management, thinning, and pruning of plantations.

7066. *The taste for landscape-gardening* has been comparatively dormant in England during the last thirty years; in Scotland it has been more active, but not of the purest kind: little has been done in Ireland generally, though there are some patriots there, who have been active in improvement. A taste for deer-parks is not common in Scotland; and rare in Ireland.

7067. *The taste for public gardens, as promenades and botanic gardens, seems on the increase; but, unfortunately, these are seldom founded on a sufficiently secure basis. The funds of the recently established botanic gardens have been generally raised by the subscriptions of a certain number of individuals, to whom, and to certain annual subscribers, the garden is alone accessible. Perhaps it would be better, if, as in the case of public promenades, the funds were raised by the whole town or community, and the garden thrown open to all, like that of Paris. Public umbrageous promenades, either equestrian or pedestrian, are very desirable additions to all aggregations of houses.*

7068. *Choice of a gardener.* Very much of the comforts and pleasures which a private gentleman derives from his garden, and garden-scenery, depends on the qualifications of the gardener whom he employs to manage them. It was formerly the practice, in books of gardening, to give directions to gentlemen how to choose a gardener. These might have been of use when the qualities desired differed little from those sought for in a common labourer; such as sufficient strength and health, and good morals, disposition, temper, &c. But every master can judge of these and other similar points; and for any gentleman who has not a knowledge of gardening to go farther, would be more dangerous than useful. We are clearly of opinion that, in almost every case, the best mode is to apply to a respectable nurseryman; to describe to him the sort of garden and garden-scenery to be managed, and the sort of productions desired, and to rely on his recommending a fit person for accomplishing the intended objects. If this person should not turn out so well as was expected, the nurseryman will be in some degree responsible for his conduct, and will feel doubly anxious to replace him by a more competent person.

CHAP. II.

Education of Gardeners.

7069. *By education* is generally understood that portion of knowledge which is obtained at schools; but we shall here use the term in a somewhat more extended sense, and consider it as the means which may be employed to render man competent for executing the part which he undertakes to perform in life with increased satisfaction to himself and others. Education may be thus considered as extending to everything which operates on the body or mind, from the earliest period of our existence to the final extinction of life. With this object in view, in preceding editions, we treated in succession on the professional, intellectual, moral, religious, physical, and economical education of gardeners; but the twelve years that have passed away since we composed that chapter have produced wonderful changes, with respect to education, not only in Britain, but throughout Europe. In 1828, while in Germany, we had an opportunity of informing ourselves as to the state of public instruction in Wirtemberg, Bavaria, and Baden; and we published in Paris, in the January following, a pamphlet, entitled *Des Etablissements pour l'Education publique en Bavière, dans le Wirtemberg, et à Bade; et Remarques sur les Améliorations à introduire dans ces Etablissements pour les faire adopter en France, en Angleterre, et autres Pays*. It is satisfactory to us even to hope that this tract may have had some influence in forwarding the cause of public instruction in France; and we flatter ourselves that the notices which we gave from time to time in the *Gardener's Magazine*, and in the *Magazine of Natural History*, as well as a pamphlet entitled *Parochial Institutions, or an Outline for a National Education Establishment*, &c. have not been written without doing some good in Britain. The subject of education, which has been uppermost in our minds for many years, is now (August, 1834) happily occupying the attention of the public and of government; and its great importance to all classes, and especially to those who have no other source of living than their personal labour, is beginning to be understood, and acknowledged. In a few years, we have no doubt that such a system of public instruction will be adopted in Britain, as will insure the communication of all the elements of useful knowledge to all young persons without exception; and as this will include young men destined for the profession of gardeners, as well as others, it seems unnecessary that we should here repeat those details which will be found in preceding editions. (See *Gard. Mag.*, vol. v. p. 292.) In general, the most useful part of education, with reference to the conduct of life, is that which a young man gives himself after he has left school, and entered on that pursuit which is to form his future occupation. We would, therefore, strongly recommend every young man who has entered on the profession of gardening, to be most assiduous in his endeavours to add to his stock of knowledge, from books, from observation, and from personal intercourse with eminent gardeners. An accumulation of facts thus stored in the memory will not, however, be alone sufficient to fit a man for the exercise of his profession in a superior manner. The mind must be exercised on these facts, so as to generalise on them, and make them its own; to trace them up to principles of general application; and thus to be enabled to apply them in unforeseen cases. An immense number of facts necessarily must come before every gardener; more especially before him who studies botany, and acquires the names and the culture of some thousands of plants. Perhaps the acquirement of this kind of knowledge has a tendency to prevent reflection; and, therefore, it appears to us that the great object of reading with reference to persons thus circumstanced, ought to be to teach them to think and generalise; for it is probably on this point that young gardeners of the present day may be most deficient.

KALENDARIAL INDEX.

THE *almanac time* in this kalendar is calculated for the meridian of London; but as a *kalendar of nature* is given for the metropolitan district, the *almanac time* may, in every part of the empire, be varied to suit the local climate and vegetation.

In general, other circumstances being alike, four days may be allowed for every degree, or every 70 miles north or south of London: in spring, operations may be commenced earlier in that proportion southwards, and later northwards; but in autumn the reverse, and operations deferred as we advance southwards, and accelerated as we proceed to the north: in every case allowing a due weight to local circumstances.

JANUARY.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	35 9	6	29 66	1-967 inch.	A cold January is reckoned seasonable. The gardener, during this month, does not labour in the garden more than five hours a day; allowing one hour more for early and late attendance on hot-house fires, and seven hours for sleep, there remains eleven hours for personal improvement. Let the young gardener, who is ambitious of distinguishing himself, not let one of these hours run to waste.
Edinburgh -	34 5		29 194	2-594	
Dublin -	29 92		29 721	2-697	

1. Kalendar of animated nature round London.

In the first week: shellless snails (*Hélix* and earth-worms (*Lumbricus terrestris*) appear.

Second week: redbreast (*Sylvia Rubecula*) whistles, nuthatch (*Sitta europæa*)'s chatters, mistletoe-thrush (*Turdus viscivorus*) sings, and wagtails (*Motacilla alba* and *flava*) appear.

Third week: the common lark (*Alauda arvensis*) congregates.

Fourth week: snails (*Hélix aspersa*) and slugs (*Limax ater* and *hyalinus*) abound in sheltered parts of gardens; the hedge-sparrow (*Acceator modularis*) whistles, the large titmouse (*Parus major*) sings, and flies appear on the windows.

2. Kalendar of vegetable nature round London.

In the first week: some plants accidentally in flower; and others, as the *laurustinus*, continued from December.

Second week: winter aconite (*Erānthis hyemalis*), Christmas-rose (*Helleborus peltatus*) in flower, and hazel (*Corylus Avellana*) catkins beginning to appear; common honeysuckle (*Caprifolium Periclymenum*) buds begin to appear.

Third week: primrose (*Primula vulgaris*) flowers in sheltered places; daisy (*Bellis perennis*) and chickweed (*Stellaria media*) begin to flower.

Fourth week: mesteron (*Daphne Mezereum*) begins to flower; and sometimes spurrey (*Spirgula arvensis*), pansy (*Viola tricolor*), white scented violet (*Viola odorata*), archangel (*Tamium rubrum*), and coltsfoot (*Tussilago Petasites* and *fragrans*), show blossoms.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) early frame and Charlton peas about the beginning, and some dwarf marrowfats about the end of the month. (4012.) Early mazagan and long-pod beans in the first week (4027.) and the last. (4030.) In the last fortnight, on a sheltered border, sloping to the south, the hardy green Egyptian, early and brown Dutch lettuces. (4368.) On a similar border, in the first and second week, early dwarf short-topped radish; in the last fortnight, the salmon-coloured. (4157.)

Protect (4392.) by temporary coverings, newly sown seeds, as lettuce, endive, celery, &c.

Transplant (4114.) strong plants of the brassica tribe, carrots, parsneps, &c. to run for seed.

Dig (3676.) and *trench* (3682.) vacant ground in dry weather.

Prepare (2783.) composts and manures. Attend to neatness (3196.) by picking up all dead leaves, and removing all plants killed by the frost, &c. (3188. to 3200.)

Insects, &c. (3096.) Destroy slugs, set traps for mice, and remove all larvae, webs, eggs, &c.

4. Hardy fruit department.

Plant (2891.) fruit trees in general, in open weather.

Protect (3024.) newly planted trees from frost and drought by mulching (3912.); fig trees by fronds or mats, if you have neglected this business in October. (3125.)

Prune (2929.) apples, pears, plums, cherries, gooseberries, currants, and raspberries, preferring mild weather, or only moderate frosts. Prune first such trees as stand in compartments or borders that you wish to dig or dress (2045.); apricots in the last fortnight, if very mild. (4932.) Loosen the extremities of the shoots of such trees as it is not proper to prune at present, and wash them with soap-suds and sulphur, or scalding water, if insects are suspected. (3086.)

Dig (3676.) and stir the earth round trees which have been pruned; trench ground intended for trees.

Stake newly planted trees. (2912.)

Clean trees from moss, mistletoe, &c. (3116.) Guard against hares, by furring or lime-whiting their stems, or tying thorns round them. (3038.)

Destroy (3096.) insects by washes, or hot water, applied both to walls and trellises, and to the trees.

Fruit-room and cellar. (2574.) Look over the fruit in open boxes or shelves, and pick out decayed or tainted ones; but do not touch the casks of fruit in the cellar. (2575.)

5. Culinary hot-house department.

Glass case without heat. (2987.) Sow radishes, lettuce, carrots, small salads (4157.); and peas and beans for transplanting. (4010.)

Hotbeds and pits. (3288.) Prepare for making up hotbeds for early cucumbers (3685.) and melons (3713.), if you have not begun in November. Sow early radishes, and small saladings on slight hotbeds. (3812.) Sow carrot on a slight hotbed, to produce a crop for drawing in April and May. (3809.) Kidney-beans, peas, potatoes (3783. 3804. 3797.), &c. may be sown and planted on slight hotbeds in small pots, to fit them for transplanting. (3919.) Force asparagus (3765.), sea kale (3782.), and tart-rhubarb (3782.) on hotbeds or in pits, or in the open garden. (3775. and 3781.)

Pinery. (3466.) Give air and water sparingly to pines; sow kidneybeans; take in strawberries.

Forcing-houses. (3556. and 3680.) Give air and water, and, according to the progress your trees have made, increase your stimuli of every description. Attend to kidneybeans and strawberries, wherever you have any stove-room. (3791. and 3751.)

6. Flower-garden. — Open-ground department.

Plants (2891.) dried roots of border flowers, if not done before; but defer planting bulbs of the finer florists' flowers till February, unless the weather is very mild. (5833.)

Transplant (2913.) daisies, and other edgings, if the weather is fine, and it was not done before. (6012.)

Protect (3024.) choice plants by matting, litter, cases of wickerwork, old bark, and all other proper means, observing to do it with due attention to neatness in this department of gardening. (3188.) Attend to the finer sorts of tulips, which will emerge from the ground by the end of the month; hoop them over, and apply mats. (5698.) Ranunculuses and anemones, which have been planted in November, will require a similar attention. (5709.)

7. Flower-garden. — Hot-house department.

Glass case without heat. (2387.) Attend to the alpine (6021.) : they should have air every dry day, and must, in very severe weather, be protected by mats, and even litter, to imitate their native snow covering at this season. Mignonette and other prolonged annuals, as stocks, sweetpeas, &c. will require similar attention. (5951.) Look to choice auriculas (5795.) and polyanthus (5842.) : keep them plunged in frames in old tan, or, what is better, saw-dust, or ashes. In general, never attempt to keep a potted plant through the winter in a cold frame, unless it be plunged, or the pots be standing very close together.

Hotbeds and pits. (2388.) Begin to force roses (5667.) and other shrubs, and hardy flowers, as well as bulbs, if you have not begun in November : put bulbs in blowing glasses. (5866.)

Green-house. (5670.) Minim. temp. for this month, 40°; max. at fire heat, 44°. See that the most delicate plants be in the warmest part of the house, in so far as is consistent with other arrangements : give air freely in fine weather, and water at all times sparingly. (6085.)

Dry stove. (5674.) Min. temp. for this month 45° with fire heat; water very sparingly, but give air every fine day. (5661.)

Bark, or moist stove. (5625.) The minimum temperature for this department, with fire heat, may be 58°, and maximum 70° : water and give air with discretion.

8. Pleasure-ground and shrubbery.

Plant (2891.) most sorts of deciduous trees in fine weather, and deciduous hedges. (6316. and 6339.)

Prune (2924.) native and naturalised deciduous shrubs and trees (6325.) ; cut deciduous hedges (6407.) ; attend to the weather : only the very hardest natives are to be cut during frosts and snows. (6386.)

Digging. (2674.) Continue this operation in the interior of masses and groups, as well as in the

shrubberies and other screen plantations. Where the exterior abounds with flowering shrubs and plants, it should have been dug in autumn, and must not be deferred till next month.

Dress turf (5636.) and gravel (2770.) : the former may be done in moist, but the latter only in dry weather.

Form and repair lawns and turf verges, in mild weather. (2914. and 2915.)

9. Trees. — Nursery department.

Lay out (6485.) ground for a nursery, if not done in autumn; gather all manner of tree-seeds. (644.)

Dig (3676.) and *breach* (3052.) vacant ground between the rows of plants, which are to stand a year longer : fill up any vacancies as you go along. (7112.)

Put (2895.) plants fit for planting out.

Prune (2924.) nursery plants before planting : do this in sheds, and keep the roots covered with matting or moss.

Collect (3120.) cones of the larch and other fir, and of the pine tribe. (6496.)

Protect (3024.) beds of germinating seeds with straw or litter; put tender seedlings in pots under frames, or mats and hoops, from birds, mice, snails, and other vermin. (3077.)

Rotting-ground (6441.) : turn over the different layers frequently, and see that none of them are soaked with water.

Seed-lift and cellar (6492.) : look to all the sorts of seeds in these departments : whether buried in sand, or in heaps, layers, baskets, drawers, or bags.

Destroy (3037.) vermin, and, in bad weather, cut and paint tallies and prepare parchment labels, number-sticks, hooks for laying, &c. (2571.)

10. Trees. — Permanent plantations and park scenery.

Prepare (6317.) ground for grove or screen plantations; for useful strips; for detached, and for hedgerow trees; and planting in general. (6386.)

Plant (2891.), in dry weather, deciduous trees, Scotch pine, and larch fir. (6509.)

Prune (2924.) deciduous trees, and also larch fir and Scotch pine groves (6398.) hedgerow trees, and, indeed, deciduous forest trees, in every form (6322.) ; cut and slash, repair and renovate, and complete hedges of deciduous plants or trees. (6422.)

Enclose and fence (6320.) ground intended to be planted (6322.) by posts and rails in all weathers (6320.) ; but by mortar walls, in mild weather only. (6323.)

Fell (6465.) timber trees, where the bark is no object.

Thin (6414.) crowded plantations, distinguishing between such as consist of sorts fit for barking, or transplanting, and sorts for consumption in any of the usual forms of young trees, or coppices (6415. and 6421.) , and otherwise prepare for planting the more extensive (6317.) sites. (6320. to 6355.)

Excavate and remove ground for forming pieces of water, &c. (2757. and 6751.)

FEBRUARY.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	42 3	5	29 94	0.873 inch.	This month (the spring or spring hole month of the Romans) is usually subject to much rain, or snow : either is accounted seasonable; the old proverb being, "February fill date with either black or white." Early forced articles, and especially cucumbers and peaches, require great care during this month : when the sun does not appear for several days, danger is to be apprehended from damps, and at other times from chills.
Edinburgh -	36 6		29 556	1.469	
Dublin -	43 78		30 091	2.24	

1. Kalendar of animated nature round London.

In the first week : bees (*Apis mellifera*) come out of their hives, gnats (*Culex*) play about, insects (*Insectæ*) swarm under sunny hedges, and the earth-worm (*Lumbricus terrestris*) lies out; hen-chaff-fishes (*Fringilla*) flock, and the song-thrush, or throble (*Turdus musicus*), and common lark (*Alauda arvensis*), sing.

Second week : the buntings (*Emberiza Miliaria*) and linnets (*Linaria Linba*) appear in flocks; sheep (*Ovis Aries*) drop their lambs; geese (*Anas Anser*) begin to lay.

Third week : rooks (*Corvus frugilegus*) begin to pair, and resort to their nest-trees; house-sparrows (*Fringilla domestica*) chirp, and begin to build; the chaffinch (*Fringilla coelebs*) sings.

Fourth week : the partridge (*Pterix cinerea*) begins to pair, the blackbird (*Turdus Merula*) whistles, and the field and wood larks (*Alauda arvensis* and *arboræa*) sing; the hen (*Phasianus Gallus*) sits.

2. Kalendar of vegetable nature round London.

In the first week : the snowdrop (*Galanthus nivalis*), whin (*Ulex europæa*), white deadnettle (*Lamium album*), polyanthus (*Primula veris*) flowers; and the elder (*Sambucus nigra*), and some roses and honeysuckles, begin to expand their leaves.

Second week : common crowfoot (*Ranunculus repens*), dandelion (*Leontodon Taraxacum*), and the female flowers of hazel (*Corylus Avellana*), appear.

Third week : *Veronica agrestis* in flower; many of the poplar and willow tribe show their catkins;

and also the yew (*Taxus baccata*), alder (*Alnus glutinosa*); while the tulip (*Tulipa*), crown-imperial (*Fritillaria imperialis*), and various other bulbs, are boldly emerging from the ground.

Forstia seek: the Erica carnea, wood strawberry (*Fragaria vesca*), some speedwells (*Veronica*), the groundsel, and sometimes the stock and wall-flower (*Cheiranthus*), in flower. Some sorts of gooseberries, apricots, and peaches, beginning to open their buds.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) radishes at twice or thrice (4157.); round-leaved spinach twice (4170.), lettuce for succession (4338.), peas and beans in the beginning and end of the month (4012. and 4027.); some early cabbages to replace any plants of the last August sowing; at the end of the month, red cabbage. (3919. and 3904.) In the last week savoris (3923.); in the last fortnight dill, chervil, and fennel (4505. to 4518.), early Horn carrot near the end of the month (4121.), early Dutch turnip in the last fortnight (4104.), small salad every fortnight (4486.), onions for a full crop in the last week, and a few leeks at the same time. (4219. and 4233.)

Temporary coverings. (3094.) Cover with litter, fronds of spruce and silver fir, mats, and other means, as circumstances may require.

Plant (2891.) Jerusalem artichokes (4098.), chives, garlic, shallots (4242. to 4255.), horseradish (4519.), liquorice (4648.), and potatoes. (4092.)

Propagate, by rooted offsets (2801.), mint, balm, sorrel, pennyroyal, tansy, tarragon, fennel, and burnet. (4501. 4556. &c.)

Transplant (4114.) for seed, if it was not done in autumn, the brassica tribe, onions, carrots, turnips, beet, celery, endive, parsneps, and leeks.

Dig (3676.) and **trench** (3688.) vacant ground in moderate weather, and perform all other operations of this kind only in dry weather.

Destroy insects by the usual means. (3037.)

Store-room. Look over onions, and other dried roots. (2575. and 2576.)

Tool-room. See that tools are always cleaned before being laid by at this season. (2577.)

4. Hardy fruit department.

Plant (2991.) all sorts of fruit trees, when the weather is fine (4770.): strawberries towards the end of the month. (5192.)

Protect roots of new planted trees by mulching (2912.); tops of apricot, plum, peach, and nectarine trees coming into blossom. (4922.)

Prune (2929.) apricots, peaches, and nectarines, before the blossom buds are much swelled (4910. to 4914.); apples and pears before the end of the month (4824. and 4854.): finish vines (3590.), and nail them, and also gooseberries, currants, and raspberries. (3065. 5097. and 5112.)

Prepare ground for planting (6317.): spring-dress strawberry plants; dig and dress ground where the trees are pruned; support newly planted trees with stakes (2912.); clear the bark of trees of moss, &c.; fence orchard trees where sheep, cattle, or hares may be expected. (3116. and 3038.)

Destroy insects. (3096.)

Fruit-room. (3126.) Keep continually examining the loose fruit, whether in the open shelves, or close drawers: remove all tainted specimens.

Fruit-cellar. (3675.) Such fruit as is put up in close casks, and sealed or plastered up to exclude the air, will require no farther attention than keeping out extreme frosts, so as the temperature may stand between 32 and 40 degrees.

5. Culinary hot-house department.

Glass case without heat. (2387.) Sow lettuces, small salads, &c. as in last month (4392.), plant potatoes. (3797.)

Hotbeds and pits. (2388.) In the first week begin to force cucumbers and melons: In general, the beds now set to work produce finer fruit than those put in action sooner. (3685. and 3719.) Continue sowings of salads (3812.), and kidneybeans (3783.); begin or continue to force asparagus, potatoes, sea kale, tart-rhubarb, &c. (3765.); sow a few seeds of early cabbage and cauliflower plants for early planting.

Mushroom beds. Protect established beds, and spawn new ones (3814.): keep up the heat of all hotbeds by linings. (3789.)

Pinery. (3496.) Attend to the proper temperature (3594. and 3526.): pines want little air or water at this season. See that suckers on dung heat are not too moist.

Forcing department. (3556.) If you have not begun before, this is a very good time to commence with most sorts of fruits, peaches, cherries, vines, &c. Set in strawberries and other plants in pots, also fruit trees and shrubs, and plant kidneybeans; apply stimuli by degrees, but, having once begun to excite, do not decline, otherwise you produce an injurious check to vegetation. See to the stems of vines which are outside the forcing-houses and stores which are at work. (3598. and 3606.)

6. Flower-garden. — Open-ground department.

Sow (4010.) a few hardy annuals in the last fortnight, if the weather be fine: most of the sorts are better deferred till the end of March. (5990.) Mignonette and ten weeks' stocks, in a warm border, to be protected in severe weather. (3024. and 5951.)

Propagate hardy plants from the root and herb; but September or March are better seasons. (5973.)

Plant dried roots, when the weather is open and dry. (3891.)

Transplant (4114.), if the last fortnight be fit weather, the hardier biennial and perennial border-flowers. (5678. and 5987.)

Shelter and protect (3034.) by all the usual means; but take care not to exclude air and light a moment longer than is absolutely necessary.

Prepare vacant ground for plants and trees, also composts for plants in pots. (2783.)

Bees. Feed such hives as are weak. (3602.)

7. Flower-garden. — Hot-house department.

Glass case without heat. (2387.) Dress select auriculas, and cover them at night to promote their growth (5830.); sow ten weeks' stocks, and mignonette, for successional supply. (5667. and 5951.)

Hotbeds and pits. (2388.) In the last week, prepare for tender annuals, continue to force bulbs, and the usual sorts of border flowers and Dutch roots in dung beds and pits heated by fermentable substances, steam, or by smoke flues. (5866.)

Green-house. (5650.) Minimum heat for this month, 40°; maximum, with fire heat, 44°. Give air freely in fine weather, but water sparingly; the alternate drying by fire-heat, and then macerating by watering, is a sure way of killing tender plants in small pots.

Bark, or moist stove. (5625.) Give air whenever the thermometer rises to 70°, or under it if the sun shines, keeping up your fire and bottom heat. Begin to propagate by the usual modes; attend to neatness and routine culture.

Dry stove. (5624.) Min. 45°; max. with fire heat, 50°. Give water and air as in January.

8. Pleasure-ground and shrubbery.

Plant (2891.) deciduous trees and hedges, as in January; deciduous shrubs after the middle of the month. (5592. 5613. and 5632.)

Prune (2929.) as before, finishing most sorts by the middle of the month, if possible. (5635.)

Dig (2676.) as before, and include the flower and shrubbery borders towards the end of the month. Sweep and roll gravel-walks and lawns (5636.); trim the edges of verges with a weeding-iron; remove mosses and weeds everywhere. (5643.)

Form and prepare lawns and gravel-walks, as directed for last month. (2914. and 2915.)

9. Trees. — Nursery department.

Fruit trees. Sow kernels and fruit stones (5523. and 5528.); lay guince, walnut, and mulberry trees; plant cuttings of the gooseberry, currant, and elier. Lay or graft the berberry, hazel nut, and filbert. (6544.) Preserve cuttings of the vine and fig in dry earth (2877.); plant suckers of the raspberry; prepare for grafting. (2896.)

Ornamental shrubs. Sow hardy deciduous sorts; lay and plant cuttings, and take off suckers for propagation; plant out in nursery rows, and prune deciduous kinds. (5543.)

Forest trees. (6494. to 6542.) Sow mountain ash, hornbeam, wild cherry, hawthorn, ash keys, hazel-nut, acorns, walnuts, Spanish and horsechestnuts,

&c.; holly and yew in the last fortnight. Plant cuttings of poplar, elder, and willow; lay in seedling larches; gather pine and larch cones. (6496.)

Fork up (2684), *dig* (2676), or *trench* (2682), between nursery rows, not intended for removal this season (5232); weed and remove decayed leaves, attending as much as possible to order and neatness. (3196.)

10. Trees. — Permanent plantations, and park scenery.

Plant (2891.) fences of deciduous trees (6339); forest trees of all the deciduous sorts, in mild

weather; ornamental deciduous sorts, not very tender, in fine weather.

Prune (2924) deciduous sorts, except such sorts as are apt to bleed, as the wild cherry, birch, and sycamore, or the resinous and evergreen tribes, which are best pruned in summer, autumn, or late in spring.

Thin and fell timber and young trees, as far last month; remember not to touch bark wounds this month. (6692. and 6171.)

Oversee (5752) on ground, with a view to forming roads, pieces of water, and other effects of landscape-gardening. (6910.)

MARCH.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.
London	46 4	4	30 20	0.716 inch.
Edinburgh	41 7		29 886	1.455
Dublin	41 09		29 707	2.364

REMARKS.

The beginning of March usually concludes the winter; and the end of the month is generally indicative of the succeeding spring; according to the proverb, "March comes in like a lion, and goes out like a lamb." The Saxons called this month the *luphthman* month in allusion to the increasing of the days. The most laborious period of the gardener's year is the last half of this month; and the first fortnight of April.

1. Calendar of animated nature round London.

In the first week: the ringdove (*Columba Palombus*) coos, the white wagtail (*Motacilla alba*) sings, and the yellow wagtail (*Motacilla flava*) appears; the earthworm (*Lumbricus terrestris*), and the snail (*Helix*), and slug (*Limax*), engender.

Second week: the jackdaw (*Corvus Monedula*) begins to come to churches; the tom tit (*Parus caeruleus*) makes its spring note; brown wood owls (*Strix stridula*) hoot; and the small tortoise-shell butterfly (*Vanessa urticae* L.) appears.

Third week: the marsh titmouse (*Parus palustris*) begins his notes; various flies (*Musca*) appear; the fox (*Anis vulpes*) smells rank; the turkey-cock (*Melagris Gallo-Pavo*) struts and gobbles.

Fourth week: the yellowhammer (*Emberiza Citrinella*) and green woodpecker (*Picus viridis*) sing; rooks, ravens (*Corvi*), and house pigeons (*Columba*) build; the goldfinch (*Fringilla Carduella*) sings; field crickets (*Scrabax*) open their holes; and the common flea (*Pulex irritans*) appears.

2. Calendar of vegetable nature round London.

In the first week: various species of the pine, larch, and fir tribes in full flower; the rosemary (*Rosmarinus officinalis*), the willow (*Salix*), and bay (*Laurus nobilis*), in blossom; various trees and shrubs beginning to open their buds.

Second week: the common honeysuckle (*Caprifolium Periclymenum*) and some roses in leaf; *Crocus vernus*, and other subspecies, and some Scilla, in flower; pilewort (*Picaria*) and creeping crowfoot (*Ranunculus repens*), *Hepatica* and elder (*Sambucus nigra*), sometimes in leaf.

Third week: *Saxifraga oppositifolia*, *Draba verna*, *Daphne pontica* and collina, and *Loncera nigra*, in flower.

Fourth week: the peach and nectarine, apricot, *Keria japonica*, *Cydonia japonica*, crown imperial, *Saxifraga crassifolia*, *Sisus sempervirens*, and other plants in warm situations, in flower, or just advancing to that state.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) the main crops of most esculents. Drum-headed and Scotch cabbages for field culture. (3907.) Peas (4012), beans (407), lettuce (4363), spinach (4170), and small salads every fortnight. (4466.) Indian cress (4522), a few savoy (3923) for an early crop; and towards the end for a full crop. Onions (4219) for a full crop; and leeks (4239), some red and white cabbage (3919 and 3904), full crops of carrots (4121.) and parsneps. (4131.) Asparagus in the third week. (4264.) Cauliflower in the last fortnight, for a full crop (3947.); bore-coles (3937.), and Brussels sprouts for autumn and winter crops. (3935.) In the last fortnight, sea kale (4301.), cardoons (4338.), turnips (4104.) celery (4408.), asparagus (4356.), and most culinary aromatics, as parsley, dill, fennel, &c. (4490.) In the last week, summer savoy (3923), and mustard for seed. (4433.)

Plant (2891.), in the first fortnight, horseradish (4519), liquorice (4650), chives, shallots, and garlic (4242), old store onions, as scallions or small bulbs for a full crop of large bulbs. Jerusalem artichokes and sea kale, and in the last fortnight, potatoes for a full crop. (4082.)

Temporary coverings (3094.): continue these as in last month.

Propagate edible perennials by slips and offsets (2802. and 2801.)

Transplant the brassica tribe, lettuce, and asparagus. Fill up vacancies. (5314.)

Dig, &c. as in last month (2676.); form composts and earths in heaps or hills. (3305. and 3306.)

Destroy insects. (3057.)

Store-room. Remove decaying articles, and admit plenty of air, &c. (2575. and 2576.)

4. Hardy fruit department.

Plant (2891.) fruit trees in general. The fig (5268) and mulberry may now be planted. (5015.) Finish planting gooseberry trees before the middle of the month, and currants and raspberries by the end. (5050. 5068. and 5104.) Alpine and wood strawberries may be planted, though autumn is preferable. (5131.)

Protect roots by mulching (2912.), and trees coming into blossom by the usual means.

Prune (2929.) till the middle of the month; but finish then if possible. If not, apricots may be pruned till the 5th (4932), peaches and nectarines till the 15th (4910.), gooseberries to the 7th, red and white currants to the 10th or 12th, and the black currant to the 20th. (5065. and 5097.)

Dig and dress between rows of currant trees, and other fruit trees where this operation has not been done before. Dress any strawberry beds you have not been able to do before. (5144.)

Destroy insects. (3057.)

Fruit-room (3136.) Examine the fruit in the room; take care not to leave open the door of the cellar as to raise its temperature above 40°.

5. Culinary hot-house department.

Glass case without heat. Sow kidneybeans to receive a few weeks' protection. Remove frames from cauliflower plants. (3651.)

Hotbeds and pits. (2388.) Go on with hotbeds for cucumbers and melons. (3685.) Sow a few turnips on a gentle hotbed to come in early. (3808.) Sow all sorts of culinary annuals. Give air and apply linings to maintain the proper temperature. (3768.) Attend to pine suckers and crowns; shift any that may require larger pots, and examine the roots of such as are sickly. (5008.)

Pinery. (3783.) Keep sowing kidneybeans, and filling spare corners with strawberry pots for succession. See that your bark pit be in proper heat, and attend to the temperature for this month, and the other points of culture. Pines are now generally shifted. (5021.)

Forcing department. (3556.) Attend to the culture of each particular kind; and generally to keep down insects by watering; promote setting of fruit by air, and encourage growth by steaming or filling the house with vapours by powerful fires and waterings over the leaves and every part of the house.

6. Flower-garden. — Open-ground department.

Sow (4010.) hardy annuals (5860.) in the second, third, and last week; and some of the more robust half-hardy annuals about the end of the month. (5898.) Such biennials as flower the same year, as honesty, scabious, bastard rocket, sweet alyssum, clary, Chinese hollyhock, and Indian pink. (5988.) Biennials in general, and also perennials towards the end of the month. (5973.)

Propagate by rooted slips and offsets; but next month is preferable for rootless slips and cuttings. (5801.)

Plant dried roots: finish with the anemone and ranunculus in the first fortnight. (5725. and 5718.)

Transplant annuals from the patches in the borders, and biennials and perennials from the flower-garden nursery, into their final sites. (4114.)

Shelter choice border and all florists' flowers in severe weather. (3084.)

Dig, dress, hoe, rake, &c. only in dry weather. Clean up all borders, and prepare vacant ground. (5976. to 5983.)

Beees. Feed weak hives as in last month. (5802.)

7. Flower-garden. — Hot-house department.

Glass case without heat. (5987.) Take care of alpinas and prolonged annuals, remove all weeds, and be discreet in your waterings. (6090.) Cover auricula frames in very severe nights (5830.); by keeping them rather warm at this season they will come up with fine tall stalks to support their magnificent trusses. Sow half-hardy annuals for transplanting, they will come into flower as soon as those sown in the open air last month. (5896.) Take care of the hardy succulents. (6077.)

Hotbeds and pits. (5368.) In the first fortnight sow half-hardy annuals on a slight hotbed for transplanting to come in first. (5985.) Sow tender annuals at any period of the month. (6013.) Plant tuberoses in pots for forcing. (5776.) Force roses and other flowering or odoriferous shrubs and all desirable hardy flowers in pots. Sow seeds of greenhouse and hot-house plants to be propagated in this way. Plant cuttings for the same end. (5877.)

Green-house. (5660.) Make no fires unless the thermometer, in the open air, falls to 36°; 45° with fire-heat will be a good medium heat in this month. Begin to propagate by cuttings. (5877.)

Dry stove. (5660.) A good medium heat for this month will be 55°, which may be kept up with very little fire-heat. Give water moderately, but see that what you do give wets the earth, and does not escape between the ball and the edge of the pot. Give air freely in fine weather.

Bark or moist stove. (6159.) Give air in general, as in last month. If you wish to promote a vigorous growth, shift your plants into a rich compost, water over the top about three o'clock, and then shut the house close up for the night. Do this only when the temperature has been up to 80°. (5663.)

8. Pleasure-ground and shrubbery.

Plant (2891.) deciduous trees and shrubs, also deciduous hedges; finish as early as possible, unless

the season be unusually backward. Evergreens of the harder sorts towards the end of the month. (6025. and 6059.)

Prune (5929.) deciduous trees and cut hedges, and finish this work as early as possible. In pruning plants, where the chief object is their flowers, attend to their mode of bearing these. In short, never begin to cut a tree before having a clear and distinct idea of what you wish to attain—i.e. its health, shape, size, leaves, shoots, flowers, or roots?

Dress winter and autumn dug shrubberies. Mulch, stake, water, and attend to neatness. (5912.) Dress and roll turf and gravel; attend to the margins with the turf-raser. (5636.)

Form and repair gravel-walks. In some situations imitation gravel-walks require to be turned every two or three years and partially renewed. (5915.)

9. Trees. — Nursery department.

Fruit trees. Sow kernels for stocks; lay the vine and the fig (5572. and 5678.) plant cuttings and eyes of the vine in the open air, or in pots, to be placed in a moist heat. Graft towards the middle of the month, or sooner or later, according to the season. Plant out seedling stocks in nursery rows. (5644.) Head down newly budded and grafted trees not intended to be removed. (5875.)

Ornamental trees and shrubs. Sow seeds of the harder sorts. Evergreens may be sown in the last week. Finish laying deciduous kinds, plant cuttings and suckers, and graft some rare sorts towards the end of the month. Plant out layers, cuttings, and suckers in nursery rows. (5900.)

Forest trees. (5518.) Sow nuts, keys, and berries, and also birch and alder seed. In the last fortnight begin to sow evergreens. Plant cuttings, suckers, &c. as in February. Plant out from the seed-bed or cutting-border in nursery lines. Dig between the rows of trees and shrubs not intended to be removed this season.

Weed, hoe, rake, and stir the surface in fine weather. Dig between nursery lines, where the plants are not to be removed. (5522. and 5541.)

Shelter and protect from cold, birds, and vermin. (3094. and 3037.)

10. Trees. — Permanent plantations and park-scenery.

Plant all sorts of deciduous trees and shrubs, the Scotch pine and larch fir. (5508.) Towards the end plant most sorts of evergreens. (6025.) Hedges of evergreens. Fill up blanks in plantations of two or more years' standing.

Head down trees intended to stole for underwood, or to produce single leaders for timber trees or poles. (6400. and 6329.)

Fell and thin trees and copse; but do not commence barking till the end of the month, when the trees will part freely with their bark. (5414.)

Sow forests and woods; about the middle of the month is a good time, as the crows, rooks, and other vermin will be less likely to destroy the seeds, having the farmer's sown fields to attack. (6328.)

Operations on ground, and masonry, may now go on with the utmost vigour; the days having attained a sufficient length, and the weather being generally dry: external brick walls for gardens, however, are better deferred till May, when all danger from frost will be over.

APRIL.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	49 9	3	29 77	1.460 in.	The weather of this month is distinguished by the rapidity of its changes. It is generally stormy, interspersed with gleams of sunshine, hail, snow, some frost, and occasionally violent storms of wind. Fruit-tree blossoms and half-hardy plants require protection and particular attention during this month. The young gardener, while at work, may study the germination and foliation of trees, and the different colours of the newly-expanded foliage.
Edinburgh -	46 3		29 873	2.414	
Dublin -	51 185		29 909	2.561	

1. Kalendar of animated nature round London.

In the first week: the viper (*Coleber Berus*) and woodlouse (*Oniscus asellus*) appear; the mistletoe-thrush (*Turdus viscivorus*) pairs; frogs (*Rana*) croak and spawn; and moths (*Phalaenae*) appear.

Second week: the stone curlew (*Edicnemus crepitans*) clamours; young frogs (*Rana temporaria*) appear; the pheasant (*Phasianus*) crows; the trout (*Salmo Trutta*) rises; and spiders (*Araneae*) abound.

Third week: the crested wren (*Regulus cristatus*) sings; the blackbird (*Turdus Merula*), raven (*Corvus Corax*), pigeon (*Columba domestica*), hen (*Phasianus Gallus*), and duck (*Anas Boscas*) sit; various insects appear; and the fieldfare (*Turdus pilaris*) is still here.

Fourth week: the swallow (*Hirundo rustica*) returns; the nightingale (*Sylvia Luscinia*) sings; the bittern (*Ardea rotellaria*) makes a noise; the house martin (*Hirundo rustica*) appears; the black-cap (*Sylvia atricapilla*) whistles; and the common snake (*Coleber Natrix*) appears.

2. Kalendar of vegetable nature round London.

In the first week: the daffodil (*Narcissus Pseudo-Narcissus*), the garden hyacinth (*Hyacinthus orientalis*), the wall-flower (*Cheiranthus Cheiri*), the cowslip (*Primula officinalis*), the periwinkle (*Vinca*), the sloe (*Prunus spinosa*), and various other herbs and trees, in flower.

Second week: the ground ivy (*Glechoma hederacea*), gentianella (*Gentiana scabilla*), Pulmonaria virginica, the auricula, *Iberis sempervirens*, Omphalodes verna, and most of the common fruit-trees and fruit-shrubs, in flower.

Third week: some Robinias, Andr meda, Kalmia, and other American shrubs; Daphne Laureola, Urtica campatris, Chrysosplenium oppositifolium, Mercurialis perennis, and other plants, in flower.

Fourth week: the beech (*Fagus*) and elm (*Ulmus*) in flower; ivy-berries drop from the racemes; the larch in leaf, and the tulip and some white narcissi and fritillaries in flower.

3. Kitchen-garden. — Culinary vegetables.

Sow sea kale for a full breadth; lettuce, small salads, and radishes, twice or thrice in the month. Peas and beans (4012. and 4077.), broccoli thrice (364.), borecoles in the first week (3537.), cabbages and savoy's twice (3919. and 3923.), spinach for succession (4170.), turnips twice (4104.), silver-skinned onions every three weeks during summer for drawing; onions, leeks, and cardoons, in the first week for a general crop (4219.); celery, in the first fortnight, for a general crop (4408.); mustard for seed (4433.), carrots in the second or third week, for a main crop (4121.), kidneybeans, in the second week, for an early, and in the last week for a late crop (4040.); asparagus and parsneps, in the first or second week, but not later (4131.); red beet, in the third week, for a full crop, and also nasturtiums, salsify, scorzonera, and skirret (4529.). Sow culinary aromatics and herbs, if not done in March. (4540.)

Plant bulbs and dried roots. (2889.) Finish planting the main crops of potatoes. (4492.)

Propagate perennial culinary plants by slips and offsets, as all the pot-herbs, aromatics, &c. (2801.)

Transplant lettuce, cabbages, sea kale, celery, and cauliflowers. (2893.)

Dress artichoke and asparagus beds, or compartments (4329. and 4286.) Hoe and thin spinach, onions, turnips; earth up cauliflowers and cabbages, sea kale for blanching, peas, beans, and potatoes. Stick peas, tie up lettuces, destroy weeds, and stir the ground in fine weather.

Attend to insects, and to the store-room. (3037. and 3135.)

4. Hardy fruit department.

Plant cherries, plums, apples, and pears, till the 10th; apricots and gooseberries till the 5th; peaches and nectarines till the 15th; but defer till autumn what you cannot accomplish by this period, unless the season is unusually backward. (2891.)

Protect as in last month. (2912.)

Prune, if you have delayed it; but expect vines to bleed, and stone fruits in general to be much injured by the operation, if not performed very early in the month, and even that is too late. In the last days of the month, rub off the buds of vines which appear where you do not wish shoots. (2912.)

Routine culture. Water, mulch, stake, and fence. Weed strawberry-beds, and pinch off runners, where you do not wish to have young plants.

Destroy insects, and especially the thrips, which will begin to appear on forward peach trees; pick off caterpillars. (3096.)

Fruit-room. Turn, pick, wipe, and air the more choice dessert fruits; and look also to the baking apples and pears. (3135.)

Fruit-cellar. Attend to the temperature, and never break open a cask till you are in want of its contents. (575.)

5. Culinary hot-house department.

Glass-case without artificial heat. If the season is backward, sow in the first week kidneybeans, to be protected till the weather is mild. (2387.)

Hotbeds. Continue preparing a succession of beds for ridging and hilling out cucumbers and melons. Sow, transplant, shift, &c. all esculents or pot-herbs,

which are tender annuals, as gourd, basil, love-apple, capsicum. Maintain the proper degree of heat by linings. See to pine-suckers. Plant crows and suckers taken off in the winter. (3508.)

Pinery. Attend to routine culture: shift the plants, reinforce the bottom heat, water, and give air as judgment founded on experience, reflection, and vigilant attention shall direct. The pine is a very difficult plant to kill, but it requires constant and powerful heat, and rich loamy soil, and also water more abundantly than is often given to it, to produce large, well-flavoured fruit; attend to minor articles grown or forced in the pinery, as vines, fruit trees in pots, cucumbers, kidneybeans, and strawberries.

Forcing department. All that it is proper, in our opinion, to say here, is, "Guard against supineness: there is much less danger from your ignorance than from your indifference or want of vigilance." (3197.)

6. Flower-garden. — Open-ground department.

Sow annuals; all the sorts for a main crop, or for a succession, if you have sown them in March (5980.); half-hardy annuals in warm borders there to remain. (5996.) Biennials and perennials should be sown as early in the month as possible.

Propagate by rooted and unrooted slips and offsets. (2801.)

Transplant all sorts from the nursery to the borders (2953.); tender and half-hardy annuals from the hotbeds to the borders. (2913.)

Routine culture. Weed, hoe, rake, stir the surface, remove all decayed leaves and stalks as soon as the plants have done flowering, unless you select a stalk or two occasionally for seed. Never leave all the flower-stems for this purpose, and seldom all the pods or seed-vessels which are on a stem, as that would weaken the plants.

Protect your auriculas from the extremes of every description of weather: if placed on a stage facing the north, or set on a shaded paved platform about three feet high, they will be better than if continued in the frames. (5896. and 5833.)

Destroy insects, and especially pick the grubs from the leaves of rose-trees; if you do not attend to this, you will have no blow worth looking at. (3096.)

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. Alpines may now be entirely uncovered, and also prepared annuals and most half-hardy sorts; a few half-hardy annuals may still be sown, if not done in proper season. (5996.)

Hotbeds and pits. Shift frequently such tender annuals as you mean to come to a handsome size, more especially balsams. (5944.) Sow more seed, if you have not enough of plants; plant out some in the borders to grow strong border plants, especially balsams and combs in very warm situations. Plant tuberose roots, and shift those which are coming forward, if they appear to be stunted in their growth. (5775.) Attend to pots of cuttings, and seedlings from either of the following departments (2882. —

Green-house. Fire-heat may generally be dispensed with in this month. Go on propagating by all the methods in use; this is the fittest season of the year: a good deal depends on taking off, making, and putting in the cuttings, but nothing will answer, if constant attention is not paid to keep them in a medium state as to air, heat, and moisture afterwards. (5937.)

Dry stove. No fire will here be necessary, except when the thermometer in the open air is under 40° or 49°. Propagate by the usual means, which in general for succulents is cuttings; attend to bulbs now coming into flower. (5820. and 6147.)

Bark or moist stove. Go on, as in last month, shifting, propagating, and stimulating as the nature of the different hot-house plants requires, and as your views or duties inculcate: never forget neatness, and removal of dust, insects, &c. (6192.)

8. Pleasure-ground and shrubbery.

Plant (2891.) such sorts of deciduous shrubs as you deemed too tender to plant last month; but finish this work in the first week. Plant a few roses as late as you can, in order to retard their coming into bloom: or, if you can afford the time and room,

place potted roses in the ice-cold cellar in autumn, and do not take them out till the August following, by this means you will have a fine show in October and November. (6044.) Evergreens, the hardiest sorts at the beginning, and the less so at the end of the month. (6025.)

Prune such deciduous shrubs as you have neglected last month; evergreens from the middle to the end of the month. (6386.)

Form and repair lawns, by procuring and laying turf, and by sowing grass-seeds. Where it is desired to destroy moss on extensive lawns, fold sheep till it be trod down and killed by pressure and manure; on small lawns, roll. In shady, damp situations, however, moss makes a better lawn than grass; and it should be encouraged, by forming the surface of lawns of bog earth, in all situations where grasses do not thrive, as in towns, under close trees, &c. Mow established lawns twice a month; attend to gravel and margins. (2915.)

9. Trees. — Nursery department.

Fruit trees (4770.) Finish sowing kernels for stocks, or new varieties. Plant cuttings of the vine, fig, gooseberry, and currant, if it has been unavoidably delayed till this unfavourable season. Graft the pear, plum, and apple. (2985.) Attend to newly grafted trees, and repair cracks in the clay, or renew such balls as may have dropped off; eradicate all suckers, and pinch off shoots that protrude below the grafts.

Ornamental trees and shrubs. Finish sowing deciduous sorts, as early as possible. Sow cedars, cypresses, and other ornamental evergreens about the end of the month. Sow in pots or boxes, or in shady borders of soft peat earth. Transplant evergreens. (2993 to 2912.)

Forest trees. Finish sowing common tree-seeds, and commence with the resinous tribe, the larches, firs, and pines; the cypresses, arbut-vitæ, &c. Finish planting deciduous trees in nursery rows, as early as possible. (2900.) Evergreens may be transplanted during the month. Kiln-dry the cones of the cedar and fir tribe, but not of the pine tribe; and get the seeds out in time for sowing the end of this month or beginning of next. (6497.)

10. Trees. — Permanent plantations and park-scenery.

Sow for forests and woods, and all sorts of profitable plantations in masses. Observe, it is rather late for nuts, berries, and keys, but this is the proper season for small seeds. (6528.)

Plant evergreen trees, as pine, fir, cedar of Lebanon, holly, and yew, during the month; but finish planting deciduous sorts as early as possible. (2981.) Wherever the plants are to be, or have been long out of ground, take good care to keep the roots as fresh and moist as possible; and avoid exposing them to the sun and air. Be very careful in planting.

Routine culture. Begin to hoe and clean the ground in plantations, which have been made on prepared ground. Crop the ground in newly made plantations, where cropping is intended.

Operations on ground or rocks may now be prosecuted with vigour. This is also one of the best months for building. Road-making, draining, fencing, &c. are advantageously performed during this and the two preceding months. But improvements can neither be well designed nor executed after the trees are covered with leaves, and the ground's surface and qualities disguised by luxuriant herbaceous vegetation.

MAY.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London	56 61	5 5	30 08	0.794 inch.	Vegetation now goes on with great vigour, though there are often very cold and even frosty nights, which materially injure exotics, natives of the warmer climates, such as the potato, georgina, kidneybean, &c. Man, in common with most other animals indigenous to our climate, is generally in high spirits and vigour during this month. Woe to the young gardener who exhausts his spirits in any other way than in self-improvement.
Edinburgh	56 64	8 0	30 58.5	1.945	
Dublin	52 193		30 061	1.812	

1. Kalendar of animated nature round London.

In the first week: the titlark (*Tilæa pratensis*) sings; the cuckoo (*Cuculus canorus*) is heard; the gudgeon (*Cyprinus Gubio*) spawns; the redstart (*Sylvia Phœnicurus*), swift (*Hirundo Apus*), white-throat (*Sylvia Cypselus*), and stinging-fly (*Cônops calcitrans*) appear.

Second week: the turtle-dove (*Columba Turtur*) coos; the red ant (*Formica rubra*), the laughing wren (*Curruca salicaria*), the common flesh-fly (*Musca vomitoria*), the lady-cow (*Coccinella bipunctata*), grasshopper-lark (*Curruca haustella*), and willow-wren (*Sylvia Tróchilus*) appear.

Third week: the blue flesh-fly (*Musca vomitoria*, var.) appears; black slugs (*Arctolite empiricorum Fér.*) abound; and the large bat appears.

Fourth week: the great white cabbage-butterfly (*Pontia brassica*), and dragon-fly (*Libellula 4-maculata*) appear; the glow-worm shines; and the fern-owl, or goatsucker (*Caprimulgus europæus*), returns.

2. Kalendar of vegetable nature round London.

In the first week: *Gêum urbânium*, *Artemisia campestre*, lily of the valley (*Convallaria majalis*), water-violet (*Hottonia palustris*), tulip tree (*Liriodendron Tulipifera*), and numerous other plants, in flower.

Second week: the oak, ash, sweet chestnut (*Castanea vesca*), hawthorn (*Crataegus Oxycantha*), the common maple (*Acer campestre*), horsechestnut (*Aesculus Hippocastanum*), berberry (*Berberis vulgaris*), and the *Ajuga reptans*, in flower.

Third week: the water scorpion-grass, or forget-me-not (*Myosotis palustris*), lime tree (*Tilia*), milk-wort (*Polypogon vulgaris*), nightshade (*Atropa Belladonna*), and various American shrubs, in flower; and rye (*Sceale cereale*) in ear.

Fourth week: oaks, ashes, and beeches now generally in leaf, and the mulberry (*Morus nigra*) beginning to open its buds; the cinnamon-rose and

some other hardy roses in flower; and also the bramble (*Rubus fruticosus*), moneywort (*Lysimachia Nummularia*), columbine (*Aquilegia vulgaris*), and various other trees and shrubs, in blossom.

3. Kitchen-garden. — Culinary vegetables.

Sow hardy aromatic herbs, if not done last month. Small salads four times in the month for a complete succession. Radishes and lettuce thrice. (4157, and 4363.) Peas and beans once a week. (4012.) Spinach once a fortnight. (4170.) Carrots, for late drawing, twice in the month. (4191.) Borecole, in the first week, for a second main crop. (3837.) Dwarf kidney-beans, in the first week, for a full crop in July; in the last fortnight, for crops in August and September. (4040.) Borecole and Brussels sprouts for the last crop, and German greens to come in for spring. Savoys for the last crop. (3923.) Onions for drawing, young leeks to be late transplanted, cauliflowers in the second and third weeks for a Michaelmas crop. (3947.) The less hardy aromatic herbs, and pumpkins, the last fortnight. (4008.) Cucumbers for picklers on a dry warm border, in the last week. (5314.)

Protection. Continue this, nightly, for kidney-beans and tender plants transplanted from hotbeds. (3024.)

Propagate by bulbs and dried roots. If abundance of potatoes have not been planted, effect this as early as possible; in late situations they may be planted till the middle of June. (3797.)

Plant slips and offsets. Transplant the brassica tribe, lettuce, celery, radishes, and other plants for seed. (4114.)

Routine culture. Stick peas, top early crops of beans, and also of peas; earth up cabbages, beans, peas, potatoes, &c. Thin, weed, hoe, and stir the surface among seedling crops. Water in dry weather, support stems, pinch off all decayed leaves, &c. Destroy insects and vermin. (3096.)

4. Hardy fruit department.

Plant strawberries, if it has not been done last month. (5122.)

Prune what trees you have neglected, and run the risk of losing, for if you leave them unpruned till autumn it will require a year or two to restore them to a proper state. Summer prune vines, peaches, and other early shooting trees against walls, and such gooseberries as are planted there to produce early fruit. (2946.) Remove all suckers, except selected ones of raspberries, and pinch off strawberry runners as directed for last month. (5122.)

Routine culture. Mulch, protect, and water where necessary. Water strawberries over the herbage, and especially after the fruit is set. (5137.)

Destroy insects, especially snails and caterpillars. On the first symptoms of the leaves rolling up, unroll them and pick out the grub before it does further mischief. Take special care it does not get at the petals of apple and pear blossoms. (3096.)

Fruit-room. Look over the fruit of every description, which the increase of temperature will now cause to taint rapidly. (3136.)

Fruit-cellar. Open a few casks of such dessert apples and pears as are now wanted for the table. Close them as soon as you have taken out the proper quantity, and let them still remain in the cellar. (2575.)

5. Culinary hot-house department.

Glass case without artificial heat. Remove glasses from cauliflowers and kidneybeans, according to the weather. Sow capicum under frames or hand-glasses in a warm border. (4677.)

Hotbeds. Go on with hotbeds for frames for melons, and build dung-ridges for growing cucumbers under hand-glasses. (5710.) Sow cucumbers and melons for late crops, and attend to the various particulars in their culture. Attend to air, water, shade, insects, &c.

Pinery. Attend particularly to your fruiting plants, give abundance of heat and water, and keep down all manner of dirt, insects, &c. (3537.) Attend to minor articles cultivated in the pinery, and to routine culture of every kind. Think and act for yourself; kalendars too often mislead the ignorant, who rely on them implicitly, not considering that no two cases are ever to be found exactly alike.

Forcing Department. Produce the required temperatures, and attend to all the parts of good culture and neat management.

6. Flower-garden. — Open ground department.

Sow annuals of all sorts for succession. Biennials in the nursery compartment for a stock for next year. (5990, and 5672.)

Propagate, especially by cuttings from the stalks, as of wallflower, rocket, &c. (5573.)

Take up bulbs and tuber roots, as crocus, hyacinth, lily, &c. (5933.)

Transplant, as directed for the last month, stocks and other sorts in pots for winter. (4114.)

Protect tulip-beds and all rare florists' flowers from the midday sun, the rain, and the winds. (3094.)

Routine culture. Hoe, rake, stir, weed, and clear away dead leaves. Do not neglect, whenever rain has battered the ground, to stir it up and refresh it as soon as it is nearly dry. Stir the surface round close patches of annuals, and refresh and top-dress all pots of prolonged annuals, now in full flower or in seed. Keep all the primula tribe rather dry at this season, and in the shade of a north wall. Plunge the pots in ashes or sawdust.

Destroy insects, and pick the grubs off roses. Detach seed-pods from all plants you do not wish to ripen seeds. Water, thin, and shade with judgment, and keep a vigilant eye to order and neatness. Shut yourself up in your room for two entire days, or to be put under light culinary crops. (6457.) Prepare ground for autumnal planting or forming of plantations by sowing, as the tree-seeds ripen. (6486.) Operate on ground for water, or other territorial improvements. Continue to build and execute plans determined on at an earlier season.

Store-room. Lay up crocus and other bulbs and roots till wanted in the autumn.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. These will now be chiefly employed with annuals in pots, for prolongation and in striking from cuttings, &c. (3677.)

Hotbeds. (3338.) Go on as directed last month with your tender annuals. Plant a few tubercles for succession. (5775.) Attend to cuttings and seedlings from the hot-house and green-house departments. Shift and transplant as occasion requires. (3914.)

Green-house. Give abundance of air every day, and in mild nights leave some all night: water over the top and shut the house in the afternoon when you water. This invigorates growth wonderfully.

Propagate as before. Shift most of the plants, examine their roots.

Dry-stove. (5891.) Give abundance of air. Fire will not now be wanted. Look to bulbs, as soon as they have done flowering. Shift all such as require it, putting them into larger or smaller pots according to their state, and your object.

Bark, or moist stove. (6159.) Give abundance of heat, air, and water, if you wish the plants to grow and flower vigorously. (6220, to 6234.)

8. Pleasure-ground and shrubbery.

Plant deciduous trees and shrubs, but only to fill up a vacancy, or to cause a check for the purpose of late flowering. Immediately after performing the operation, mulch, shade, and water. (2912.) Evergreens, especially the more tender sorts, but finish by the middle of the month. (6025.)

Prune (2523.) Evergreens, finishing by the middle of the month. (3368.)

Routine culture. Hoe, rake, weed, water, stake, shade, shelter, &c., as circumstances require. Roll and mow once a week, if showers are frequent, but once a fortnight will do in dry weather.

Lay down turf, if not completed before; water well, and roll immediately afterwards. (5636.)

Gravel-walks may still be formed and repaired, but the work should have been completed last month. Roll well with a heavy roller. (2915.)

9. Trees. — Nursery department.

Fruit-trees. (2826.) Look over grafted trees.

Ornamental trees and shrubs. Sow the seeds of evergreens and American sorts, in the first and second weeks of the month. Lay and graft the tender sorts of evergreens and Americans. Plant out tender evergreens and Americans in nursery rows, or in pots, for more convenient removal. (3800.)

Forest trees. Finish planting out evergreen, seedlings, and nurplings as early as possible. Sow poplar and willow seeds as soon as gathered. These seeds will not come up if kept a very few days out of the ground. (6528.)

Protect from all sorts of garden enemies, and attend to order and neatness. (3096, and 5196.)

10. Trees. — Permanent plantations and park-scenery.

Planting evergreens may still go on, if the weather is dull and moist; but the sooner it is finished, the better. (6025.)

Pruning. Sang recommends this as a good season for pruning old oaks, because the wound heals quicker while the sap is flowing.

Fell oak woods and coppices, and other harking trees; but complete the operation about the middle of the month, or before. (6452.)

Routine culture. Attend to planted ground under, or to be put under light culinary crops. (6457.)

Prepare ground for autumnal planting or forming of plantations by sowing, as the tree-seeds ripen. (6486.)

Operate on ground for water, or other territorial improvements. Continue to build and execute plans determined on at an earlier season.

JUNE.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London - Edinburgh Dublin -	63 22 57 2 58 76	2	29 93 29 66 30 06	0.832 inch. 1.335 0.960	The weather is sometimes cold at the beginning, but is generally agreeable and steady towards the middle of the month. By observing the column indicating the greatest variation of the thermometer in each month, it will be seen that it varies, in London, only two degrees in June, which is less than in any of the preceding months. In July and August, the variation is the same; but in March and October, it is twice as much.

1. Kalendar of animated nature round London.

In the first week : the sedge-sparrow (*Curruca arundinacea*), the fly-catcher (*Muscicapa atricapilla*), the wasp (*Vespa vulgaris*), and several species of bee and butterfly, appear.

Second week : the burnet-moth (*Zygæna filipendulæ*) and forest fly (*Hippoboscæ æquina*) appear; bees swarm.

Third week : several flies, butterflies, moths, beetles, and other insects, appear.

Fourth week : insects abound; and singing-birds begin to retire to the woods, and leave off singing.

2. Kalendar of vegetable nature round London.

In the first week : water-lilies (*Nymphæa* and *Niphar*) flower; also *Iris Pseudacorus*, *Anthem. Côtula*, *Polygonum Persicaria*, *Málva rotundifolia*, and numerous other plants.

Second week : the vine, raspberry, and elder in full flower; also various Scotch roses (*Rosa spinosissima*), broom (*Spartium*), nettle (*Urtica*), and wheat in the ear.

Third week : the *O'rchis*, *Epilobium*, *Iris Xiphium* and *siphoides*, the hardy *Fixin* and *Gladiol.*, and a great variety of garden and field plants in flower; also the wheat, and many of the pasture grasses.

Fourth week : some black and red currants ripe, strawberries in abundance; young shoots of trees and shrubs have nearly attained their length; oats and barley in flower; blue-bottle, scabious (*Centaurea Cyanus*), and numerous others, in bloom.

3. Kitchen-garden. — Culinary vegetables.

Sow peas and beans once a week or ten days. (4012.) Cucumbers for picklers. (5314.) Gourds in the first week. (4609.) Small salads and lettuce every week or ten days. (4486 and 4362.) Radishes and spinach in the first week. (4170.) Kidneybeans every fortnight, for succession. (4040.) Endive about the 10th or 24th, for the main autumn and winter crops. (4382.) Chervil twice in the month for summer use, also purslane. (4496.) Cabbages, of quick-growing sorts, for summer and autumn consumption, about the beginning and middle of the month. (3919.) Turnips in the first week, for succession; and in the second and third week for a full autumn crop. (4104.) Carrots (4121.) twice, for drawing young. Broccoli and borecole, in small portions, for succession, late in spring. (3964 and 3937.) Onions to be drawn young.

To save seed. Mark out cauliflowers, lettuces, &c. and let them send up their flower-stems. (3918.)

Protect when and where necessary. (3094.)

Propagate by bulbs, roots, offsets, slips in showery weather. (2799.)

Transplant (2893) the brassica tribe, cardoons, endive, lettuce, and other plants and herbs, also plants reared in hotbeds.

Routine culture. Tie up garlic and rocambole leaves in knots, to check the progress of the flower-stalk. Stick and top peas; top beans; earth up fennel to blanch; also white beet. Thin, hoe, weed, and stir the ground as before. Support with stakes, and water, as far as practicable, in dry weather.

Taking crops. (3120.) Cut and dry herbs for winter use. Gather ripe seed. Discontinue cutting asparagus at the end of the month.

4. Hardy fruit department.

Prune and train the summer shoots of all descriptions of wall and trellis trees. (2948.)

Thin out the summer shoots of fruit-shrubs, and of all fruit trees, except high standards, which do not require this nicely. (2947.)

Routine culture. Mulch, water, fasten by stakes, weed, hoe, and rake where wanted. Throw nets over cherry trees, and protect the fruit from the birds. Water strawberry plots every day in dry weather, desisting a little as the fruit begins to ripen.

Destroy insects. Strew sulphur over the mildew, water for the scarus; direct a stream of tobacco smoke against the aphid and thrips, but depend on your fingers for the thorough eradication of grubs, which, at this season, are by far the most mischievous of garden enemies. (3096.)

Fruit-room and cellar. As in last month. (3136.)

5. Culinary hot-house department.

Glass case without artificial heat. Raise hand-glasses over cucumbers on props, and train out the runners, in the second or third week. Ridge out melons in good earth, in the last fortnight; cover with mats till the end of the third week. (3712 and 3747.)

Hotbeds. Keep up adequate temperatures for ripening the fruits by linings. Reinforce melon ridges with linings. Train, prune, and impregmate, as circumstances require. Attend to air, water, shade, and even nightly coverings after cold days. Keep up proper linings to your beds of pine-suckers.

Pinery. Attend to what was stated last month. If you want extraordinary large fruit, and do not mind losing the suckers, apply the usual means, viz. heat, water, and removal of all stem and root suckers. (3528.)

Forcing department. See last month. Keep up successive supplies of kidneybeans, strawberry, and fruit trees in pots.

6. Flower-garden. — Open-ground department.

Sow a few hardy and half-hardy annuals for succession, as before. (5990 and 5996.)

Propagate, by cuttings, such plants as are proper for this purpose, as they go out of flower. Pipe and lay pinks and carnations towards the end of the month. (5864 and 5866.)

Take up bulbs and other tuberous roots, dry them in the shade, and remove them to boxes or drawers in the store-room; wrap the finer sorts in paper. (5884.)

Transplant (4114) annuals in the borders and in pots for autumn and winter flowering. Biennials and perennials may also be transplanted into nursery rows at this season, or even where they are finally to remain.

Routine culture. Mow, weed, hoe, rake, thin, stir, and dress; and keep up as complete an appearance of polish and high keeping as your strength of men and other means will permit. (2635, to 2693.) Shade, shelter, water, and attend to carnations coming into flower. Destroy earwigs and all manner of insects. (3096.) Go round the garden frequently and examine everything minutely, and reflect on what might be done to promote its growth and beauty. To aid you, imagine it to be a garden which you were sent to criticise, and to be paid according to the number of faults you found.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. Propagate the dianthus tribe by pipings under hand-glasses and frames. (5867.)

Hotbeds and pits. Put pots of carnations and pink pipings in gentle heat, it will facilitate their striking. (5867 and 5872.) Do not forget to give head-room to your balsams and other tender annuals, which should now be noble-looking plants. Attend to pots of cuttings and seedlings; also to young stove plants put into this department for more rapid advancement.

Green-house. As soon as the mulberry comes into leaf, remove the plants to a fit situation in the open air. Some plunge them in saline; but the major part set them on scoria, gravel, or pavement, in a partially shaded situation; a cold bottom and a certain degree of shade are essential to their well-doing. (6126.)

Dry stove. (5820.) Give abundance of air night and day, but be moderate as to water. Cease to water bulbs soon after they have done flowering; let them go slowly into a state of hybernation; and then take them out of the pots and dry them.

Bark or moist stove. Increase your heat with the lengthening day and prolonged sun, and by consequence increase the concurring agents of vegetation. Propagate by the usual means; save seeds where you can; destroy insects, and attend to neatness. (3096. to 3195.)

8. Pleasure-ground and shrubbery.

Prune and regulate summer shoots, and take off suckers where not wanted to extend the bush or propagate the species. (6396.)

Routine culture. Weed, hoe, rake, stir the surface, support climbers, regulate the shoots of creepers, &c. Water and roll any new-laid gravel to combine it properly with the rest. Dress, roll, and mow lawns and turf in every form. Keep your eyes open to every part of the grounds at this season; for now perfect neatness and the utmost polish and high keeping is expected. Do not trust to what you are told to do in calendars, but think for yourself: calendars frequently make mere machines of gardeners; for though man is a thinking animal, yet he is also a lazy imitative animal, and will not exert himself in any way, and not even think, unless urged on by some strong motive. All your faults will be discovered, sooner or later; and, rely on it you will receive a proportionate disservice from your neighbours or visitors: if you are attentive to your duty, your merits will be discovered in like manner, and you will receive appropriate credit and reputation, which is your capital stock in trade, on which you depend for your livelihood. (3196.)

9. Trees. — Nursery department.

Fruit trees. Begin budding during the last fortnight. Look over all your newly grafted and all other trees; rub off superfluous, irregular, or ill placed shoots and suckers, and the weak grafts and dangling shoots from budded stocks to neat stalks. (2912.)

Ornamental trees and shrubs. Lay the summer shoots of roses, hard-wooded evergreens, and other

sorts which are proper to be propagated in this manner. Put in cuttings of young wood properly ripened at the lower end. Bud rare sorts. (2954.)

Forest trees. Collect and sow elm seed in the third or fourth week; or if you do not wish to sow it, lay it in the store-loft. (2536.) Seedlings of the more choice pines may be thinned where too thick, and the thinnings planted and shaded about the end of the month. (2590.) Gather Scotch elm seed from the middle to the end of the month. (2654.) Attend to kitchen crops among transplanted trees, and in vacant places in general. (2687.)

10. Trees. — Permanent plantations and park-scenery.

Fell oak-coppices, if it has not been done before. The middle of this month will prove a better time, as to the trees, than the middle of May, as they will not bleed so much: but the bark will not peal so well. (2452. to 2467.)

Prune and thin the side shoots of the present season, from established trees. (2399.)

Routine culture. Stake newly planted tall hedge-row trees, where not done before. Attend to weeds everywhere, and to ground under crop. Prepare ground for autumn sowing or planting.

Operations on ground and buildings are carried on at this season with less advantage than in the three preceding months. The ground is hard and difficult to penetrate; and the moisture in new-built masonry dries too rapidly.

JULY.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.
London -	66 8	2	29 89	2-194 inch.
Edinburgh -	60 6		29 445	2-246
Dublin -	61 15		29 929	2-614

REMARKS.

This was called *July month* by the Romans, and in it we see many plants in flower than during any other. The young gardener should now devote a considerable portion of his time to collecting and drying specimens, diptera, and triplicates, in order to acquire a stock to exchange with brother-gardeners or naturalists; or with bookshelves, apothecaries, students, schoolmasters, and clergymen, for the loan of books, and for aid and instructions in study.

1. Calendar of animated nature round London.

In the first week: the cuckoo (*Cuculus canorus*) leaves off singing; the stone-curlew (*Œdicnemus creptans*) whistles occasionally late at night; and the golden-crowned wren (*Œgulus cristatus*) now and then chirps.

Second week: the quail (*Coturnix vulgaris*) calls; the cuckoo-spit, or frog-hopper (*Tettigonia spumaria*), abounds.

Third week: young frogs migrate; hens moult.

Fourth week: the great horse-fly (*Tabanus divinus*) appears; and partridges fly.

2. Calendar of vegetable nature round London.

In the first week: enchanter's nightshade (*Circæa lutetiana*) and lavender (*Lavandula Spica*) in flower, and pinks and carnations in full bloom.

Second week: the fallen star (*Tremella Nidulosa*) appears, also puff-balls (*Lycoperdon Botrya*), and sometimes the common mushroom (*Agaricus campestris*).

Third week: raspberries and gooseberries ripe, potatoes in flower, asparagus in berry, the lilliums in perfection.

Fourth week: the truffle (*Tuber cibarium*) now hunted or dug up in commons and forests; nightshade (*Solanum nigrum*), devil's bit (*Scabiosa succisa*), burnet-saxifrage (*Pimpinella Saxifraga*), and a great number of plants in flower.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) salads and lettuce in shady situations, for successional crops. Turnip-radish for an autumn crop. (4163.) Kidneybeans, in the first week, for a late full crop. (4040.) Peas and beans, in the first week, and a fortnight afterwards try a small sowing for a late crop. (4012.) Endive, in the first week, to come in at the close of autumn; in the third week, for a winter crop. (4382.) Broccoli, before the 10th, for a late spring crop. (3963.) Fineschio, for succession, in the first fortnight. (4508.) Round-leaved spinach, in the first week, in a shady border for a succession. (4174.) Large-leaved or Flanders spinach, in the last week, in poor ground, to stand the winter. (4178.) York and sugar-loaf cab-

bages, in the first week, for autumn use, and in the last week, for winter and spring. (3919.) Carrots, in the first week, in a shady border. (4121.) Turnips twice or thrice, in showery weather. (4102.) Welsh onions; for autumn onions, sow the bulbing sets in the last week, to stand the winter. (4219.) Coriander and borage for young crops. (4627. and 4536.) To save seed. Mark out the brassica tribe and other esculents in perfection, and let them about up flower-stems.

Propagate by slips, offsets, &c. where not done before, and where plants have completed their inflorescence, and are to be cut down, as tarragon and other pot-herbs. (3901.)

Transplant (3923.) as before, and include celery and celeriac, endive, &c.

Routine culture. Stick and top peas and kidney beans, top common beans, train cucumbers and gourds, earth up the leguminous crops and potatoe; hoe, thin, and stir the surface wherever necessary, among all descriptions of crops; water, as far as your time will permit, and particular crops require.

Taking crops. (3117.) Take up shallots, and dry them for winter use; also romaneole and garlic when ready. Gather ripe seeds and onions, and cut herbs in blossom, drying and storing both. Gather the fruit of young gourds for pies, stews, and pickling.

Destroy insects, and ward off vermin. (3066.)

4. Hardy fruit department.

Plant strawberries in the open garden; and in pots for next winter's forcing. (5122.)

Prune, train, thin, and regulate all the summer shoots of wall and espalier trees, and dwarf and tall standards. (2948.)

Routine culture. Hoe and weed fruit-tree borders. Hang up nets, water and mulch where necessary. Water alpine strawberries, which will now be in full bearing, every third or fourth day, unless in a shady situation.

Destroy (3096.) insects: keep earwigs, ants, mites, from the fruits, as cherries, &c. &c., which are approaching to a state of ripeness.

Fruit-room. (3156.) This will now be empty: clean and wash every part of it, and air it well for occasional summer and next winter's use.

Fruit-cellar. (2575.) If you have attended properly to casking up keeping-apples and pears, you will still have a supply, and even of grapes in some cases. If the cellar gets too warm, the casks should be removed to the ice-house.

5. Culinary hot-house department.

Glass case without artificial heat. Plant out melons and cucumbers, shading and watering, &c. (3747. and 3710.)

Hotbeds and pits. Prune melons and cucumbers; give air and water, and attend to shading and weeding; collect mushroom-spawn; attend to young pines. (3510.)

Pinery. You will now begin to cut fruit in abundance. See to the stools; earth them up, so as to cause the suckers to strike root; put them into a briek bottom-heat, and give proper supplies of water. You will thus gain much time, and profit from the expiring strength of the parent plant as long as possible. This is the true way to fruit a pine-plant in eighteen months or even less time. Suckers thus treated will, next spring, be equal to two-year-old plants. (3552.)

Forcing-houses. Expose those houses, where crops are taken, to the natural climate, by removing, as far as possible, the roof, and even the ends and front, if they are movable. (3603.)

6. Flower-garden. — Open-ground department.

Sow a few annuals, for succession and prolongation in pots through winter. (3690.)

Propagate (5973.) from cuttings of plants going out of flower; from rooted slips of such as are ripening their seed, as auriculas and the primula tribe; go on piping and laying the dianthus tribe. (5864.)

Take up bulbs as they go out of flower: this work should generally be completed by the end of the first week, unless for the lily tribe, the colchicum, and a few others.

Transplant late sowings of annuals, and also biennials and perennials, into nursery rows. (2899.)

Routine culture. Eradicate all weeds the moment they appear; keep the surface always fresh, and rather rough, never smooth and battered. It is better to have little clods and knots of earth, than to have a naked or dug surface as smooth as a table. The clods and knots make variety of light and shade, and are besides more favourable for the admission of air, heat, and water to the roots. Shade, shelter, and water. Gather seeds as they ripen, and dry them in the seed-room or lofts, the windows being open. Destroy insects; cut out broken stalks, and diseased parts of plants. Cut down stalks which have done flowering, and remove all decayed leaves.

Gather flowers neatly with a knife, and so as not to disfigure the plant. (5644.) Gather in general from the reserve-garden, so as not to disfigure the borders.

Store-room. (2576.) Look over your bulbs now and then, to see that none get mouldy. See also to your newly put-up seeds.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. (3387.) Most of

these, at this season, are given up to the kitchen-garden, or used to protect at nights the tender annuals, some of which, as the humble and sensitive plant, cannot so well be put out in the borders. (3214.)

Hotbeds and pits. (3488.) Little use is now made of them by the florist, unless for propagation of stove plants. Attend to cuttings from whatever department. If you are endeavouring to flower the more delicate aquatics, see to the keeping up a regular heat.

Green-house. (5690.) This will now be filled with pots of tender annuals, which only require shifting now and then till of a certain growth; and then only common routine culture.

Dry stove (5920.) Some set out a part of the succulent tribe at this season. If you do, let it be in a very warm situation: heavy and continued rains prove very injurious to succulents in the open air.

Bark or moist stove. (6158.) Increase the temperature with the increase of light, and add air and water accordingly. Attend to all the minor points of culture. See that the floors or paths of your stoves are swept every day, and wash them soon get well with the engine, otherwise they will soon get unsightly. Take care not to dash this water upon plants in blossom, lest you should spoil their beauty, and prevent them from setting fruit.

8. Pleasure-ground and shrubbery.

Prune (2929.) as in last month: box-edgings and evergreen hedges in the last week of this month, if the season is a forward one. (5635.)

Routine culture as in June.

Lawns. (2914. and 2915.) Attend to these, according as the weather may be showery or otherwise. In dry weather, set your men to mowing at three o'clock, and let them rest from eleven till three o'clock: in moist weather, the time of the day is of less consequence. In France and Italy, the working gardeners, during summer, may be said to do the principal part of their work early in the morning, and late in the evening.

Gravel-walks. Weed and roll these in moist weather. When dry, and the gravel becomes loose, water and roll. (5657.)

9. Trees. — Nursery department.

Pratt trees. Attend to budding, and look over your grafted trees; pinch off all obtruding shoots and suckers. (2947.)

Ornamental trees and shrubs. Continue laying summer shoots, and plant cuttings and bud as in last month. (2854.)

Forest trees. Sow elm-seed; attend to weeding and cleaning all beds and rows of seedlings, or other nurslings, and of transplanted trees. (5536.)

10. Trees. — Permanent plantations and park-scenery.

Prune (6398.) evergreens in the last week, if the summer has been so favourable as nearly to ripen the wood.

Routine culture. Attend to kitchen or field crops, among young plantations; and to large weeds everywhere. Do not forget hedges and other fences: keep all sorts of fences at all times in repair. (8390.) Few operations in landscape-gardening can now be commenced; but some, as excavating for water, &c., may go on.

AUGUST.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	65 85	2	30 06	0.824 inch.	This is the best or harvest month of the Saxons; many seeds of herbaceous vegetables ripen in this month, and most sorts of culinary crops, raised in the open garden, are now in perfection. Insects, especially the winged tribes, now abound; and the young gardener should be assiduous in collecting them, for the same object as he collects specimens of plants. By carrying a small box in his pocket, he may pick them up while at work.
Edinburgh -	60 6		29 828	1.996	
Dublin -	62 82		30 172	5.858	

1. Kalender of animated nature round London.

In the first week: flying ants (*Formica*) appear; bees kill their drones; and the swallow-tailed butterfly (*Papilio Machaon*) appears.

Second week: young martins (*Hirundo arborea*) and swallows (*Hirundo rætica*) begin to congregate, and swifts (*Cypselus A'pus*) to depart; the whame, or burrel-fly (*Æstrus Bovis*), lays eggs on cattle.

Third week: the black-eyed marble-butterfly (*Hipparchia semele*) appears; various birds resume their spring notes.

Fourth week: the nuthatch (*Sitta europæa*) chatters; the stone curlew (*Edicnemus crèpitans*) whistles at night; the goatsucker (*Caprimulgus europæus*) and young owls (*Strix stridula*) make a noise in the evening; robin-redbreast (*Sylvia Rubécula*) sings; and rooks roost on their nest-trees.

2. Kalendar of vegetable nature round London.

In the first week: melilot (*Melilotus officinalis*), rue (*Ruta graveolens*), yellow succory (*Picris hieracoides*), and burdock (*Atractum Lappa*), in flower; the bread-corns ripe.

Second week: wild clary (*Silvia Verbenaca*), meadow rue (*Thalictrum flavum*), ploughman's spike-nard (*Conys squarrosa*), and various other natives, in flower.

Third week: the mallow (*Malva*), Lavatera, hollyhock (*Althea rosea*), and lobelia, among the garden flowers, and the polygonums and potamogetons among the wild plants, now in blossom.

Fourth week: the autumnal crocus (*Cochicum autumnale*), *Aster*, *Solidago*, *Senecio paludosus*, tassel (*Dipsacus fullonum*), and various other plants, in flower; the earlier varieties of all the hardy kernel-fruits ripe.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) turnip for a main crop, in the first week; but sowings made after the 15th seldom fully succeed (4102.); make frequent sowings of small salad, radishes, and lettuce (4163.): the latter for autumn and winter crops. Parsley may now be sown for winter and spring use, this being the most natural season for sowing biennials. (4490.) Some of the large sorts of cabbage, in the first week, to come in in the autumn of the following year and subsequent winter; and early sorts in the first week, for coleworts next winter and spring. (3919.) Spinach, in the first or second weeks, for a main winter crop. (4174.) Carrots in the first and third weeks for drawing young in spring. (4121.) Endive and corn-salad for winter and spring; chervil for a late crop; onions for a full winter crop; angelica, fennel, scurvy-grass, and blessed-thistle for next year. Cauliflowers twice, in the third and fourth week, for crops, to stand over the winter, in sheltered borders, or under frames. American cress, in the last fortnight, for a spring crop.

Propagate (4759.) by slips and cuttings, where necessary.

Transplant (3935.) as in last month, and include leeks, perennial herbs, &c.

Routine culture. Displace the suckers from such artichoke heads as you would grow to the greatest magnitude; stick peas and runner kidneybeans; earth up the brassica and leguminous tribe, and potatoes in so far as requisite. Land up celery, endive, white beet, spinach, &c. for blanching. Hoe, thin, weed, stir the surface, water, shade, and attend to neatness and order; and clear off all crops the moment they are done with.

Taking crops. (3180.) Take up the alliacious tribes as before; gather pickling cucumbers; cut herbs; gather ripe seeds.

Destroy insects. (3096.)

4. Hardy fruit department.

Plant (5122.) strawberries, as directed for last month.

Prune (3948.), regulate, train, and otherwise arrange the summer shoots of all fruit trees, as directed for last month.

Routine culture. Hoe, rake, weed, and stir the surface under gooseberry compartments, and in general under and around all fruit-trees. Where fruit is beginning to ripen, be very moderate in thinning the leaves. Mat up small fruits on north walls, intended to be preserved till late in autumn; water spring-planted trees in dry weather, also strawberry plants in blossom and fruit. Dress strawberry-beds that have done bearing. (5122.)

Take (3119.) gooseberries and currants, with the fruit-scissors or tongs. Apriots and such wall-fruit as is ripe with the fruit-gatherer. (See *figs.* 413 to 412.)

Destroy (3066.) insects; the acarus will now be your greatest enemy.

5. Culinary hot-house department.

Glass case without artificial heat. Sow long prickly cucumbers for a late crop, to receive the aid of artificial heat in October and November. Sow in pots, or make layers or cuttings for the same purpose. (3877.)

Hotbeds and pits. (2388.) Recruit the linings of melon-beds, and prune, train, wood, water, and impregnate all the cucurbita tribe.

Mushrooms. Search for spawn, in cow-pasture more especially, and take care of it when met. (3813.)

Pinery. See last month.

Forcing-houses. (3556.) Most of the forced peaches will now be gathered; fully expose the trees, unless you have so great a proportion of grapes under the rafters, or running along the top of your trellis, as to render it worth while to keep the ashes on to ripen them. It is however better never to have them together in such contending proportions. Cherry trees and others in pots, and of which the shoots are ripe, should be put in a state of hibernation, by removal to a cold cellar, or shaded border. This will fit them better for a succeeding early artificial spring.

6. Flower-garden. — Open-ground department.

Sow (4010.) auricula and other primula seeds in pots and boxes, so as to admit of winter protection. These seeds come up stronger now than if kept till the following spring; and, though they will not flower sooner than the second spring after sowing, yet they will then flower much stronger than plants just a year old. (5799. to 5805.) Mignonette, stocks, and other annuals in pots, for prolongation through the winter. (3024.)

Propagate (5975.) by all the usual means. This is now the best time for taking off rooted slips of the auricula: the Lancashire florists will sever touch these till the third day of this month, when their florists' sales commence. (5812.)

Take up bulbs and tuber roots of the few plants which had not ripened their stalks before, as of the martagon and red and white lily.

Plant dried offsets of bulbs, as these, from their small size and tenderness, rather suffer from being long out of the ground. Plant autumn-flowering bulbs and Guernsey lily. (5885.)

Transplant (4114.) most sorts of biennials and perennials, and your latest sowings of annuals and half-hardy annuals intended for the borders.

Routine culture. Prepare composts. Hoe, dig, rake, stir, weed, thin, shade, shelter, prop, stick sweet peas, and other climbers. Water, and gather seeds; mow verges and glades where they exist in the flower-garden, according as you find they require it.

Store-room. (2575.) Look once a month at your roots and seeds; and gather, dry, clean, and store up seeds as they ripen, attending to name and date each packet or bag accurately.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. See last month.

Hotbeds. (2398.) Attend to such cuttings as are forwarding in these, and to late crops of tender annuals. Prepare successions of tender annuals for the green-house.

Green-house. (5760.) Attend to your tender annuals; and do not forget creepers, and vines, and such plants as being planted in the ground cannot be turned out.

Dry stove. (5820.) About the end of the month, it will be safe to replace such plants as you had ventured in the open air. Any you put in cold pits may remain a month longer.

Bark or moist stove. (6159.) See last month. Attend to creepers, climbers, and vines, also aquatics, which, if you have a proper aquarium, will now be in great perfection, and highly beautiful. (6214.)

8. Pleasure-ground and shrubbery.

Plant (3201.) evergreens towards the end of the month; water, mulch, and shade, for some days, if very delicate sorts. (2912.)

Prune evergreens (6398.); roses for forcing. (6004. and 6045.)

Routine culture. Hoe, rake, weed, &c., as before. Prepare ground for planting; dress gravel and grass as in June and July.

Form and repair lawns, by turfing or sowing. It is now an excellent season for sowing lawns. See that you make use of the proper grasses, according to the soil and situation. Attend to gravel walks. (5637.)

9. Trees. — Nursery department.

Fruit trees. (4770.) Finish budding of the late

varieties of the stove fruits, before the middle of the month, (2864.) Look over the grafted trees, and slacken the bandages of your earlier and most advanced grafts and buds.

Ornamental trees and shrubs. Plant cuttings of hardy evergreens, as laurel-bay, privet, box, &c., in the last fortnight (3877.) Provide heath and bog-earth for American and other sorts. (3049.) Go on with budding rare species.

Forest trees. Sow elm seed, if you have not done it before, or do not choose to defer it till spring. (5336.)

Routine culture. Hoe, weed, &c., and keep every part in perfect order; look to your kitchen-crops and ripening seeds. Prepare ground from which kitchen crops have been removed for planting.

10. Trees. — Permanent plantations and park scenery.

Plant (6025.) evergreens in the last week, if the weather is moist. Water to settle the roots, and mulch and stake according to circumstances. (3912.)

Prune the birch, wild cherry, and maple tribe, at the end of the month, when the leaves are beginning to fall, as they are apt to bud later or earlier (2923.) Evergreens at the end of the month. (3398.)

Prepare ground for planting next month, either by ploughing, digging, trenching, or pitting, as the case may be. (2676. and 2682.)

Destroy ferns, nettles, and other bulky weeds in park scenery, by bruising their stems with the weeding pincers, close by the surface; as cutting them over is found a less permanent check to their flowering again.

SEPTEMBER.

Weather at	Average of the thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	59 63	3 5	30 09	0.482 inch	The temperature begins now to decline and to vary; the nights begin to lengthen, and heavy dews and diminished transpiration and evaporation render artificial watering in the open air less necessary, unless against frost on walls, to keep down insects. Many varieties of fruits ripen during this and the former month, which the young gardener ought to study, and, when he can afford time from other studies, he should make drawings of a few.
Edinburgh -	54 3		29 739	3.470	
Dublin -	59 35		30 329	3.021	

1. Kalendar of animated nature round London.

In the first week: young broods of goldfinches (*Fringilla Carduella*) appear; the linnet (*Linaria Linota*) congregates; the bull (*Bos Thaurus*) makes his shrill autumnal noise; and swallows (*Hirundo rœstica*) sing.

Second week: common owls (*Strix stridula*) hoot; the saffron butterfly (*Colias Hyle*) and willow red under-wing moth (*Noctua inépta*) appear; herrings (*Clupea Harlangus*) are now cheap.

Third week: the ring-ouzel (*Turdus torquatus*) appears; the flycatcher (*Muscicapa Attricapilla*) withdraws.

Fourth week: the stare (*Sturnus vulgaris*) congregates; the woodlark (*Luscinia arborea*) sings; the woodcock (*Scelopax rusticola*) and fieldfare (*Turdus pilaris*) appear; and the swallow (*Hirundo -ustica*) departs.

2. Kalendar of vegetable nature round London.

In the first week: some fungi appear; traveller's joy (*Clematis Vitalba*) and *Parnassia palustris* and *Balkita nigra* in flower.

Second week: catkins of the hazel and birch formed; blossoms, and green, red, and black berries found on the bramble at the same time; leaves of the sycamore, birch, lime, mountain ash, and elm begin to change.

Third week: the ivy (*Hedera Hélix*), laurel (*Cerasus Laurocerasus*), and furze (*Ulex europæa*) in flower.

Fourth week: hips, haws, and nuts ripe; leaves of plane tree (*Platanus*) tawny; of the hazel, yellow; of the oak, yellowish green; of the sycamore, dirty brown; of the maple, pale yellow; of the ash, fine lemon; of the elm, orange; of the hawthorn, tawny yellow; of the cherry, red; of the hornbeam, bright yellow; of the willow, hoary.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) small salads twice or thrice on a south border, chervil, corn-salad, cress of sorts may still be sown to stand over winter. (4461. to 4470.) Endive in the first week for a late autumn crop. (4163.) Lettuce in the first week for standing the winter under a south wall, and under cold frames. (4368.) Spinach in the first fortnight for use late in spring. (4174.)

Protect cucumbers and melons, at night, by matting or otherwise, as the case may be. (3024.)

Propagate (3801.), as in April, culinary herbs and under shrubs.

Transplant (2893.) all articles intended for use the current autumn, during the first week. The brassica tribe, leeks, celery, endive, &c. for winter and spring use. Seeding cauliflowers, where you think you can insure their standing through the winter. Try a bed of sandy loam or lime rubbish under a

tree or south wall. (3952.) Make plantations of herbs.

Routine culture. Earth up and stir only in dry weather. Stick, stop, support, cut down, blanch, and thin where you see it necessary; no time is to be lost at this season.

Take up crops. (4078.) Take up potatoes, and do it *effectually*. Gather pickling cucumbers, onions, nasturtium seeds, and other pickling articles. Gather herbs and take ripe seed. Remove all decayed leaves, haulm, stems, &c., and the remains of all crops, which have been taken, so as to preserve order and neatness, and make way for other crops or winter fallows. (3196.)

Destroy insects and vermin. (3096.)

Store-room and cellar. Dress, sort, and put up seeds which have been well dried. Finish housing edible bulbs of the alliacaceous tribe and potatoes (2575. and 2576.)

4. Hardy fruit department.

Plant (2891.) strawberries for a main plantation, this being the best month in the year for that purpose. (5122.) Pot strawberries for forcing. (3751.)

Prepare ground for planting; and towards the end of the month, if the wood of young peach and apricot trees be ripe, you may remove them.

Prune (2948.) and regulate summer shoots, but cut little after the middle of the month. Thin leaves sparingly.

Routine culture. Provide composts for recruiting old borders and forming new ones. Protect choice fruit, especially grapes, from birds and flies. After the crops of wall trees or compartment borders are gathered, dig and dress the borders. Dress and fork up strawberry beds.

Take (3117.) peaches, grapes, early apples, pears, plums, &c., the dessert sorts, with fruit-gatherer, and sorts for the kitchen, with the hand-gloved. Choose, if possible, dry weather for gathering all sorts of fruit.

Destroy insects, especially acarus, and guard against wasps and large blue flies. (3086.)

Fruit room. (3136.) Lay up apples and pears for keeping a few months; in general, the long-keeping sorts ripen late in the season.

5. Culinary hot-house department.

Glass case without artificial heat. Sow small salads under hand glasses or frames in the last week (4487.) Take off the glasses from cauliflower plants in all mild days.

Hotbeds and pits. Attend to late crops of melons and cucumbers; keep up the temperature, and be discreet in the use of water. (3697. and 3723.) Begin to build mushroom beds, either in or out of doors. This month and March are the two best seasons. Plant suckers and crowns of pines on rotten tan placed on dung, or other fermenting beds or pits.

Pinery. (3522.) You will still have abundance of fruit; attend to what was said in July. Renovate your bark or leaf beds when necessary, and keep up the full heat till your fruit is chiefly ripened off, of

removed (pot and all) to the fruit room to ripen leisurely. Your young plants will grow faster in this month than in any month of the year.

Forcing-houses. (3556.) Late crops of grapes will be coming in, but most of the forcing-houses will now be in a state of rest. Keep off all the sashes, unless you mean to force very early, in which case cover the house with mats from the sun, and admit air from the north, in order to promote a cool dry atmosphere, as best for hybernation.

6. Flower-garden. — Open-ground department.

Sow the primula tribe, if not done last month. (5795. and 5841.) The seeds of most biennials and perennials may be sown this month with advantage, provided you can afford protection to them in winter. On the whole, however, it appears better to defer the business till spring, unless with a few sorts which sometimes lie a whole year before they come up, when sown at that season. Among them may be enumerated columbine, agrimony, chelone, &c. If sown now, their seeds will come up the following spring, and they will flower the same season.

Propagate (5801.) by all the modes, but more especially from slips rooted or unrooted, the stalky part of herbaceous plants being now of a proper texture and maturity for this purpose.

Plant crocus and other bulbs, and such autumn-flowering bulbs as you have neglected to plant early in spring. (5783.)

Transplant as in last month. (5893.)

Shelter. (3094.) If the end of the month be wet, hoop and mat such plants as will be injured by over much wet. Among these are the primula tribe and tender annuals planted in groups over the borders; also bulbs, as the tuberoses and Guernsey lily, planted or plunged in the borders.

Routine culture. Prepare ground for florists' flowers. Trench and sift the earth where tulips and hyacinths are to be planted, at least three feet deep.

Store-room. See to roots and seeds. (2575.)

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. (2387.) Replace the more tender auriculars in the frames; but keep off the glasses, except when it rains.

Hotbeds. See last month. (2388.) Most of the green-house and hot-house plants will now be advanced: remove them to cold frames, or to the green-house or dry stove, according to their natures, to harden them gradually. Some may go directly to the stove.

Green-house. The beginning of this month is a fit time to reair, paint, glaze, and clean the flues, &c. of every description of house not in crop. Replace some of the more tender plants from the open air at the beginning, and the whole in the course of the last week of the month. Dress them properly and set them in natural groups, not in the usual method.

Dry stove. Replace all the succulents and other plants, which you had put in the open air, and arrange every part of your stage for the winter. If you cannot form natural groups, at least put every genus by itself.

Bark or moist stove. Begin to lessen the stimuli towards the end of the month, in order to harden for the approaching winter. Plant bulbs which have been taken up and dried. Attend to routine culture.

8. Pleasure-ground and shrubbery.

Plant (2891.) evergreens generally; deciduous species in the last week.

Prune (6398.) evergreens all the month; deciduous species when the leaves are dropped.

Routine culture as in last month. Remove all decaying flowers that do not bear ornamental seeds or berries. Dress and mow turf, and roll and clean gravel.

Form and repair lawns, or verges, or grassy glades. (5636. and 5915.)

9. Trees — Nursery department.

Fruit trees. (4770.) Sow cherry and plum stones for stocks, also peach and almond stones for the same purpose, or for new varieties. Gooseberry and currant cuttings may be planted in the last week of the month, in sheltered dry situations, where they will not be much damaged by alternate frosts and thaws in winter.

Transplant (4114.) stocks from the seed-bed to the lines, where they are to remain to be grafted. Look to the budded and grafted trees. The matting may generally be removed early in the month.

Ornamental trees and shrubs. (2864.) Sow brier and other rose seeds. Plant cuttings of hardy evergreens. Take off layers of the sorts which have been laid two years, or which root well within one season. Plant cuttings of a few of the deciduous shrubs which are most hardy, or of tree-currant, ivy, honeysuckle, yellow-berryed elder, &c. Take off suckers, and plant them in nursery rows.

Forest trees. Gather and sow all sorts of deciduous tree seeds. If you do not sow them, take them to the seed-loft or rot-heap for preservation. Plant and prune evergreens, as also the wild cherry, birch, and sycamore. Gather seeds of all sorts now ripe. (6536.)

10. Trees. — Permanent plantations and park scenery.

Thin woods and coppices; and, where the trees are wanted, take them carefully up; if they are large, they should have been previously prepared a year ago. (6376.)

Plant (2891.) deciduous trees, generally, and even the larch, spruce fir, and Scotch pine.

Prepare for planting by fencing and all the subsequent processes. (6391.)

Operate on ground, and recommence building walls or other works belonging to the department of landscape-gardening.

OCTOBER.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London	58 81	4	29 69	2.027 inch.	Grapes and other late fruits ripen during this month, and some made culinary crops are gathered and banded. A few specimens of plants may still be collected, and many species of the animal kingdom. Not one animated being should be neglected from the warm upwards. Collections of spiders are best made during this month, and the young gardener may continue to dissect and study the pulpy fruits.
Edinburgh	58 77		29 59	3.324	
Dublin	61		29 76	2.708	

1. Kalendar of animated nature round London.

In the first week: the redwing (*Turdus iliacus*) arrives; snakes and vipers bury themselves.

Second week: hooded crows (*Corvus cornix*) and wood pigeons (*Columba palumbus*) arrive; hen-chaffinches (*Fringilla coelebs*) congregate, and prepare for migration, leaving their males in this country.

Third week: the snipe (*Scotiopax gallinago*) appears in the meadows; wildgeese (*Anser ferus*) leave the fens, and go to the ryelands.

Fourth week: the tortoise (*Testudo graeca*) begins to bury himself in the ground, and rooks visit their nest-trees; some larks (*Alauda*) sing, and the

woodcock (*Scotiopax rusticola*) returns; spiders' webs abound.

2. Kalendar of vegetable nature round London.

In the first week: strawberry tree (*Arbutus Unedo*), holly (*Ilex Aquifolium*), China hollyhock (*Ailthia chinensis*), and China aster (*Callistemma chinensis*), in bloom.

Second week: catkins of some species of salix formed; leaves of the ash almost all off; of the Spanish chestnut, yellow; of the sugar-maple (*Acer saccharinum*), scarlet; of the common birch, yellow and gold; and of the weeping-birch, gold and bright-red coloured.

Third week: Clematis calycina in flower; some horsechestnuts and acacias quite denuded of leaves.

Fourth week : various plants, especially annuals, continue in flower ; leaves of marsh-elder (*Sambucus Ebulus*), of a fine pink ; of stag's-horn sumach, of a purplish red ; of the American oaks, of fine shades of yellow, orange, red, and purple.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) small salads, lettuces, and radishes in the first week. If mild weather continues, they will come in about Christmas. Maragan beans, and hotspur or frame-peas (4027.), in the third or last week, to see if they will stand the winter. (4012.)

To save seed. Transplant cabbage, savoy, beet, parsnep, carrot, turnip, bulbing and Welch onion. Mark what is said (3916. and 3936.) as to the danger of bastardy among the cruciferae family. (3945.)

Protect all newly risen annuals, and newly deposited seeds, as also parsnep, on the approach of frost. (3024.)

Propagate (4213.) the alliseous tribe and culinary perennials.

Transplant (4114.) endive and lettuce on warm borders, and cabbages in close rows or in beds, to remain in that state till wanted as plants in spring. Cauliflowers in the last week, to receive the protection of frames. (3954.)

Routine culture. Earth up and stir the surface only in fine dry weather. Hoe, rake, thin, weed, and dress off all beds of winter crops. *Protect* cauliflowers from heavy rains, by breaking a large leaf and folding it over the flower. As crops are cleared, dig and trench the vacant ground.

Take up (4078.) potatoes, Jerusalem artichokes, beet, parsnep, salsify, scorzonera, skirret, tap-rooted parsnep and horseradish of two summers' growth. Preserve them in dry sand.

Destroy insects. (3086.)

Root cellar. See that this is perfectly dry, and that abundance of sand is laid over the roots.

Store-room. Finish cleaning and putting up seeds, and see that all you have are in a good state, and not attacked by vermin. (2575.)

4. Hardy fruit department.

Plant (3263.) all sorts of hardy fruit-trees as soon as the leaves have dropped off, but not before, as some practise ; for in this state neither their shoots nor roots are ripe. Give ample waterings after planting.

Protect (3024.) fig trees as soon as their leaves have fallen. Shield laid grapes from frost by matting. Immerse pots containing plants intended to be forced, into dry old tan or ashes to save their roots from frost.

Prune (3939.) all sorts of fruit trees except the raspberry, elder, and fig, which, being trees of much pith, or medulla, are apt to die back from the point of section-cut place, when pruned at this season, and are therefore better left till spring.

Routine culture. Prepare ground for new plantations. Dig and ridge up where the trees are already pruned. Winter-dress strawberry-beds.

Take (3117.) grapes, apples, pears, and other fruits.

Fruit-room. (3126.) Lay all fruits first here till thoroughly dried, and then barrel up the longest keepers, and remove them to the fruit-cellar.

5. Culinary hot-house department.

Glass case without artificial heat. (3387.) Plant lettuces and cauliflowers under frames, to stand the winter. Sow small salads in the second week, and last fortnight under frames or hand-glasses.

Hotbeds and pits. (3388.) Keep up the declining heat of such beds as have not yet ripened off their crops. Dress those which have done bearing, and prick in lettuce or cauliflower plants. Prepare mint and other herbs for forcing, by pitting them in pots or boxes. Get up mushroom-beds if not done in September. Plant pine-suckers in the open bed or pit, as they are taken off. Cover well at night. (3024.)

Pinery. This is a general time for shifting and renewing the bark-bed. Do not put the plants into very large pots, as they will not grow much in winter. Till the last week of the month your plants will grow rapidly. (3493.)

Forcing-houses. (3554.) Prune and in general

cleanse and repair the houses and flues, mend broken glass, and paint the whole when necessary.

6. Flower-garden. — Open-ground department.

Sow (4010.) annuals in pots, for prolongation, in cold frames and pits, and some of the hardier sorts in warm borders, to come in early next spring, if the winter should prove mild. The sorts fit for this are larkspur, adonis, belvidere, pansy, periscaria, annual stock, and strawberry blite.

Propagate (3801.), but chiefly at this season by dividing the root, as of daisies and of other edging plants, lilies, &c.

Plant most of the border-bulbs about the end of this month ; and you may even plant florists' anemones in properly prepared beds. (5725.)

Transplant (4114.) biennials and perennials, in the flower-nursery to stand till the spring. Strong plants may be moved where they are finally to remain. (5672. and 5987.)

Protect (3024.) auriculas, carnations, and other florists' flowers from heavy rains by mats and hoops, or glass frames. Begin at the end of the month to remove georgina roots to be dried in an open shed, and then carried to the store-room.

Routine culture as in last month. Prepare composts. Stir the ground only in dry weather. If the season has been very dry, flower-borders may be dug over about the end of the month. Attend, above all things, to neatness. Do not trust to any kalendar for directions in this, or any point ; but endeavour to bring your own brain into work, and try to look at your works with the eye of a critic and a stranger, or even of an enemy.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. (3387.) Begin about the middle of the month to fill frames and pits with pots of mignonette, stocks, &c. for prolongation through the winter.

Hotbeds and pits. (3388.) Roses which have been some time in a state of hibernation, and in the shade, may now be put in bottom heat, as may hyacinths and some other bulbs. Water-glasses may now be brought into use. Observe, in the first place, to plant the bulbs in earth for a week or fortnight, which will make them strike roots more freely, and then take them up and put them in the water-glasses. Force them forward a week or two in frames, before you remove them to the drawing-room. Continue to plant some every fortnight for succession. (3928.)

Green-house. (5680.) Replace all your plants, if you have not already done so. All your winter's credit depends on the manner in which you do this : give air night and day, unless the thermometer drop to 35°. Water sparingly.

Dry stove. (5620.) Apply fires towards the end of the night, so as to keep a medium temperature with fire-heat of 46° or 48°. Arrange the plants for the winter. Pot and set in bulbs of most sorts.

Bark or moist stove. Lessen your temperature by degrees ; and also your air and water. A good medium heat for this month will be 70°, which will require fire-heat, even if the bark-bed is in full force. (6210. to 6334.)

8. Pleasure-ground and shrubbery.

Plant (2891.) all the hardier trees and shrubs where the ground is not apt to be rendered very wet during winter : very delicate sorts leave till spring. This is the best season for planting.

Prune (3929.) evergreens ; but finish, if possible, in the beginning of the month. Deciduous sorts as soon as the leaves fall.

Routine culture. Clear away all refuse, weeds, and decayed twigs. Roll, mow, sweep, hoe, weed, and remove moss and worm-casts.

Form and repair lawns as before. (2914.)

9. Trees. — Nursery department.

Fruit trees. Sow for stocks as directed for last month. The plum, cherry, almond, medlar, apple, pear, quince, berberry, service tree, walnut, albert, and common hazel-nut, may now be sown to greater advantage than in spring, provided you can keep the vermin from them during winter. Lay the

moulberry, or any other sort generally propagated in that way. Plant cuttings of elder; but it is rather too late for the ribes tribe. Remove raspberry suckers. Remove fruit trees to their final situations, as soon as they have lost their leaves. This month, in all dry situations, is the best month in the year for transplanting fruit trees.

Ornamental trees and shrubs. Sow the seeds of deciduous sorts. Lay deciduous sorts as their wood ripens. Plant out in nursery rows; shelter where requisite. (3084.)

Forest trees. Sow most sorts, as directed for last month; but take care to guard against vermin. Gather haws, sloe and holly berries, hips, &c. and take them to the rot-beap. Lay and propagate by cuttings some of the timber-growing willows and poplars. Plant and prune in the nursery lines as required. (6414 to 6464.)

10. Trees. — Permanent plantations and park scenery.

Plant (2891.) generally as long as the weather is mild; but prefer the spring for very wet, late, bleak situations. (6339. to 6362.)

Thin, prune, and fell generally; but do not fall barking-trees, or remove thinnings of the oak, larch, &c. so large as to be worth barking; because, unless the sap is in full motion, the bark will not strip off.

Prepare for planting, as directed for last month. This is a very fit season for draining, which may be continued in all weathers, when men can work out of doors, till the planting season returns. In this way the men may be kept on without loss either to themselves or you. (6317.)

Operations on ground should now be carried on vigorously; and buildings should be completed, if possible, by the middle of the month.

NOVEMBER.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London .	44 44	6	29 68	2·927 inch.	This is the windy month of the season; it is generally also cold and moist, and one of the most disagreeable for the labouring garden, but is very serviceable owing to the shortness of the day, and the approach of evening, when he may lay aside his wet dress and find his mind by converse with books. Beans, fruits, &c., dried herbs, and insects require looking over and protecting from damp.
Edinburgh	41 1		29 638	4·514	
Dublin .	43		29 74	0·394	

1. Kalendar of animated nature round London.

In the first week: the buck (*Cervus Capreolus*) grunts.

Second week: the golden plover (*Charadrius pluvialis*) appears.

Third week: snails (*Helix*) and slugs (*Limax*) bury themselves.

Fourth week: greenfinches (*Fringilla Chlois*) flock; the winter moth (*Geometra brumaria* Sem.) and the common flat-body moth (*Geometra aplyna* Sem.) appear in gardens about the end of the month.

2. Kalendar of vegetable nature round London.

In the first week: a few plants in flower, by accident, chiefly annuals, according to the season.

Second week: the fungus *Helvella mitra* appears; *laurustinus* in flower.

Third week: *Chimonanthus fragrans* in flower.

Fourth week: some primroses show flowers at this season; and some plants, unnaturally in flower, still continue if the weather is temperate.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) short-topped radishes on a warm border, for the chance of obtaining an early spring crop. (4163.) Peas and beans, as directed for last month. (4012. and 4027.)

Protect (3024.) celery, endive, artichoke, sea kale, potatoes left in the ground to be taken up as wanted, and any other outstanding edible roots, by litter or leaves. Radishes and parsley, with fronds of fern. Cauliflowers, by hoops and mats.

Propagate (2793.) perennial herbs, if not done last month.

Transplant (2893.) any thing you have omitted in October.

Routine culture. All operations on the earth, except digging and trenching, must be performed only in fine dry weather. Dress artichoke and asparagus beds. Take up endive, broccoli, and cauliflowers, and lay them flat in dry ground, or in some of the ways described. (5151, &c.) Guard against the damping off of cauliflower plants, and weed all seedling crops. Dig, trench, and manure.

Take up all edible roots, which you intend to preserve, and remove them to the root-cellar.

Destroy (3086.) insects, and particularly snails, at this season.

Root-cellar. (2575.) Keep out the frost, if it sets in severe; and equally so water, from above or below.

Store or seed room. (2576.) Turn over edible roots kept in the dry, as the alluaceous tribe, and pick out decaying bulbs. See to your seeds.

Ice-house. (2891.) Fill the ice-house if the frost is sufficiently strong.

4. Hardy fruit department.

Plant (2893.) all sorts of fruit-trees, as directed for last month. Choose dry weather. Water to settle the earth. Stake where required, and mulch (2912.) both root and stem, where you wish the trees to do well. Mulching the stem is particularly useful for very tall standards, and especially for the pithy-wooded sorts.

Prune (2929.) the vine, and other very hardy fruit trees; the apricot, peach, and nectarine had better be deferred till spring.

Routine culture. Dig and dress wherever pruning admits; or where you have not been able to overtake the work last month.

Take (3117.) such apples as appear as dry remain on the trees during the first week; still then well in the fruit-room, and then barrel or jar up the long-keeping sorts for the cellar.

Fruit-room. (3120.) Examine such bunches of grapes, and branches of plums and currants, as you have hung up to preserve the fruit; and pick off all decaying berries. Look over all the other fruits, and attend to medlars, quinces, and service.

5. Culinary hot-house department.

Glass case without artificial heat. (3237.) Sow small salads and peas and beans, either to transplant or to remain after moving the frames. Transplant lettuces and cauliflowers from the frames to be covered with hand-glasses. Attend to air and removing decayed leaves.

Hotbeds and pits. (3238.) Sow small salads, force mint and other herbs. Try sowing of radishes on a moderate hotbed. Transplant lettuces from the cold-frames to force them forward. Begin to force asparagus six weeks before the expected demand. Build mushroom-beds; if under cover, it will be better.

Pinery. (3486.) Moderate every stimulus to vegetation; because, for the proper well-being of plants, it is requisite they should all go on in harmony. Heat, air, and water, art can supply; but light, in any thing like adequate quantities for vegetation, is beyond the power of man; therefore let your heat, air, and water, be in a proportion to your light.

Forcing-houses. Some begin this month; if so, begin the usual course. Dig and dress the borders; prune, train, paint, and cleanse the house, &c. if not done last month, which is much the best time. Set in strawberries. (5192.)

6. Flower garden. — Open-ground department.

Plant (2891.) dried roots of border-flowers.

Transplant (4114.) biennials at the beginning of the month, if the weather is very fine; but this work is better deferred till spring. (5672. and 5857.)

Protect (3084.) tender roots by litter, leaves, tan, ashes, or landing-up; trees by mats, or straw covered with mats or nets. Take care of seedlings.

Routine culture. Collect earths, composts, and manures; and, in general, finish digging among herbaceous flowers by the middle of the month. Asters and such like plants are often only checked in their growth and flowering by the frosts and rains; attend to them, as they are apt to be blown about and be disfigured at this season. In cutting them over after the ground is dug, choose a dry day, and obliterate the prints of your feet with a fork. Mow as occasion requires.

Store-room. (2576.) Look at such bulbs as you are keeping for spring planting.

Bees (2802.) See that these are properly protected by straw covers, or by being placed in the beehouse.

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. (2387.) Take care of alpine and the primula tribe. Also of the annuals and perennials intended for forcing. Guard against damps by admitting air; and to do this effectually, always remove the sashes in the daytime; or, if the frame, being in front of stoves, do not admit of this, tilt or elevate them in front, as high at least as the plane of the sun's rays at noon.

Beds and pits. (238.) Go on forcing in manner of flowering shrubs, bulbs, and perennial plants, and take in now and then a few pots of mignonette, to keep up a constant supply in full flower for the drawingroom. Blow Dutch roots in water-glasses as before.

Green-house. (5690.) Medium temperature, with fire-heat, 45°, maximum 44°. Water sparingly; give air as the weather will permit; and see to neatness. Take care to prevent mouldiness on the surface of the pots, and to remove all weeds and decayed leaves, these being highly injurious to the plants.

Dry stove. (5690.) Minimum temperature, with fire-heat, 45°, maximum 50°. Succulents require very little water at any time, but especially at this season.

Bark or moist stove. (6159.) Your medium temperature may now be 65°, or less, but never exceeding a minimum of 55°, and a maximum of 75°. Lessen water and air, as light and heat are lessened. See that bulbs receive proper treatment, as these will produce your finest spring flowers, especially the crinums and amaryllidæ.

8. Pleasure-ground and shrubbery.

Plant (2393.) deciduous trees, and shrubs of the hardier kind so long as the weather continues dry.

Prune and cut hedges. (6407.)

Protect delicate American trees, as magnolia, and shrubs not yet fully acclimated, as the Chinese rose. Roll, mow, and sweep turf. Attend to fallen leaves. (5693, and 5695.)

Turf may still be laid, but it is now too late to form or repair lawns by sowing grass-seed. (2915.)

Prepare for planting, by levelling, digging, trenching, &c. (6317. and 6387.)

9. Trees. — Nursery department.

Fruit-trees (4770.) Plant only in mild and rather dry weather; mulch, water to settle the earth about the roots, and stake as circumstances require. Forward delayed work as to fruit trees, for after the middle of the month it is better not to touch them till February.

Ornamental trees and shrubs. Complete what should have been done last month, as to planting, laying, taking off layers, &c. (2319.) Prune the more hardy sorts in the lines, and protect such as are tender, by the usual means.

Forest trees. Finish sowing the larger sorts before severe weather sets in. Complete all other nursery operations for the season, if possible. Pruning the plants in lines may be the last operation. Gather cones, acorns, mast, nuts, keys, and berries for immediate sowings, or the soft or rot-heap, according to their natures, and your skill and circumstances. (6491. 6496, &c.)

10. Trees. — Permanent plantations and park-scenery.

Plant in all temperate weather, and moderately dry situations. (6315.)

Thin, fell, and prune deciduous trees, as in last month. Cut, plash, and repair hedges; and more especially the hawthorn kind. (6427.)

Dead fences of every description, except mortar-walls, may now be attended to; but avoid building, in December and January, even the simplest wall. Frost is certain at this season, and its effects equally so.

Operate on ground, water, rocks, woods, and timber erections; but by no means on buildings where mortar is used.

DECEMBER.

Weather at	Average of the Thermometer.	Greatest Variation from the Average.	Average of the Barometer.	Quantity of Rain.	REMARKS.
London -	41 4	5	29 64	1.124 inch.	Winter month, &c. Cold, but dry. The gardener's operations are chiefly of the laborious kind; but the days are short and the nights long. In the last week the young gardener should examine himself as to his professional and intellectual progress during the bye-past year. If he contents himself with merely being equal to his fellows, he is lost; let him aspire at professional perfection, and high reputation among good and scientific men.
Edinburgh -	38 9		29 66	2.596	
Dublin -	36 34		29 723	2.916	

1. Kalendar of animated nature round London

The mole (*Talpa europæa*) throws up hillocks; the December moth (*Eriogaster pippuli* &c.) appears about the beginning, and the yellow-line quaker (*Nöctua flavilinea* Sam.) about the end, of the month.

2. Kalendar of vegetable nature round London.

Some of the last month's plants continue in flower, according to the weather.

3. Kitchen-garden. — Culinary vegetables.

Sow (4010.) peas and beans, and a few radishes (4012. and 4163.) as for last month. Choose the very mildest weather, and consider the final result as extremely uncertain.

Protect (3024.) beans sown thick for transplanting, and parsley intended for daily use, with fern; celery, with litter; any plants with litter which you have not been able to land up, as artichokes, asparagus.

To save seed. Transplant cabbages, if you have neglected it until so unfit a season.

Routine culture. Attend to this only in the best weather, and chiefly in the middle of the day. Earth up peas and beans, or cover their stems with ashes, sawdust, or old tan. Earth up celery when dry. Tie up any endive, cardoons, and white beet which has been neglected. Weed, but do not depend on the hoe, and only attempt to stir dry grounds; as stirring clayey lands at this season will do much more harm than good.

Take up edible roots and full-grown vegetables with esculent leaves, as the borecoles, and plant the latter in sand in an open shed for daily use.

Destroy (3096.) slugs, snails, mice, and other vermin.

Root-cellar, seed, and store-room. (2575. to 2576.) See that these, and what they contain, be kept in perfect order.

Ice-house. (2591.) Fill this, if not done last month.

4. Hardy fruit department.

Plant (2393.) the hardier trees, as the apple, pear, gooseberry, currant, &c. in mild weather.

Prune as directed for last month; but remit the operation in severe weather. (2323.) Partially unnailed or untie trained trees, and wash their boughs and shoots, as well as the walls and trellises, with any glutinous bitter fluid.

Routine culture. Trench, dig, and ridge up the

soil, but only in dry weather. Turn over composts, dung, and earth heaps. Prepare borders and orchards, &c., for planting in spring. Recruit exhausted soils by the application or partial substitution of such as is fresh and rich.

Destroy the larvæ of moths and every description of garden enemies, by the usual means. It is a great mistake to suppose that very cold winters destroy either the eggs of insects, or the seeds of weeds. When these are destroyed by natural causes, it is almost always by unseasonable weather; by the prolongation of the autumn into the winter, in consequence of the mildness of which eggs are hatched or seeds germinated, which, under seasonable weather, would have remained dormant till spring; or, in consequence of winter weather occurring after spring has commenced, and effecting the same destruction among young insects, as it does among young plants. If this effect take place with native plants, it is not to be wondered at that it should take double effect with exotics; and hence the great and incessant care required from the gardener.

Fruit-room. Look over the loose fruit every ten or twelve days.

Fruit-cellar. Keep this close to retain an even low temperature, never under 32° nor over 40° till May, the earliest period when it should be opened. (2575.) Many gardeners have no fruit cellar, and in that case one of the best modes of keeping the finer sorts of apples and pears, is to pack them in fern, in jars, or even in common flower-pots; and to place them in a chest or box of hay, or otherwise to envelope them either in that material, or in straw. The advantage of packing them in pots or jars is, that one jar or pot can be taken out at a time as wanted for use, without changing the temperature of those which remain. We have no doubt that ice put into jars might be preserved in a similar manner, and one jar at a time taken out as wanted, with much less loss than by the present mode of keeping it in ice-houses.

5. Culinary hot-house department.

Glass case without artificial heat. (2387.) Sow small salads, radishes, and lettuce; if the weather proves mild they may do some good. Weed, take off decayed leaves, and give abundance of air in dry weather. Protect in severe frosts, by mats or litter. *Hotbeds and pits.* (2388.) Begin to force asparagus, sow small salads, and transplant lettuce to be forced forward. Use the planter, in order that no check may be given, or any occasion for watering produced. Prepare cucumber-beds; or, if you have begun, see to them. Light is the grand thing to be attended to; for heat, air, water, and earth you can command at pleasure. Force mint, attend to mushroom and compost-making, procuring earth, manures, &c. Cover up at nights with all care; but avoid damps, by always giving a little air on fine days, and all night, when there is danger of steam of dung.

Pinery. (3408.) Keep a steady heat; but little air or water will be wanting, except to the kidneybeans and strawberries which you set in last month.

Forcing-houses. (3556.) Go on with the routine culture, for houses which you have begun to force; and dig and prepare the borders of the others, but it is too late for pruning or repairs.

6. Flower-garden. — Open-ground department.

Protect as directed for last month, and be liberal in the use of ashes, rotten tan, litter, &c., to the roots of the more tender plants; as to the beds of florists' bulbs, tender and half-hardy shrubs, as China roses, hydrangeas, &c., where such plants can be ventured in the borders.

Routine culture. Prepare composts, manures, and simple soils, and turn them over frequently. Much of the value of all composts and soils, at least for the florist, depends on their being sweet and mellow; which is only to be attained by time and frequent turnings. Attend to neatness in the application of litter, ashes, and other protecting materials.

Store-room. See that the frost is completely excluded. (2576.)

7. Flower-garden. — Hot-house department.

Glass case without artificial heat. (2387.) Attend

to alpine, and florists' flowers in frames; also to annuals, as directed for last month.

Hotbeds and pits. (2388.) Go on forcing shrubs and flowers, and blowing bulbs in water; renovate by linings, where necessary. If you have begun in October to force roses, you will have them as well as bulbs in blow by the middle of the month. See to bulbs in water-glasses, and take care to keep up a succession of roses, bulbs, and most popular forcing-flowers and shrubs. (5667, to 5666.)

Green-house. (5690.) Minimum temperature 42°; maximum 44°, with fire-heat. Water sparingly; give air freely in good weather, and remove decayed leaves as they appear.

Dry stove. (5624.) Minimum temperature for this month 45°; maximum, with fire heat, 50°. The more severe the weather out of doors, give less water within; but give air freely in fine weather.

Bark or moist stove. (6158.) Keep a medium heat of 50°, or 58°, and lessen water and air. Attend to routine culture; but the grand thing at this season is, to keep the fire-heat as regular as possible; for the ratio of increase of heat from flues, after they are heated to a certain extent, is such as often to overheat the house, and scorch or desiccate the plants; and hence, in our opinion, one of the many advantages of adopting steam, or hot water, by which the pipes can never be heated much above 340°.

8. Pleasure-ground and shrubbery.

Plant as in last month. (2691.)

Prune (2924.) in fine weather.

Protect as before. (3024.)

Routine culture. Rake up leaves, and sweep them from the lawns and gravel. Repair walks, and roll them; see that water stand on no part of their surface.

Lay down turf, if you cannot help it; but this is not a good season; September and March are the best. (2915.)

Prepare for planting by trenching, digging, &c. (2676.) Rods and poles for tying up plants and for twiners, spray or sticks for sticking climbers, as the sweet-pea, &c. (2871.)

9. Trees. — Nursery department.

Fruit trees. (2770.) Complete neglected work as far as weather will permit; but if the season is severe, defer it till February. Prepare tallies, &c.

Ornamental trees and shrubs. (6023 and 6227.) Finish delayed work, and attend to protecting tender sorts. See to the seeds in store, and prune only in very fine weather. Prepare tallies, labels, sticks, stakes, poles, rods, spray, froms, and other materials of culture and management. Collect composts, earths, and manures, and turn over those you have got, so as the frost may thoroughly penetrate them.

Forest trees. (6491.) Attend to the rot-benz, seed-loft, and compost-ground; and plant, or take up, or prune only in fine weather: much depends on the season, and other circumstances.

10. Trees. — Permanent plantations and park-scenery.

Plant (6315.) only in fine weather, unless thorn-hedges, or large trees of common sorts, with balls of earth.

Pell and prune (6465 and 6484.) where the trees are not for transplanting, nor of the harking sorts.

Thin out coppice-wood for poles, stakes, &c. (6425.)

Prepare for planting by the usual processes, and by fencing and draining. (6316 and 6390.)

Operate on ground and rocks, but not on buildings.

11. Hedges in gardens, park scenery, or plantations.

All deciduous hedges may be pruned and repaired during this and the preceding and following months. They ought always to be moulded into such a form that the base should be several inches wider than the top; otherwise they are certain to become naked below. A hedge six feet high may be two feet wide at the base, and one foot at the top. Hedges should never be clipped, but always cut with the hedge bill; unless we except hedges of privet, furze, and the like, but even in these cases the cutting shears (Ag. 381. or 376.) should be used, and not common shears, which bruise off the shoots, instead of cutting them.

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THE END.

ERRATA AND ADDITIONS.

- "Woods," should be substituted for "Wood," wherever the name occurs in PART I. BOOK I.
- In p. 7. line 1. *after* "sycamore," *insert* "fig, Pharaoh's fig tree (*St. John's Egypt*, vol. I. p. 76.), or fig mulberry (*Ficus Sycamorus L.*)"
- In p. 23. § 74. *for* "Casta," *read* "Castor;" and *for* "Dejolanus," *read* "Dejotanus."
- In p. 24. § 81. *delete* the comma between the words "beech" and "mast."
- In p. 28. § 110. *for* "beginning of the 14th century," *read* "about 1471."
- In p. 45. § 175. *after* "*Chiolo*," *insert* "*of Naples*."
- In p. 68. § 272. *for* "physician," *read* "botanist."
- In p. 73. § 281. *for* "*Celtis cordata*," *read* "*Celtis occidentalis var. cordata*."
- In p. 75. § 292. *for* "although not mentioned either by Van Oosten or by Commelyn," *read* "and though not mentioned by Van Oosten, it is figured by Commelyn in his *Horti Medici Amstelodamensis*, &c. p. 109. tab. 57."
- In p. 80. § 310. *for* "*Hortus Amstelodamus*," *read* "*Horti Medici Amstelodamensis*, &c."
- In p. 81. § 318. *for* "*St. Germain en Laye*," *read* "*St. Cloud*."
- In p. 102. *after* No. "65," *add* "Since 1832, this garden has been in a great measure destroyed."
- In p. 118. *for* line 8. *substitute* "M. Foulchiron's palms were sold to the Berlin Botanic Garden in 1830."
- In p. 124. § 453. *for* the last line *substitute* "M. Cels died, and his plants were sold and dispersed, in 1832."
- In p. 125. § 463. *for* "Messrs. Simon, frères," *substitute* "M. Gabriel Simon."
- In p. 138. line 42. *for* "grown," *read* "drawn."
- In p. 138. line 8. *after* "M. Rauch," *insert* "whose son Charles is."
- In p. 155. in § 560. *for* "is," *read* "was;" and *for* the last seven words *substitute* "but is now in gravel." *For* § 551. *substitute* "The Chinese Tower, the Paradise, Tiroll, and Kleinkeckeloh, are parts of the English garden at Munich; and Biederstein, the summer seat of the queen dowager, is also within its precincts."
- In p. 165. line 8. from the bottom, *for* "fig. 120." *read* "fig. 119."
- In p. 185. § 615. line 9. from the bottom, *for* "by M. Arnold," &c. *substitute* "by him, as we were told, when we visited them," &c.
- In p. 195. line 3. from the bottom, *for* "This garden," &c., *substitute* "This garden was designed and chiefly laid out by M. Zeyer of Schwesingen; and it does him the highest honour. It was planted by M. Rins, nurseryman at Frankfurt, whose son, M. Jacob Rins, &c."
- In p. 206. line 41. *for* "present," *read* "late."
- In p. 212. § 707. *for* "Prince," *read* "Fürst."
- In p. 308. § 1102. *for* "Cullen," *read* "Cullum."
- In p. 320. § 1159. *omit* the comma between the words "hemlock" and "spruce."
- In p. 328. § 1174. *after* the name of "Pope," *insert* that of "Thomson."
- In p. 332. line 5. *for* "251," *read* "231."
- In p. 334. line 21. *for* "143," *read* "225."
- In p. 350. § 1240. *for* "*Phil. Trans.*, vol. xl," *read* "vol. xlvi."
- In p. 351. § 1251. *after* "Dr. Uvedale's at Enfield," *insert* "Dr. Sherard's at Etham."
- In p. 351. § 1255. *for* "1751," *read* "1748."
- In p. 383. § 1419. *for* "1700," *read* "1696."
- In p. 388. § 1421. *for* "Lord Walpole," *read* "Horace Walpole."
- In p. 518. § 2107. *for* "297," *read* "239," and *for* "239," *read* "300."
- In p. 555. § 2326. *for* "505," *read* "508."
- In p. 625. § 2694. *for* "297," *read* "230."
- In p. 683. last line but one, *for* "Centronus," *read* "Centrotus."
- In p. 860. § 4407. *for* "first two sorts," *read* "Italian variety is."

